# FINAL ENVIRONMENTAL ASSESSMENT

# West Corporate Development and East Parcel Development

Manassas Regional Airport

Volume II of II

Prepared for

City of Manassas

And

U.S. Department of Transportation Federal Aviation Administration

As lead Federal Agency pursuant to the National Environmental Policy Act of 1969

Prepared by:

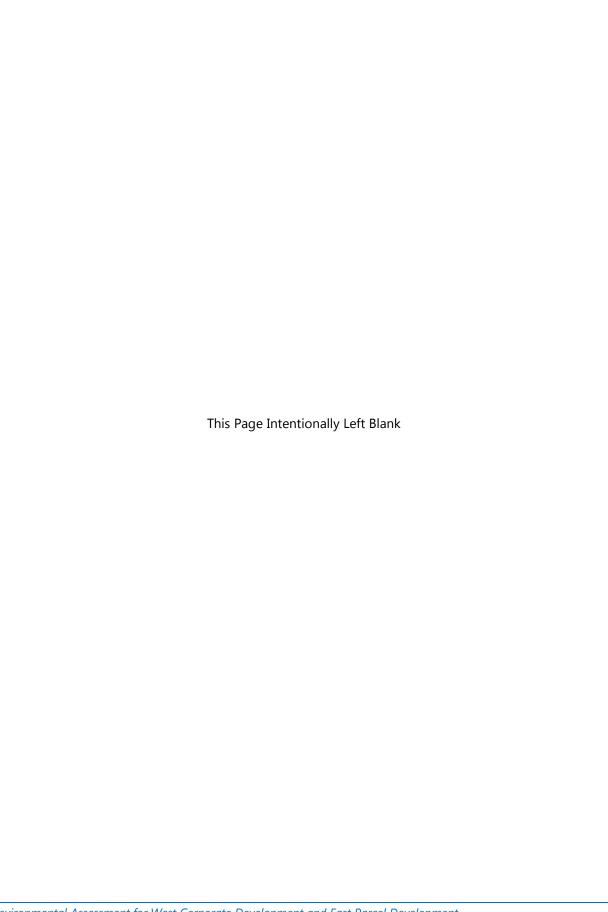
RS&H

### March 2018

and dated by the Responsible Federal Official.	orandatou, orginou
Responsible Federal Official	Date

This Environmental Assessment becomes a Federal document when evaluated signed







[DATE]

<CONTACT NAME>
1234 Your Street, Suite ABC
City, State 12345

RE: Early National Environmental Policy Act (NEPA) Coordination
Environmental Assessment for Corporate Development at Manassas Regional Airport
Manassas. VA

Dear < Mr./Ms. CONTACT LAST NAME>,

The City of Manassas (City) proposes to redevelop the west side corporate area and a parcel on the east side of the Manassas Regional Airport (Airport). The City will request the Federal Aviation Administration's (FAA) unconditional approval of the projects as shown on the Airport's conditionally approved Airport Layout Plan. This request is a Federal action, and through the requirement for the City to meet FAA grant assurances, RS&H, Inc. will prepare a National Environmental Policy Act (NEPA) Environmental Assessment (EA) for the Proposed Project. The EA will assess the following development projects and actions associated with those projects (e.g., clearing and grading activities, staging areas):

- » On-Airport roadway improvements;
- » Maintenance and storage building construction;
- » West aircraft apron expansion;
- » Taxilane extension;
- » Fixed base operator building and parking lot reconstruction;
- » T-hangars demolition/replacement and construction and T-hangar parking lot;
- » Apron taxilane tie down parking expansion;
- » Corporate hangar and parking lot construction; and
- » Wash rack construction.

The Airport and project are located in the City of Manassas and Prince William County, Virginia. The project study areas for this EA are on the west and east side of the Airport property and encompass all of the development actions and associated actions for the Proposed Project. Enclosed Figures 1 through 4 show the Airport location and project study areas.



In accordance with the NEPA and FAA Orders 1050.1F, *Policies and Procedures for Considering Environmental Impacts* and 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions of Airport Actions*, the EA will analyze the potential environmental effects of the Proposed Project. As part of the EA process, various field surveys will be conducted. These include a threatened and endangered species survey, floodplain analysis, hazardous materials survey, Phase I archaeological survey, and wetland delineation (including a jurisdictional determination).

On behalf of the City, we are sending you this early notification letter to:

- 1. Advise your agency of the preparation of the EA;
- 2. Request any relevant information that your agency may have regarding the project site or environs; and
- 3. Solicit early comments regarding potential environmental, social, and economic issues for consideration during the preparation of the EA.

You may send any information and comments to me via email at <u>David.Alberts@rsandh.com</u> or to the address provided at the top of this letter. We would appreciate your prompt response within 30 days.

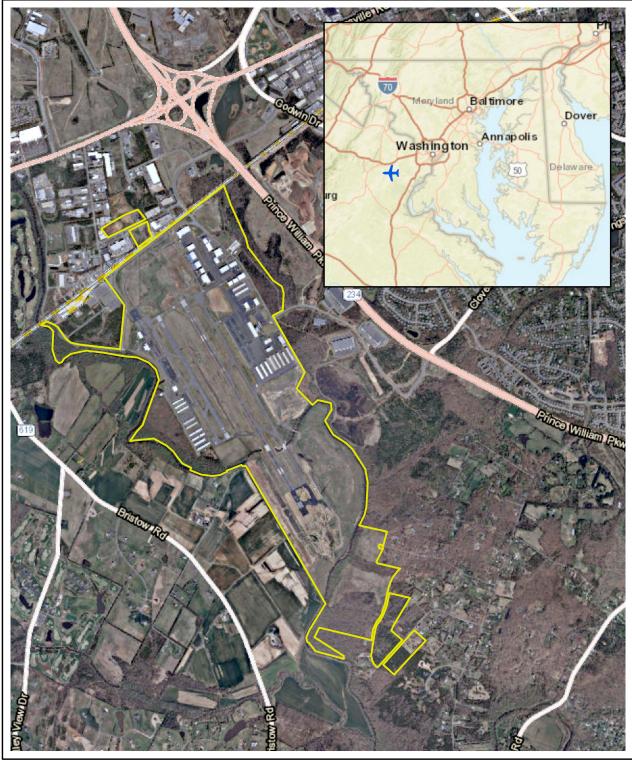
On behalf of the City, we would like to thank you for your interest in this project and look forward to working with you as we prepare the EA. If you have any questions or need additional information regarding Proposed Project or EA, please do not hesitate to contact me at (904) 256-2469.

Sincerely,

David Alberts Project Manager RS&H, Inc.

#### Attachments

cc: Jolene Berry, Manassas Regional Airport
Susan Stafford, Federal Aviation Administration
Susan Simmers, Virginia Department of Aviation
Alan McDonald, RS&H
Project File



Sources: Esri, 2016; RS&H, 2016

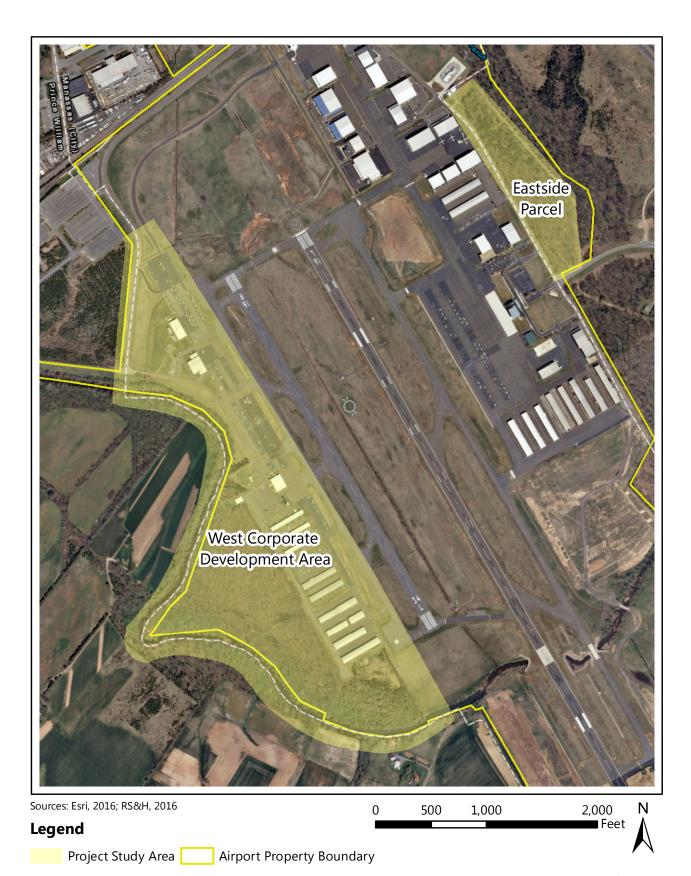
This figure is for graphic purposes only and is not to scale.  $\,\,$ 

#### Legend

← Manassas Regional Airport Airport Property Boundary









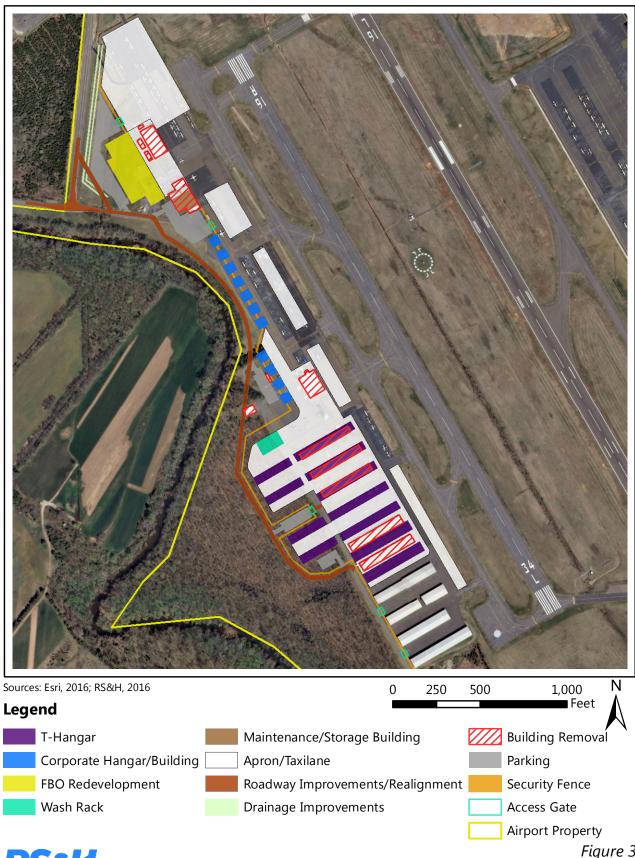
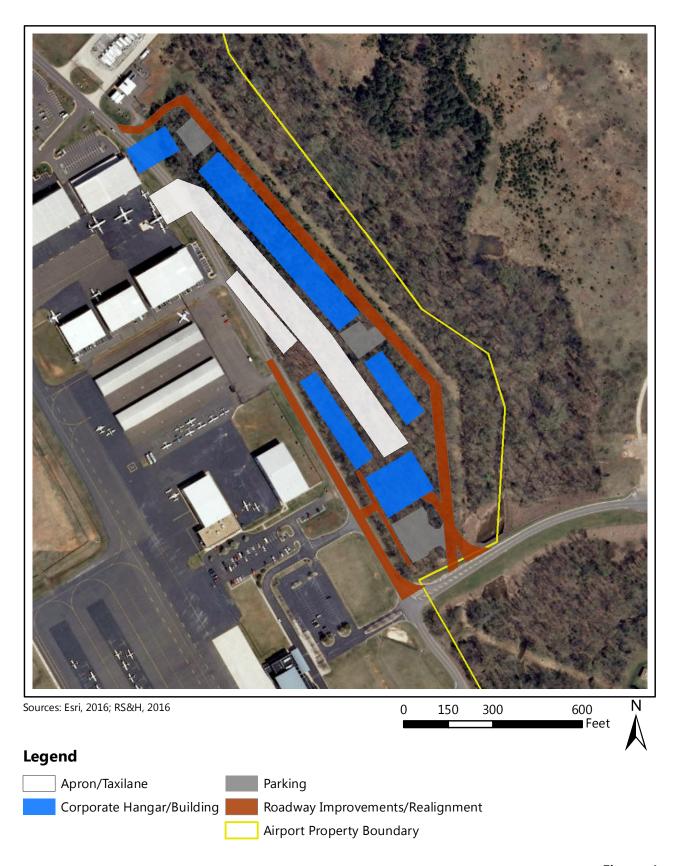




Figure 3
West Corporate Development Area





#### **Early Coordination Mailing List**

#### **FEDERAL AGENCIES**

**USEPA** 

Mr. John "Randy" Pomponio, Director

Environmental Assessment and Innovation Division

USEPA Region 3 1650 Arch Street

Philadelphia, PA 19103

**FEMA** 

Ms. Amanda Ciampolillo

**Environment & Historic Preservation Contact** 

FEMA Region III

615 Chestnut Street

One Independence Mall, Sixth Floor

Philadelphia, PA 19106

Amanda.Ciampolillo@dhs.gov

DOI

Ms. Lindy Nelson

Regional Environmental Protection Specialist
Office of Environmental Policy and Compliance

U.S. Department of the Interior

1760 Market Street

Suite 500

Philadelphia, PA 19103

Lindy Nelson@ios.doi.gov

**USDA** 

Mr. John A. Bricker

State Conservationist

Virginia State Conservationist's Office

Natural Resources Conservation Service

1606 Santa Rosa Road, Suite 209

Richmond, VA 23229

<u>Jack.Bricker@va.usda.gov</u>

**USACE** 

Ms. Lynette Rhodes

Chief, Southern Section

United States Army Corps of Engineers

803 Front Street

Norfolk, VA 23510

(757) 201-7727

**NOAA-NMFS** 

Ms. Jennifer Anderson, NEPA Coordinator

Greater Atlantic Region Office

National Marine Fisheries Service

National Oceanic and Atmospheric Administration

55 Great Republic Drive

Gloucester, MA 01930

<u>USFWS</u>

Attn: NEPA Coordination

USFWS Virginia Field Office

6669 Short Lane

Gloucester, VA 23061

**STATE AGENCIES** 

**VDEQ** 

Ms. Valerie Fulcher

Office of Environmental Impact Review

Virginia Department of Environmental Quality

629 East Main Street, 6th Floor

Richmond, VA 23219

**VDHR** 

Mr. Roger Kirchen

Director

Division of Review and Compliance

Virginia Department of Historic Resources

2801 Kensington Avenue

Richmond, VA 23221

#### <u>Virginia Department of Game and Inland Fisheries</u>

Mr. Ray Fernald, Manager Environmental Services Section Virginia Department of Game and Inland Fisheries P.O. Box 90778 Henrico, VA 23228

#### Virginia Department of Conservation and Recreation

Ms. Roberta Rhur Planning and Recreation Virginia Department of Conservation and Recreation 600 East Main Street, 24<sup>th</sup> Floor Richmond, VA 23219

#### Virginia Department of Health

Attn: NEPA Coordination Environmental Health Services Virginia Department of Heath 109 Governor Street, 5<sup>th</sup> Floor Richmond, VA 23219

#### Virginia Department of Aviation

Ms. Susan Simmers
Airport Services Division
Virginia Department of Aviation
5702 Gulfstream Road
Richmond, VA 23250

#### Virginia Department of Transportation

Ms. Renée Hamilton Northern Virginia District Virginia Department of Transportation 4975 Alliance Drive Fairfax, VA 22030

#### **LOCAL AGENCIES**

#### City of Manassas

Mr. Matthew Arcieri, AICP, Manager Planning and Zoning Services City of Manassas 9027 Center St., Room 202 Manassas, VA 20110

#### City of Manassas

Ms. Michelle Brickner, P.E., C.B.O. Engineering Department City of Manassas 8500 Public Works Drive Manassas, VA 201110

#### **Prince William County**

Mr. Chris Price, Director
Planning Division
Prince William County
5 County Complex Court, Suite 210
Prince William, VA 22192



### COMMONWEALTH of VIRGINIA

Molly J. Ward Secretary of Natural Resources

# Department of Game and Inland Fisheries October 27, 2016

**Bob Duncan** *Executive Director* 

Mr. David Alberts RS&H, Inc. 10748 Deerwood Park Boulevard S Jacksonville, FL 32256

Re: Request for Determination of Impact upon Wildlife Resources: Corporate Development at Manassas Regional Airport

Dear Mr. Alberts:

We appreciate that you submitted your project(s) for review by VDGIF to ensure the protection of sensitive wildlife resources during project development. Due to current staffing limitations within our Fish and Wildlife Information Services (FWIS) and Environmental Services sections, we are unable to review and provide comments on projects that are not currently involved in one of the regulatory review processes for which we are a consultatory agency (see <a href="http://www.dgif.virginia.gov/environmental-programs/environmental-services-section.asp">http://www.dgif.virginia.gov/environmental-programs/environmental-services-section.asp</a>). Please note that no response from VDGIF does not constitute "no comment" nor does it imply support of the project or associated activities. It simply means VDGIF has not been able to respond to your request.

To assist you in determining which, if any, wildlife resources under our jurisdiction, including threatened and endangered wildlife, may be present on or near your project site, we recommend that you access the Virginia Fish and Wildlife Information System (VAFWIS) at <a href="http://vafwis.org/fwis/">http://vafwis.org/fwis/</a>.

If you should have further questions or need additional information about VDGIF's Environmental Programs, please visit: http://www.dgif.virginia.gov/environmental-programs/.

Please feel free to attach a copy of this correspondence and any reports from VAFWIS with your project paper work to document your correspondence with us regarding this project.

Thank you,

Shirl Dressler, Program Support Technician

Environmental Services Admin.



# United States Department of the Interior



#### FISH AND WILDLIFE SERVICE

Virginia Field Office 6669 Short Lane Gloucester, VA 23061

October 30, 2015

#### Greetings:

Due to increased workload and refinement of our priorities in Virginia, this office will no longer provide individual responses to requests for environmental reviews. However, we want to ensure that U.S. Fish and Wildlife Service trust resources continue to be conserved. When that is not possible, we want to ensure that impacts to these important natural resources are minimized and appropriate permits are applied for and received. We have developed a website that provides the steps and information necessary to allow any individual or entity requiring review/approval of their project to complete a review and come to the appropriate conclusion. This site can be accessed at: <a href="http://www.fws.gov/northeast/virginiafield/endangered/projectreviews.html">http://www.fws.gov/northeast/virginiafield/endangered/projectreviews.html</a>.

The website is frequently updated to provide new species/trust resource information and methods to review projects. Refer to the website for each project review to ensure that current information and methods are utilized.

If you have any questions about project reviews or need assistance, please contact Troy Andersen of this office at (804) 824-2428 or troy\_andersen@fws.gov.

Sincerely,

Cindy Schulz Field Supervisor Virginia Ecological Services

#### Alberts, David

From: Rhur, Robbie (DCR) < Robbie.Rhur@dcr.virginia.gov>

Sent: Monday, October 31, 2016 2:04 PM

To:Alberts, DavidSubject:Manassas Airport

#### Afternoon David:

I received your letter requesting review for the above mentioned airport. While DCR's Division of Planning and Recreation has no comment; I recommend you submit the review to the Division of Natural Heritage, it can be done electronically on our web site.

I also suggest for future review requests, email them to me, it really helps expedite the process.

Thank you for the opportunity to comment.

Robbie Rhur Environmental Review Coordinator/DCR 600 E Main Street 17th Floor Richmond VA 23219 804-371-2594



# 

#### **DEPARTMENT OF TRANSPORTATION**

CHARLES A. KILPATRICK, P.E.

4975 Alliance Drive Fairfax, VA 22030

November 9, 2016

Mr. David Alberts
Project Manager
RS & H
10748 Deerwood Park Boulevard, South
Jacksonville, Florida 32256



Re: Early National Environmental Policy Act (NEPA) Coordination, Environmental Assessment for Corporate Development of Manassas Regional Airport, Manassas, Virginia

Dear Mr. Alberts:

The Virginia Department of Transportation (VDOT) is in receipt of your early notification letter dated October 26, 2016 requesting information and comments that may be pertinent to your preparation of the Environmental Assessment (EA).

The following highway improvement projects have been completed or are underway for Route 28:

- VDOT Project Number 0028-076-982: Widening Route 28 to 6 lanes between Fitzwater Drive (Route 652) and Linton Hall Road (Route 619) and relocation of Vint Hill Road (Route 215) to align with Infantry Lane. Project administered by Prince William County and will be constructed in 2 phases. Phase 1 from Infantry Lane to Linton Hall Road is currently under construction and will be completed by the end of this year. Phase 2 from Infantry Lane to Fitzwater Drive will be advertised the end of this year and construction is anticipated to begin in Spring of 2017.
- VDOT Project Number 0028-076-111: Widening of Route 28 to 6 lanes from Linton Hall Road to Pennsylvania Avenue. Prince William County will be funding and administering this project which will be advertised through design-build procurement. Construction of this project is anticipated to begin Spring 2017.

Mr. David Alberts November 9, 2016 Page Two

County's real estate database is 7694-76-3569 and the address is 10151 Harry J. Parrish Boulevard.

In accordance with the Code of Virginia §10.1-1183, the Virginia Department of Environmental Quality (DEQ) coordinates the Commonwealth's review of National Environmental Policy Act documents. When the EA is available for review and comment, it should be sent to DEQ at: Post Office Box 1105, Richmond, Virginia 23210.

If your field survey crews or contractors require access on VDOT's right-of-way or property, please contact Mr. Art Kloss at our Prince William County Land Use Permit Office at (703)-366-2004 or via email <u>A.Klos@VDOT.Virginia.gov</u>.

Sincerely,

Renée N. Hamilton

Deputy District Administrator

cc:

Richard (Dic) Burke

Nicholas Roper, P.E.

Helen Cuervo

John C. Muse

Art Klos

#### Alberts, David

From: ImpactReview <impactreview@vofonline.org>
Sent: Thursday, November 10, 2016 3:06 PM
To: Sullivan, Bettina (DEQ); Alberts, David

**Subject:** RE: SCOPING REQUEST Corporate Development at Manassas Regional Airport,

Manassas, VA

Ms. Sullivan and Mr. Alberts,

The Virginia Outdoors Foundation has reviewed the project referenced above. As of 10 November 2016, there are not any existing nor proposed VOF open-space easements within the immediate vicinity of the project.

Please contact VOF again for further review if the project area changes or if this project does not begin within 24 months. Thank you for considering conservation easements.

Thanks, Mike

Mike Hallock-Solomon, AICP Virginia Outdoors Foundation

From: Sullivan, Bettina (DEQ) [mailto:Bettina.Sullivan@deq.virginia.gov]

Sent: Thursday, November 10, 2016 11:34 AM

To: dgif-ESS Projects (DGIF) <rr.dgif-ESSProjects@dgif.virginia.gov>; Tignor, Keith (VDACS)

< Keith. Tignor@vdacs.virginia.gov>; Rhur, Robbie (DCR) < Robbie. Rhur@dcr.virginia.gov>; odwreview (VDH) < odwreview

VDH@cov.virginia.gov>; Gavan, Larry (DEQ) <Larry.Gavan@deq.virginia.gov>; Sepety, Holly (DEQ)

<Holly.Sepety@deq.virginia.gov>; Dacey, Katy (DEQ) <Katy.Dacey@deq.virginia.gov>; Narasimhan, Kotur (DEQ)

<Kotur.Narasimhan@deq.virginia.gov>; Harlow, Kevin (DEQ) <Kevin.Harlow@deq.virginia.gov>; Evans, Gregory (DOF)

<Gregory.Evans@dof.virginia.gov>; Cromwell, James R. (VDOT) <James.Cromwell@VDOT.Virginia.gov>; Jordan, Elizabeth
(VDOT) <Elizabeth.Jordan@VDOT.Virginia.gov>; ImpactReview <impactreview@vofonline.org>; gmg@novaregion.org;
citymanager@ci.manassas.va.us; jspatton@pwcgov.org

Cc: david.alberts@rsandh.com

Subject: RE: SCOPING REQUEST Corporate Development at Manassas Regional Airport, Manassas, VA

Good afternoon—attached is a request for scoping comments on the following:

Corporate Development at Manassas Regional Airport, Manassas, Virginia.

If you choose to make comments, please send them directly to the project sponsor (<a href="mailto:david.alberts@rsandh.com">david.alberts@rsandh.com</a>) and copy the DEQ Office of Environmental Impact Review:

<a href="mailto:http://www.deq.virginia.gov/Programs/EnvironmentalImpactReview/DocumentSubmissions.aspx">http://www.deq.virginia.gov/Programs/EnvironmentalImpactReview/DocumentSubmissions.aspx</a>. We will coordinate a review when the environmental document is completed.

DEQ-OEIR's scoping response is also attached.

If you have any questions regarding this request, please email our office at eir@deq.virginia.gov.

Bettina Sullivan

Manager

Environmental Impact Review and Long Range Priorities Program

Department of Environmental Quality

629 E. Main Street, Richmond, VA 23219

Mailing address: P. O. Box 1105, Richmond, VA 23218

804.698.4204

www.deq.virginia.gov

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DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 629 East Main Street, Richmond, Virginia 23219

Mailing address: P.O. Box 1105, Richmond, Virginia 23218

www.deq.virginia.gov

David K. Paylor Director

(804) 698-4000 1-800-592-5482

November 10, 2016

David Alberts RS&H 10748 Deerwood Park Boulevard S Jacksonville, Florida 32256

Molly Joseph Ward

Secretary of Natural Resources

RE: Scoping Response, Commercial Developmnet at Manassas Regional Airport, Manassas, Virginia

Dear Mr. Alberts:

This letter is in response to the scoping request for the above-referenced project.

As you may know, the Department of Environmental Quality, through its Office of Environmental Impact Review (DEQ-OEIR), is responsible for coordinating Virginia's review of federal environmental documents prepared pursuant to the National Environmental Policy Act (NEPA) and responding to appropriate federal officials on behalf of the Commonwealth.

#### **DOCUMENT SUBMISSIONS**

In order to ensure an effective coordinated review of the NEPA document, notification of the NEPA document and federal consistency documentation should be sent directly to OEIR. We request that you submit one electronic to <a href="eir@deq.virginia.gov">eir@deq.virginia.gov</a> (10 MB maximum) or make the documents available for download at a website, file transfer protocol (ftp) site or the VITAShare file transfer system (<a href="https://vitashare.vita.virginia.gov">https://vitashare.vita.virginia.gov</a>).

The NEPA document and the federal consistency documentation (if applicable) should include U.S. Geological Survey topographic maps as part of their information. We strongly encourage you to issue shape files with the NEPA document. In addition, project details should be adequately described for the benefit of the reviewers.

# ENVIRONMENTAL REVIEW UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT: PROJECT SCOPING AND AGENCY INVOLVEMENT

As you may know, NEPA (PL 91-190, 1969) and its implementing regulations (Title 40, *Code of Federal Regulations*, Parts 1500-1508) requires a draft and final Environmental Impact Statement (EIS) for federal activities or undertakings that are federally licensed or federally funded which will or may give rise to significant impacts upon the human environment. An EIS carries more stringent public participation requirements than an Environmental Assessment (EA) and provides more time and detail for comments and public decision-making. The possibility that an EIS may be required for the proposed

project should not be overlooked in your planning for this project. Accordingly, we refer to "NEPA document" in the remainder of this letter.

While this Office does not participate in scoping efforts beyond the advice given herein, other agencies are free to provide scoping comments concerning the preparation of the NEPA document. Accordingly, we are providing notice of your scoping request to several state agencies and those localities and Planning District Commissions, including but not limited to:

Department of Environmental Quality:

- o DEQ Regional Office
- o Air Division
- o Office of Wetlands and Stream Protection
- o Office of Local Government Programs
- o Division of Land Protection and Revitalization
- o Office of Stormwater Management

Department of Conservation and Recreation

Department of Health

Department of Agriculture and Consumer Services

Department of Game and Inland Fisheries

Virginia Marine Resources Commission

Department of Historic Resources

Department of Mines, Minerals, and Energy

Department of Forestry

Department of Transportation

#### **DATA BASE ASSISTANCE**

Below is a list of databases that may assist you in the preparation of a NEPA document:

• DEQ Online Database: Virginia Environmental Geographic Information Systems

Information on Permitted Solid Waste Management Facilities, Impaired Waters, Petroleum Releases, Registered Petroleum Facilities, Permitted Discharge (Virginia Pollution Discharge Elimination System Permits) Facilities, Resource Conservation and Recovery Act (RCRA) Sites, Water Monitoring Stations, National Wetlands Inventory:

- o <u>www.deq.virginia.gov/ConnectWithDEQ/VEGIS.aspx</u>
- DEQ Virginia Coastal Geospatial and Educational Mapping System (GEMS)

Virginia's coastal resource data and maps; coastal laws and policies; facts on coastal resource values; and direct links to collaborating agencies responsible for current data:

- o http://128.172.160.131/gems2/
- DHR Data Sharing System

Survey records in the DHR inventory:

- o www.dhr.virginia.gov/archives/data sharing sys.htm
- DCR Natural Heritage Search

Produces lists of resources that occur in specific counties, watersheds or physiographic regions:

- o www.dcr.virginia.gov/natural heritage/dbsearchtool.shtml
- DGIF Fish and Wildlife Information Service

Information about Virginia's Wildlife resources:

- o http://vafwis.org/fwis/
- Environmental Protection Agency (EPA) Comprehensive Environmental Response,
   Compensation, and Liability Information System (CERCLIS) Database: Superfund Information Systems

Information on hazardous waste sites, potentially hazardous waste sites and remedial activities across the nation, including sites that are on the National Priorities List (NPL) or being considered for the NPL:

- o www.epa.gov/superfund/sites/cursites/index.htm
- EPA RCRAInfo Search

Information on hazardous waste facilities:

- o <u>www.epa.gov/enviro/facts/rcrainfo/search.html</u>
- EPA Envirofacts Database

EPA Environmental Information, including EPA-Regulated Facilities and Toxics Release Inventory Reports:

- o www.epa.gov/enviro/index.html
- EPA NEPAssist Database

Facilitates the environmental review process and project planning: <a href="http://nepaassisttool.epa.gov/nepaassist/entry.aspx">http://nepaassisttool.epa.gov/nepaassist/entry.aspx</a>

If you have questions about the environmental review process and/or the federal consistency review process, please feel free to contact me (telephone (804) 698-4204 or e-mail bettina.sullivan@deq.virginia.gov).

I hope this information is helpful to you.

Sincerely,

Bettina Sullivan, Program Manager Environmental Impact Review and Long-Range Priorities

Bethra Sulliva

#### Alberts, David

From: Sullivan, Bettina (DEQ) < Bettina.Sullivan@deq.virginia.gov>

Sent: Monday, November 14, 2016 1:51 PM

**To:** Alberts, David

**Subject:** FW: SCOPING REQUEST Corporate Development at Manassas Regional Airport,

Manassas, VA

Bettina Sullivan

Manager

Environmental Impact Review and Long Range Priorities Program

Department of Environmental Quality 629 E. Main Street, Richmond, VA 23219

Mailing address: P. O. Box 1105, Richmond, VA 23218

804.698.4204

www.deq.virginia.gov

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From: Warren, Arlene (VDH)

Sent: Monday, November 14, 2016 1:49 PM

**To:** Sullivan, Bettina (DEQ)

Subject: RE: SCOPING REQUEST Corporate Development at Manassas Regional Airport, Manassas, VA

Project Name: Corporate Development at Manassas Regional Airport

Project #: N/A UPC #: N/A

Location: Manassas, Virginia

VDH – Office of Drinking Water has reviewed the above project. Below are our comments as they relate to proximity to **public drinking water sources** (groundwater wells, springs and surface water intakes). Potential impacts to public water distribution systems or sanitary sewage collection systems **must be verified by the local utility.** 

#### The following public groundwater wells are located within a 1 mile radius of the project site:

PWS ID Number	City/County	System Name	Facility Name
	ν	BROAD RUN GOLF	WELL
6153041	PRINCE WILLIAM	BRISTOW MANOR GOLF CLUB	WELL

There are no surface water intakes located within a 5 mile radius of the project site.

The project is within the watershed of the following public surface water sources:

PWS ID		
Number	System Name	Facility Name
6059501	FAIRFAX CO WATER AUTHORITY	OCCOQUAN RESERVIOR INTK

Best Management Practices should be employed on the project site including Erosion & Sedimentation Controls as well as Spill Prevention Controls & Countermeasures.

There may be impacts to public drinking water sources due to this project if the mitigation efforts outlined above are not implemented.

Best regards,

Arlene Fields Warren
Virginia Department of Health,
Office of Drinking Water
James Madison Building
109 Governor St,
Richmond, VA 23219
804.864.7781

From: Sullivan, Bettina (DEQ)

Sent: Thursday, November 10, 2016 11:34 AM

**To:** dgif-ESS Projects (DGIF); Tignor, Keith (VDACS); Rhur, Robbie (DCR); odwreview (VDH); Gavan, Larry (DEQ); Sepety, Holly (DEQ); Dacey, Katy (DEQ); Narasimhan, Kotur (DEQ); Harlow, Kevin (DEQ); Evans, Gregory (DOF); Cromwell, James R. (VDOT); Jordan, Elizabeth (VDOT); <a href="mailto:impactreview@vofonline.org">impactreview@vofonline.org</a>; <a href="mailto:gmanassas.va.us">gmg@novaregion.org</a>; <a href="mailto:citymanassas.va.us">citymanassas.va.us</a>; <a href="mailto:jspatton@pwcgov.org">jspatton@pwcgov.org</a>

Cc: david.alberts@rsandh.com

Subject: RE: SCOPING REQUEST Corporate Development at Manassas Regional Airport, Manassas, VA

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<a href="mailto:http://www.deq.virginia.gov/Programs/EnvironmentalImpactReview/DocumentSubmissions.aspx">http://www.deq.virginia.gov/Programs/EnvironmentalImpactReview/DocumentSubmissions.aspx</a>. We will coordinate a review when the environmental document is completed.

DEQ-OEIR's scoping response is also attached.

If you have any questions regarding this request, please email our office at eir@deq.virginia.gov.

Bettina Sullivan

Manager

Environmental Impact Review and Long Range Priorities Program Department of Environmental Quality 629 E. Main Street, Richmond, VA 23219 Mailing address: P. O. Box 1105, Richmond, VA 23218

804.698.4204

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# COMMONWEALTH of VIRGINIA

#### **DEPARTMENT OF TRANSPORTATION**

CHARLES A. KILPATRICK, P.E. COMMISSIONER

4975 Alliance Drive Fairfax, VA 22030

November 15, 2016

#### **MEMORANDUM**

TO:

Mr. David Alberts, Project Manager

FROM:

Nina Andrews, Executive Assistant

**SUBJECT:** Amendment to Previous Letter in Reference to Early National Environmental Policy Act (NEPA) Coordination, Environmental Assessment for Corporate Development of Manassas Regional Airport, Manassas, Virginia

Please see the amended letter attached; page two was missing bulleted points from the original letter mailed on November 9<sup>th</sup>, 2016.

Thank you.



**Attachment:** Early National Environmental Policy Act (NEPA) Coordination, Environmental Assessment for Corporate Development of Manassas Regional Airport, Manassas, Virginia



## COMMONWEALTH of VIRGINIA

#### **DEPARTMENT OF TRANSPORTATION**

CHARLES A. KILPATRICK, P.E.

4975 Alliance Drive Fairfax, VA 22030

November 15, 2016

Mr. David Alberts
Project Manager
RS & H
10748 Deerwood Park Boulevard, South
Jacksonville, Florida 32256

Re: Early National Environmental Policy Act (NEPA) Coordination, Environmental Assessment for Corporate Development of Manassas Regional Airport, Manassas, Virginia

Dear Mr. Alberts:

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The following highway improvement projects have been completed or are underway for Route 28:

- VDOT Project Number 0028-076-982: Widening Route 28 to 6 lanes between Fitzwater Drive (Route 652) and Linton Hall Road (Route 619) and relocation of Vint Hill Road (Route 215) to align with Infantry Lane. Project administered by Prince William County and will be constructed in 2 phases. Phase 1 from Infantry Lane to Linton Hall Road is currently under construction and will be completed by the end of this year. Phase 2 from Infantry Lane to Fitzwater Drive will be advertised the end of this year and construction is anticipated to begin in Spring of 2017.
- VDOT Project Number 0028-076-111: Widening of Route 28 to 6 lanes from Linton Hall Road to Pennsylvania Avenue. Prince William County will be funding and administering this project which will be advertised through design-build procurement. Construction of this project is anticipated to begin Spring 2017.

- VDOT Project Number 0028-155-270: Widening of Route 28 to 6 lanes from Godwin Drive to the southern limits of the City of Manassas. Project is administered by the City of Manassas and is currently scheduled to be advertised for construction April 2018.
- VDOT Project Number 6234-076-112, L80: Manassas Wetlands Mitigation Site, this 89 acre parcel on the east side of airport property was required mitigation for unavailable impacts to wetlands resulting from the construction of Route 234-Bypass from Route 28 to I-66. This is deeded in perpetuity as conservation easement. The GPIN in the County's real estate database is 7694-76-3569 and the address is 10151 Harry J. Parrish Boulevard.

In accordance with the Code of Virginia §10.1-1183, the Virginia Department of Environmental Quality (DEQ) coordinates the Commonwealth's review of National Environmental Policy Act documents. When the EA is available for review and comment, it should be sent to DEQ at: Post Office Box 1105, Richmond, Virginia 23210.

If your field survey crews or contractors require access on VDOT's right-of-way or property, please contact Mr. Art Klos at our Prince William County Land Use Permit Office at (703)-366-2004 or via email <u>A.Klos@VDOT.Virginia.gov</u>.

Sincerely,

Renée N. Hamilton

**Deputy District Administrator** 

cc:

Richard (Dic) Burke

Nicholas Roper, P.E.

Helen Cuervo

John C. Muse

Art Klos

From: Alberts, David
To: Heath, Natalie

Subject: FW: SCOPING REQUEST Corporate Development at Manassas Regional Airport, Manassas, VA -- Review &

Comments

Date: Tuesday, November 22, 2016 10:35:45 AM
Attachments: Manassas Airport Request Letter.pdf

Reply to Alberts David - National Env Policy Act.pdf

Please add to the project files.

#### David E. Alberts

Aviation Senior Environmental Manager 10748 Deerwood Park Blvd South, Jacksonville, FL 32256 O 904-256-2469 | M 904-307-7049

**From:** Dabestani, Cina (VDOT) [mailto:Cina.Dabestani@VDOT.Virginia.gov]

**Sent:** Tuesday, November 22, 2016 10:28 AM **To:** Alberts, David < David. Alberts@rsandh.com>

**Cc:** Jordan, Elizabeth (VDOT) <Elizabeth.Jordan@VDOT.Virginia.gov>; Environmental Impact Review (DEQ) <eir@deq.virginia.gov>; Cromwell, James R. (VDOT) <James.Cromwell@VDOT.Virginia.gov>; Beacher, Andrew (VDOT) <Andrew.Beacher@vdot.virginia.gov>

**Subject:** SCOPING REQUEST Corporate Development at Manassas Regional Airport, Manassas, VA -- Review & Comments

Hello-

Per the request by the Environmental Division at VDOT Central Office, following is NoVa District Office's comments on the subject matter.

Please note that similar request letter from you (Manassas Airport Request Letter dated October 21 2016, attached) was responded by a letter (Reply to Alberts David – National Env Policy Act) from Ms. Renee Hamilton, Deputy District Administrator, on November 9, 2016.

In addition, the following additional comments are offered: Any realignment or improvement of roads affecting VDOT right of way will require a permit.

Any relocation of utilities will also require a permit plus the consent of the utilities affected.

Traffic impacts on the operation and safety on VDOT roadways, intersections and interchanges need to be analyzed and adequately addressed.

The City will be responsible for obtaining all necessary environmental approvals/authorizations for any work performed in VDOT right-of-way under a Land Use Permit issued by VDOT. Additionally, I would note the Manassas Wetlands Mitigation Site (VDOT Project Number 6234-076-112, L801) exists on the east side of the airport property. This 89-acre parcel was required mitigation for unavailable impacts to wetlands resulting from the construction of Route 234-Bypass from Route 28 to I-66. This is deeded in perpetuity as conservation easement. The GPIN in the County's real estate database is 7694-76-3569 and the address is 10151 Harry J. Parrish Boulevard.

Should you have any questions on this correspondence, please contact me directly.

Thank you, Cina S. Dabestani **Sr. Transportation Engineer Transportation Planning Virginia Department of Transportation** 703 . 259 . 2991

Cina.Dabestani@VDOT.Virginia.GOV



Please consider the environment before printing this email

#### Alberts, David

From: Okorn, Barbara < Okorn.Barbara@epa.gov>
Sent: Monday, November 28, 2016 1:44 PM

To: Alberts, David

**Cc:** Marcus.Brundage@faa.gov

**Subject:** Manassas Regional Airport Environmental Assessment Scoping

Mr. Alberts,

EPA has reviewed your letter dated October 21, 2016 regarding the subject project. We understand that the study is being done in compliance with the National Environmental Policy Act (NEPA) and CEQ regulations implementing NEPA. Please find below recommendations for the scope of analysis for the proposed study.

- Information regarding the purpose and need, alternatives analyzed, avoidance and minimization of resources, and cumulative effects for the proposed project should be included in the EA.
- The NEPA document should include a clear and robust justification of the underlying purpose and need for the proposed action. The purpose and need statement is important because it helps explain why the proposed action is being undertaken and what objectives the project intends to achieve. The purpose of the proposed action is typically the specific objective of the activity. The need should explain the underlying problem for why the project is necessary.
- Alternatives analysis should include the suite of other activities or solutions that were considered and the rationale for not carrying these alternatives forward for detailed study.
- The document should describe potential impacts to the natural and human environment. Existing resources should be identified and EPA encourages that adverse impacts to natural resources, especially wetlands and other aquatic resources, be avoided and minimized.
- A robust narrative fully describing any aquatic resources and functions should be included in the EA. We suggest at a minimum, a narrative should be provided that includes: a discussion of hydrology, including sources and direction of flow; the vegetative communities in the impact area, including size of trees (dbh), percent canopy cover, understory and other components such as woody debris and snags, and presence of invasive species; soil type(s); and an assessment of expected functions based on the HGM type, ecological community, and surrounding landuse. Photos should be included. Some information on resources may be gained from public websites including:
- EnviroMapper<sup>1</sup>: <a href="https://www.epa.gov/waterdata/waters-watershed-assessment-tracking-environmental-results-system">https://www.epa.gov/waterdata/waters-watershed-assessment-tracking-environmental-results-system</a>
- Envirofacts<sup>2</sup>: https://www3.epa.gov/enviro/
- NEPAssist<sup>3</sup>: https://www.epa.gov/nepa/nepassist
- 303(d) Listed Impaired Waters: <a href="https://www.epa.gov/exposure-assessment-models/303d-listed-impaired-waters">https://www.epa.gov/exposure-assessment-models/303d-listed-impaired-waters</a>
- Stormwater ponds, best management practices (BMPs) and construction staging areas should not be located in wetlands and streams. Stormwater management alternatives that address the existing and new construction should be considered.
- EPA suggests coordinating with other appropriate federal, state and local resource agencies on possible impacts to wetlands, streams, historic resources and/or rare, threatened and endangered species. As needed, assessment of aquatic resources functions should be provided. We would be pleased to coordinate with VDOT and the U.S. Army Corps of Engineers on this work.

- An evaluation of air quality and community impacts, including noise, light and possible traffic impacts, should be included in the document. General conformity status should be included in the document.
- The NEPA document should include an analysis of any hazardous sites or materials, and the status of any ongoing or past remediation efforts in the project area. This includes any groundwater contamination.
- We recommend the NEPA document include a discussion and analysis of greenhouse gas emissions, climate change, and extreme weather events (in particular in association with resiliency design).
- Environmental Justice (EJ) should also be evaluated, including the identification of potential communities of concern, and meaningful and timely community involvement, public outreach, and access to information. Please consider application of a tool developed by EPA to help users to identify areas with EJ population: <a href="https://www.epa.gov/ejscreen">https://www.epa.gov/ejscreen</a>. Additionally please refer to "Promising Practices for EJ Methodologies in NEPA Reviews document for EJ analysis in NEPA reviews": <a href="https://www.epa.gov/environmentaljustice/ej-iwg-promising-practices-ej-methodologies-nepa-reviews">https://www.epa.gov/environmentaljustice/ej-iwg-promising-practices-ej-methodologies-nepa-reviews</a>. Our regional expert on EJ would be pleased to discuss methodology for identification of EJ communities at your convenience.
- Consideration should be given to potential impacts to at-risk populations, as well as consideration to sensitive subpopulations, possibly including elderly, children and others. It is recommended community impacts be avoided, minimized and mitigated, to the greatest extent possible.
- Tribal interests should be considered in the EA.
- The document should address potential indirect and cumulative effects in the project areas; analysis may aid in the identification of resources that are likely to be adversely affected by multiple projects, and sensitive resources that could require additional avoidance or mitigation measures. It is suggested that a secondary and cumulative effects analysis begin with defining the geographic and temporal limits of the study; this is generally broader than the study area of the project. The cumulative impact analysis should evaluate impacts to environmental resources that have the potential to be impacted by the project (i.e. wetlands, surface water, etc)

1 The Watershed Assessment, Tracking & Environmental Results System (WATERS) unites water quality information previously available only from several independent and unconnected databases

2 Includes enforcement and compliance information

3 NEPAssist is a tool that facilitates the environmental review process and project planning in relation to environmental considerations. The web-based application draws environmental data dynamically from EPA Geographic Information System databases and web services and provides immediate screening of environmental assessment indicators for a user-defined area of interest. These features contribute to a streamlined review process that potentially raises important environmental issues at the earlier stages of project development.

Thank you for coordinating with EPA on this project. We look forward to working with you as more information becomes available. Please let me know if you have any questions on the recommended topics above. Please provide a copy of the EA to EPA when it is available for review.

Sincerely, Barb

Barbara Okorn USEPA Region III (3EA30) 1650 Arch Street Phila, PA 19103 Phone (215) 814-3330



#### **COUNTY OF PRINCE WILLIAM**

5 County Complex Court, Prince William, Virginia 22192-9201 (703) 792-7615 FAX (703) 792-4401 Internet www.pwcgov.org

PLANNING OFFICE



December 9, 2016

David Alberts RS&H 10748 Deerwood Park Boulevard S Jacksonville, Florida 32256



RE: Scoping Response, Commercial Development at Manassas Regional Airport, Manassas, Virginia

Dear Mr. Alberts:

This letter is in response to the scoping request for the above referenced project for an Early National Environmental Policy Act (NEPA) Coordination as requested in your letter dated October 21, 2016.

As indicated in your letter, the City of Manassas (City) proposes to redevelop the west side corporate area and a parcel on the east side of the Manassas Regional Airport (Airport). As part of this project, and to meet the associated project requirements, the City will prepare a National Environmental Policy Act (NEPA) Environmental Assessment (EA) for the Proposed Project.

The EA will assess the following development projects and actions associated with those projects (e. g., clearing and grading activities, staging areas):

- On-Airport roadway improvements;
- Maintenance and storage building construction;
- West aircraft apron expansion;
- Taxilane extension;
- Fixed base operator building and parking lot reconstruction;
- T-hangars demolition/replacement and construction and T-hangar parking lot;
- Apron taxilane tie down parking expansion;
- Corporate hangar and parking lot construction; and
- Wash rack construction.

The Airport and project are located in the City of Manassas and Prince William County, Virginia.

Your request was forwarded to our County review agencies and the following agency comments were received:

December 9, 2016 Scoping Response Manassas Regional Airport Page 2 of 2

#### **Transportation**

The scoping documents don't mention improvements to Piper Lane – the only access to the western development site. An analysis of the current condition of Piper Lane and the adequacy of the roadway to handle additional traffic associated with the new development must be performed. Width, pavement thickness, drainage and capacity are items that should be reviewed for adequacy.

#### **Cultural Resources**

Analysis of impacts should include Cultural Resources. There is high potential for direct and indirect impacts to historic properties. Two Civil War battlefields eligible for listing on the National Register of Historic Places may be adversely affected by this proposal. Analysis of impacts to the Bristoe Station Battlefield and the Kettle Run Battlefield should be included in the NEPA study. Undisturbed areas proposed for construction should be archaeological surveyed and the methods should include metal detector surveys by the archaeologist. Some land in the East Parcel Development Area has been subject to archaeological survey. Consultation with the County Archaeologist on the scope of the archaeological survey is requested.

These comments represent our initial review; we would like to review all applications as this project continues to move forward. Should you have any questions or need further clarification please feel free to contact Connie Dalton via email at <a href="cdalton@pwcgov.org">cdalton@pwcgov.org</a> or by telephone at 703-792-6934.

Sincerely,

David J. McGettigan, AICP Long Range Planning Manager

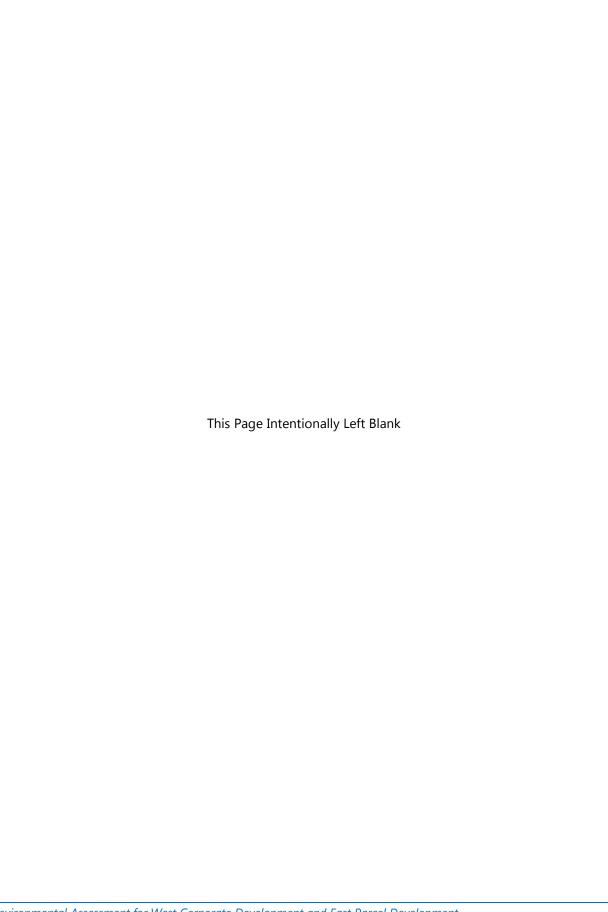
PRML2017-00661

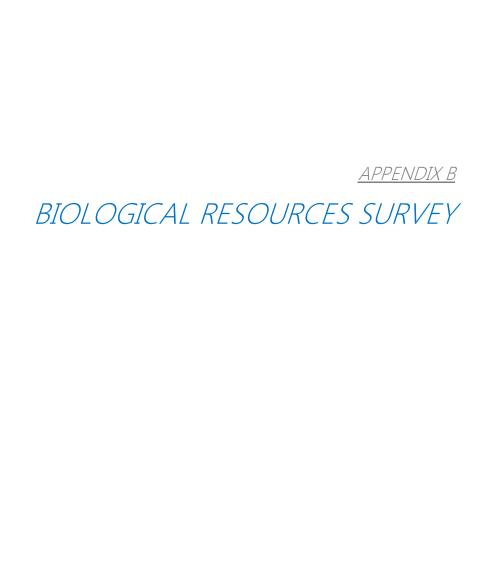
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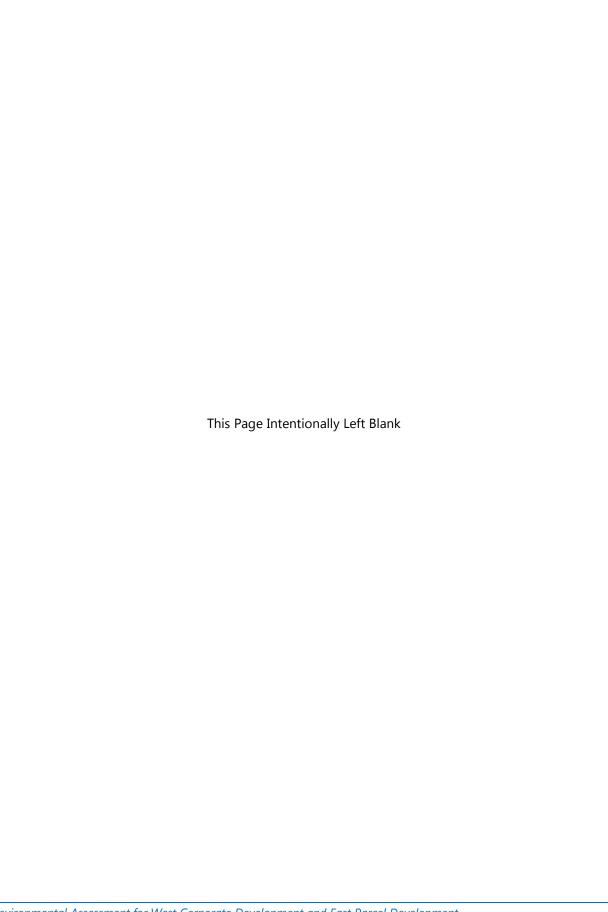
Chris Price, Acting Director of Planning

Elizabeth Scullins, Division Chief, Transportation Planning and Programming

Justin Patton, County Archaeologist











# Endangered, Threatened and Special Concern Species Assessment Manassas Regional Airport (HEF) Environmental Assessment for Corporate Development Manassas, VA

Prepared for: RS&H 10748 Deerwood Park Blvd South Jacksonville, FL 32256-0597

Prepared by:
Matt Neely
Senior Environmental Scientist, PWD
Mill Creek Environmental Consultants

19 December 2016

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#### 1.0 Introduction

As part of a Federal Aviation Administration (FAA) Environmental Assessment (EA) at Manassas Regional Airport (HEF), Mill Creek Environmental Consultants, Ltd. recently completed an analysis of approximately  $\pm$  48 acres of study area across 3 different parcels (see Exhibit 1) immediately adjacent to the Manassas Regional Airport in Manassas Virginia. The purpose of the analysis was to determine the presence of endangered, threatened, or special concern (ETS) species of flora and fauna on the property. The findings and opinions in this report will be included in the EA to satisfy the requirements set forth in the National Environmental Policy Act (NEPA).

The Virginia Department of Conservation and Recreation (VDCR), Virginia Department of Agriculture and Consumer Services (VDACS), Virginia Department of Game and Inland Fisheries (VDGIF), and the U.S. Fish and Wildlife Service (USFWS) work cooperatively to insure the continued survival of Virginia's diverse flora, fauna, and other elements of natural diversity. The Virginia Natural Heritage Program (VNHP: a Division within VDCR) also works closely with other state and federal agencies, local governments, conservation organizations, and individuals to seek adequate protection of the State's natural heritage resources.

To achieve this protection, VNHP maintains lists of the most significant elements of Virginia's natural diversity. These lists focus the Program's Inventory on the Natural Heritage Resources most likely to be lost without conservation action in the near future. Most importantly, these lists are not only useful for VNHP, but can be used by other agencies, organizations, and individuals to guide protection and development decision making. In formulating these lists, the program uses information from previous studies, museum records, the observations and opinions of experts, DCR-DNH staff scientists, and field inventories.

All plants and animals that are officially protected by Federal or State endangered species acts are included on these lists. The Office of Plant Protection within the Virginia Department of Agriculture and Consumer Services (VDACS) has regulatory responsibility of the listing and protection of Virginia's endangered and threatened plants and insects, under the Virginia Endangered Plant and Insect Act (Section: 3.1-1020 through 1030, Code of Virginia). The Act provides for the official listing and recovery of endangered and threatened plant and insect species in Virginia. The Act also establishes a permit system for collection of listed species. A memorandum of agreement between DCR-DNH and VDACS facilitates data transfer between agencies and allows DCR-DNH to nominate candidate species for listing by VDACS,

The Department of Game and Inland Fisheries has regulatory responsibility for listing and protecting Virginia's endangered and threatened animals under Virginia's Endangered Species Act (Code of Virginia, Section 19.1-564-568). The Act prohibits the taking,

transportation, sale, etc. of endangered and threatened species, except as permitted, and provides for official listing and recovery of these species.

Federally listed species are protected by the Endangered Species Act of 1973, as amended. The U.S. Department of the Interior's Fish and Wildlife Service (USFWS) administers the Act, listing and protecting federally endangered and threatened species.

#### 2.0 Study Area Overview

The EA study area is comprised of approximately  $\pm$  48 acres adjacent to the Manassas Regional Airport in Manassas, Virginia. The EA study area is divided into three discontinuous parcels, two to the west (W) of the airport operations area (AOA) and one to the east (E). An aerial of the EA study area can be seen in Exhibit 1, while a topographic map can be seen in Exhibit 2. All three parcels sit between elevations of 160-180'. Precipitation falling within the two parcels to the west (W) of the AOA makes its way via overland sheet-flow and groundwater movement to Broad Run immediately to the west (W) and south (S). Precipitation falling within east (E) parcel makes its way via overland sheet-flow and groundwater movement down slope to the north (N) into Cannon Branch and eventually into Broad Run, which flows into the Middle Potomac-Anacostia-Occoquan basin (HUCO2070010).



#### Area A (+ 25 acres)

The largest of the three parcels comprising the study area is area A ( $\pm$  25 acres). Area A is immediately adjacent to the hangar, apron, and parking spaces on the west (W) side of the AOA between the fence line and Broad Run.



The vast majority of area A (± 22 acres) consists of mature, mixed hardwood forest. Upland vegetation is comprised of a mature over-story containing species such as white oak (*Quercus alba*), northern red oak (*Quercus rubra*), black oak (*Quercus velutina*), tuliptree (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), and various species of hickories (*Carya spp.*), with a limited shrub understory containing instances of deerberry (*Vaccinium stamineum*) and saplings of the over-story species listed above. Representative photos can be seen below.





Areas such as forested wetlands and others containing higher soil moisture content are dominated by species such as red maple (*Acer rubrum*), pin oak (*Quercus palustris*), willow oak (*Quercus phellos*), boxelder maple (*Acer negundo*), and sweetgum (*Liquidambar stryaciflua*). The shrub layer in these areas consisted of saplings of the species listed above, as well as a herbaceous layer containing species such as lizard's tail (*Saururus cernuus*), false nettle (*Boehmeria cylindrica*), shallow sedge (*Carex lurida*), and varying species of rushes (*Juncaceae spp.*). Representative photos can be seen below.





Animal species observed within or known to exist within the boundaries of this forested portion of the EA study area include white tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), Raccoon (*Procyon lotor* L.), Gray Squirrel (*Sciurus carolinensis L.*), Striped Skunk (*Memphitis memphitis L.*), Eastern Cottontail (*Sylvilagus floridanus L.*), Virginia Opossum (*Didelphis virginiana L.*), Eastern Box Turtle (*Terrapena carolina* L.), and the Black Racer (*Coluber constrictor*), and various species of frogs and skinks.

Approximately three acres of study area A consists of graded maintained/mowed grass areas immediately adjacent to observation road. The area is characterized as a level, compactly graded lot maintained regularly by normal maintenace. Representative photo seen below.



#### Area B (+ 7 acres)

Study area B consists of  $\pm$  7 on the west (W) side of the AOA between aircraft parking aprons, hangars, and taxiway spaces and observation road. It is characterized a by mostly level, compactly graded, grass surface that only changes in elevation as it slopes down to the significant stormwater ditch making its way through the EA study area.



The vegetation in this area consists of maintained fesuces (*festuca spp.*), and other weeds such as broom sedge (*Andropogon virginicus*). Representative photos can be seen below.





No animal species or evidence there of were observed within this portion of the EA study area. Study area B is most likely frequented by birds and smaller species such as field mice, rabbit, and various frogs and skinks in and around the significant stormwater ditch.

#### Area C (+16 acres)

Study area C consists of  $\pm$  16 acres on the east (E) side of the AOA, immediately east (E) of wakeman drive and west (W) of Cannon Branch.



Almost all ± 16 acres consists of mature, mixed hardwood forest. Upland vegetation is comprised of a mature over-story containing species such as white oak (*Quercus alba*), northern red oak (*Quercus rubra*), black oak (*Quercus velutina*), tuliptree (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), eastern redcedar (*Juniperus virginiana*) and various species of hickories (*Carya spp.*), with a limited shrub understory containing instances of deerberry (*Vaccinium stamineum*) and saplings of the over-story species listed above. Representative photos can be seen below.





Areas such as forested wetlands and others containing higher soil moisture content are dominated by species such as red maple (*Acer rubrum*), pin oak (*Quercus palustris*), willow oak (*Quercus phellos*), boxelder maple (*Acer negundo*), and sweetgum (*Liquidambar stryaciflua*). The shrub layer in these areas consisted of saplings of the species listed above, as well as a herbaceous layer containing species such as lizard's tail (*Saururus cernuus*), false nettle (*Boehmeria cylindrica*), shallow sedge (*Carex lurida*), and varying species of rushes (*Juncaceae spp.*). Representative photos can be seen below.





Animal species observed within or known to exist within the boundaries of this forested portion of the study area include white tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), Raccoon (*Procyon lotor* L.), Gray Squirrel (*Sciurus carolinensis L.*), Striped Skunk (*Memphitis memphitis L.*), Eastern Cottontail (*Sylvilagus floridanus L.*), Virginia Opossum (*Didelphis virginiana L.*), Eastern Box Turtle (*Terrapena carolina* L.), and the Black Racer (*Coluber constrictor*), and various species of frogs and skinks.

#### 3.0 Federal Listed Species

Physical analysis of the EA study area was conducted to determine the presence of, or suitable habitat for any species with federal listing status that are known to, or have the possibility of being present within portions of the study area or in its proximity. In order to determine which species could potentially be present the US Fish and Wildlife Service (USFWS) Information, Planning, and Conservation (IPaC) tool was consulted. This tool provided an official species list which identifies threatened, endangered, proposed and candidate species, as well as proposed final designated critical habitat, that may occur within the EA study area.

The official species list generated by IPaC for the  $\pm$  48 acres survey area associated with the Manassas Regional Airport Corporate Development EA revealed three federally listed species that may occur within the boundaries of the proposed project. These species include one clam, Dwarf wedgemussel (*Alasmidonta heterodon*), one flowering plant, Harperella (*Ptilimnium* 

nodosum), and one mammal, Northern long-eared Bat (Myotis septentrionalis). The official species list generated through IPaC can be seen in Exhibit 3.

#### Dwarf wedgemussel (Alasmidonta heterodon)

The Dwarf wedgemussel is a federally endangered species listed on March 14, 1990 (USFWS 1990). It is currently listed as State-endangered in the Commonwealth of Virginia. A general description can be read below:

"Small freshwater mussel, usually less than 45 mm length and 25 mm high. Shell subtrapezoidal, thick anteriorly and thinning posteriorly; ventral margin mostly straight; posterior margin pointed near base; dorsal margin slightly curved; beaks low and rounded, projecting only slightly above the hinge line; posterior ridge rounded, somewhat inflated and prominent; periostracum brownish or yellowish brown, with variable width reddish brown or greenish rays in young or pale colored specimens. Nacre bluish or silvery white, and iridescent posteriorly. Hinge teeth small but distinct; pseudocardinal teeth compressed, 1 or 2 in the right valve and 2 in the left; lateral teeth gently curved and reversed, that is, in most specimens, 2 in the right valve and 1 in the left. Ventral mantle margin plain; papillae flesh-colored; exhalent aperture without papillae. (Clarke, 1981; Smith, 1986; Bogan, 1993)" (NatureServe 2016)

When in occurrence the Dwarf wedgemussel is normally found in sand, firm muddy sand, or gravel bottoms of rivers of varying sizes with moderate to slow rates of current. It prefers silt-free stream beds that are stable and where the water is well-oxygenated and free of pollutants (USFWS 1990).

The mussel was believed to be extirpated from the commonwealth until it was discovered again in 1990 (Terwilliger et. al 1995). Reproducing populations are believed to be located within Aquia creek, while remnant populations exist in the South Anna and Nottoway rivers. Historically they have been found in Mountain Run, Marsh Run near Remington, Blue River, and the Maury River (North River) at Lexington (VDGIF 2016).

#### Haperella (*Ptilinium nodosum*)

Harperella is a federally endangered species listed on September 28, 1988 (USFWS 1988). It is currently listed as State-endangered in the Commonwealth of Virginia. A description can be read below:

"An annual herb with slender, erect stems, up to 12 dm high. The roots are shallow, diffuse-fibrous, and the plants have a faint scent of dill. Unlike those of the more common members of this genus, the leaves of P. nodosum are reduced to hollow, quill-like structures. Broad clusters

of small white flowers bloom mostly in July and August. Near rivers, fluctuating water levels often knock over the flowering stems, depositing the seeds in wet or moist soil near the site of the fallen flower." (NatureServe 2016)

"Occurs in three habitat types: rocky/gravelly shoals or cracks in bedrock outcrops beneath the water surface in clear, swift-flowing streams (usually in microsites that are sheltered from rapidly moving water); edges of intermittent pineland ponds or low, wet savannah meadows on the Coastal Plain; and granite outcrop seeps. In all habitat-types, the species occurs in a narrow range of water depths; it is intolerant of deep water and of conditions that are too dry. However, the plants readily tolerate periodic, moderate flooding - something to which few potential competitors are adapted. P. nodosum seeds generally germinate during short-duration spring floods and the plants have completed their life cycle by late summer or fall, just as water levels are lowest and competing species are moving in." (NatureServe, 2016)

Habitat not suitable for this species includes areas of deep standing water, scoured streams, areas with heavy siltation, stormwater discharge channels, damned streams, and densely vegetated areas including palustrine emergent and scrub shrub wetlands normally associated with streams or backwaters. Additionally, vegetated stream channels and wetlands with weedy flora and a dense over-story that shades growth would not support the proper habitat for Harperella (Sprenkle 2014).

#### Northern Long-eared Bat (Myotis Septentrionalis)

The Northern Long-eared Bat (NLEB) is a federally threatened species listed on April 2, 2015. It is currently a state-threatened species in the Commonwealth of Virginia.

The NLEB is a medium-sized bat between 3-3.7 inches in length, with a wingspan between 9 to 10 inches, and is characterized by its long ears compared to other bats within the same genus. The bat is present throughout much of the eastern and north central US and all of Canada. Its range includes at least 37 states. Significant populations of the bat have been affected by white-nose syndrome (WNS), which is a fungal disease known to adversely impact bats. It is currently the main threat to these bats. It is believed that throughout the northeast WNS has caused population declines in hibernation sites of up to 99% from pre WNS levels (USFWS 2016).

A brief description of the life history can be read below:

#### "Habitat Requirements

During summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat seems opportunistic in selecting roosts,

using tree species based on suitability to retain bark or provide cavities or crevices. It has also been found, rarely, roosting in structures like barns and sheds. Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They typically use large caves or mines with large passages and entrances; constant temperatures; and high humidity with no air currents. Specific areas where they hibernate have very high humidity, so much so that droplets of water are often seen on their fur. Within hibernacula, surveyors find them in small crevices or cracks, often with only the nose and ears visible." (USFWS 2016).

#### "Food Habits

Northern long-eared bats emerge at dusk to fly through the understory of forested hillsides and ridges feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while in flight using echolocation. This bat also feeds by gleaning motionless insects from vegetation and water surfaces." (USFWS 2016).

#### "Reproductive Strategy

Breeding begins in late summer or early fall when males begin swarming near hibernacula. After copulation, females store sperm during hibernation until spring, when they emerge from their hibernacula, ovulate, and the stored sperm fertilizes an egg. This strategy is called delayed fertilization. After fertilization, pregnant females migrate to summer areas where they roost in small colonies and give birth to a single pup. Maternity colonies, with young, generally have 30 to 60 bats, although larger maternity colonies have been observed. Most females within a maternity colony give birth around the same time, which may occur from late May or early June to late July, depending where the colony is located within the species' range. Young bats start flying by 18 to 21 days after birth. Adult northern long-eared bats can live up to 19 years." (USFWS 2016).

On January 14, 2016 the USFWS issued a final 4(d) Rule for the Northern Long-eared Bat, which outlines necessary and advisable measures providing for the conservation of the bat (USFWS 2016). Rules governing the purposeful and incidental take of this species and its habitat are outlined in this rule, and should be consulted prior to development activities. Further discussion of this can be found in the conclusion section of this report.

#### 4.0 State Listed Species

Physical analysis of the EA study area was conducted to determine the presence of, or suitable habitat for any species with state listing status that are known to or have the possiblity of being present within portions of the EA study area, or in its proximity. In order to determine which species could potentially be present the Virginia Department of Game and Inland Fisheries (VDGIF) information tool (VaFWIS) was consulted. This tool provided a list of species that are known to or likely to occur within a 2 mile radius of the Manassas Regional Airport EA study area. The full VAFWIS report can be viewed in Exhibit 6. In addition to the VaFWIS search report, input was also solicited from the Virginia Department of Conservation and Recreation (VDCR).

In addition to Northern Long-eared Bat, as discussed in the previous section, the VAFWIS search report produced a list of an additional eight species that have state statuses of State-endangered or State-threatened. These species include:

Atlantic Sturgeon (Acipenser oxyrinchus) Federal/State Endangered Northern Long-eared Bat (Myotis septentrionalis) Federal/State Threatened State Endangered Little Brown Bat (Myotis lucifugus lucifugus ) Tri-colored Bat (*Perimyotis subflavus*) State Endangered Brook Floater (*Alasmidonta varicosa*) State Endangered Peregrine Falcon (Falco peregrinus) State Threatened Loggerhead Shrike (*Lanius Iudovicianus*) State Threatened Henslow's Sparrow (Ammodramus henslowii) State Threatened Migrant Loggerhead Shrike (Lanius Iudovicianus migrans) State Threatened

Of the state listed species above, only one has been confirmed to have been observed within a 2 mile radius of the <u>+</u> 48 acre EA study area. That species is the Brook Floater (*Alasmidonta varicosa*). A short discussion of that species and others follows.

#### <u>Atlantic Sturgeon (Acipenser oxyrinchus) (Federal/State Endangered)</u>

The Atlantic Sturgeon is a long living anadromous fish species that is estuarine dependent. It can grow up to 14 feet in length and weigh up to 800lbs. These fish are anadromous, which means they spawn in freswhater, normally deep portions of large rivers, in the spring and early summer and then migrate back into the estuarine and marine waters where they will spend most of their life. It is believed that this species is currently located within 32 existing rivers within the US in which spawning is occruing in at least 20. Historically overharvesting has led to the wide spread decline of the species (NOAA Fisheries 2016).

#### Little Brown Bat (Myotis lucifiqus lucifugus) (State Endangered)

The Little Brown Bat is a small to medium bat with a glossy fur ranging from dark yellow-brown to olive brown. The face and ears are dark and the bat's total length usually ranges from 3-5 inches. The species is migratory in nature and normally migrate north to south up to several hundred miles to caves and mines from October-November and March-April. They will roost in caves, buildings, rocks, trees, under bridges, in mines and tunnels and can be found in all all forested regions (VDGIF 2016).

According to VaFWIS there has been no confirmed observation of the species within two miles of the EA study area, and only one general an resident occurrence has been cited in surrounding Prince William County.

#### <u>Tri-colored Bat (Perimyotis subflavus)</u> (State Endangered)

The tri-colored bat is a small eastern bat with yellowish-brown tri-color fur, ranging in length from 3-3.7 inches. While active until late October, these species often hibernates in caves or mines that are two small for other species of bats. In March they begin to leave the caves. They may roost in caves, rocks, trees and buildings (less regularly) (VDGIF 2016).

According to VaFWIS there has been no confirmed observation of the species within two miles of the EA study area, and only one general an resident occurrence has been cited in surrounding Prince William County.

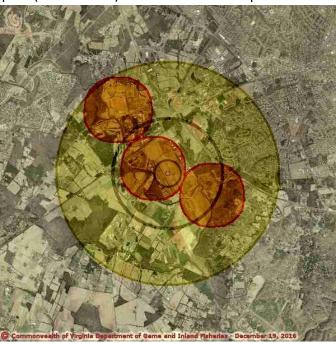
#### <u>Brook Floater (Alasmidonta varicosa) (State Endangered)</u>

The Brook Floater is a small freshwater mussel with a kidney-shaped shell (NatureServe 2016).

"Considered to be a species of creeks and small rivers where it is found among rocks in gravel substrates and in sandy shoals, the brook floater inhabits flowing-water habitats only (Nedeau et al., 2000; Nedeau, 2008). It occurs in running water and although typically found in riffles and moderate rapids with sandy shoals or riffles with gravel bottoms (Clark and Berg, 1959; Athearn and Clark, 1962), it can also be found in a range of flow conditions (usually not in very slow flow conditions). Strayer and Ralley (1993) found no consistent substrate preference but it is thought to prefer stable habitats such as coarse sand and gravel. It is more common in small to midsized streams or creeks than in large rivers (Clarke, 1981) and is more common in upper portions of large watersheds with intact upland forest but is absent from headwater streams (Nedeau, 2008)." (NatureServe 2016)

Of the species listed in the VaFWIS search report, the Brook Floater is the only species to have a documented observance within a 2 mile radius of the EA study area. From 1991 to 1998 five

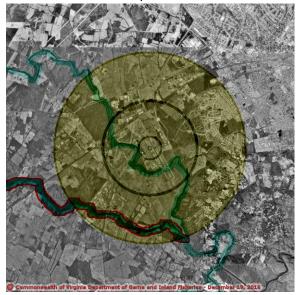
obersvations of the Brook Floater were made in segments of Broad Run in the vicinity of Manassas Regional Airport (VDGIF 2016). An observation map can be seen below:



Currently segments of both Broad Run and Kettle Run have been designated predicted habitat for WAP Tier I & II Aquatic Species. These reaches can be seen in the maps below:



Broad Run Tier I&II predicted habitat



Kettle Run Tier I&II predicted habitat

#### Peregrine Falcon (Falco peregrinus)

The Peregrine Falcon is a highly migratory falcon with long pointed wings ranging in size from 16-20 inches in length. These falcons normally have a dark crown and nape, and a dark wedge below the eye. The US Atlantic coast from New Jersey extending to South Carolina and the barrier Islands of the Gulf Coast are important feeding areas for the species (NatureServe 2016).

Preferred habitat consists of "Various open situations from tundra, moorlands, steppe, and seacoasts, especially where there are suitable nesting cliffs, to mountains, open forested regions, and human population centers (AOU 1983). When not breeding, occurs in areas where prey concentrate, including farmlands, marshes, lakeshores, river mouths, tidal flats, dunes and beaches, broad river valleys, cities, and airports." (NatureServe 2016)

According to VaFWIS there has been no confirmed observation of the species within two miles of the EA study area, and only one general occurrence has been cited in surrounding Prince William County.

#### Loggerhead Shrike (Lanius Iudovicianus)

The Loggerhead Shrike is a small bird typically smaller than 10 inches in length, characterized by a stout, all dark, hooked bill. It has a gray head and back with white or grayish underparts. Its prefered habitat consists of open areas with scattered trees and shrubs, and tends to build nests from twigs or animal hair in shrubs or small trees. The bird feeds primarily on larger insects, small birds, lizards, frogs, etc. (NatureServe 2016).

According to VaFWIS there has been no confirmed observation of the species within two miles of the EA study area, and only one general an resident occurrence has been cited in surrounding Prince William County.

#### Henslow's Sparrow (Ammodramus henslowii)

Henslow's sparrow is a small bird (5 inches) typically characterized by a large flat head and large gray bill with a short tail. The chest of the bird is streaked. Normally a secretive species, when the bird is "flushed" it will fly erratically and low while twisting its tail. The bird prefers a grassland/herbaceous terrestrial habitat such as tall meadows that are not normally maintained. Their diet consists of insects such as crickets, grasshoppers, beetles, caterpillars and other insects, as well as seeds of plants (NatureServe 2016).

According to VaFWIS there has been no confirmed observation of the species within two miles of the EA study area, and has one known general, residence, and seasonal occurrence in the surrounding Prince William County.

#### Migrant Loggerhead Shrike (Lanius Iudovicianus migrans)

The Migrant Loggerhead is similar to the species listed earlier with some distinguishing differences that can read below.

"Physical description: To differentiate this subspecies from the southern subspecies (ludovicianus): above bluish gray (vs dark slaty gray); beneath pale slaty (vs almost immaculate white); throat white; bill smaller, regularly tapering; hook delicate and sharply bent downwards. Also the tail is shorter than the wing, this follows the usual characteristic for migrating birds." (VDGIF, 2016)

"This species prefers open grassland that is grazed or mowed to keep grass short. An abundance of perching sites such as fences, woody vegetation or hedgerows is also important. This species usually nests in easern redcedar or hawthorne." (VDGIF, 2016)

According to VaFWIS there has been no confirmed observation of the species within two miles of the EA study area.

#### 5.0 Conclusion

As part of the project review process a species conclusion table was created to address the federally listed species within the project review. This species conclusion table serves as a tool to depict the ESA Section 7 Determination for each species as well as the Eagle Act Determination. The species conclusion table and Eagle Act Determination for this project can be seen in Exhibit 4 and Exhibit 5 of this report. An explanation of these determinations follows.

The federally endangered <u>Dwarf wedgemussel</u> (<u>Alasmidonta heterodon</u>) is a freswhater bivalve that requires a very narrow range of riverine/stream characteristics to thrive. This type of habitat is not located anywhere within the EA study area. Thus the conclusion was made that "no suitable habitat is present" and a determination of "No effect" was made. Additionally, development within the study area boundaries done in accordance with current erosion and sediment control regulations would likely not impact water quality within the surrounding stretches of Broad Run, which is the only habitat having the possibility of the parameters supporting the mussel.

The federally endangered <u>Harperella (Ptilimnium nodosum)</u> is a flowering plant that requires a very strict set of habitat characteristics to exist. There are no streams anywhere within the EA study area that possess the energy regime necessary for scour bars, gravel deposits, rock outcrops and cobble bars. Because of this, a conclusion of "no suitable habitat present" was

made and a determination of "no effect" was also made. Thus development within the EA study area would not impact the plant.

The federally threatened Northern long-eared Bat (Myotis septentrionalis) is a species of bat that is currently being threatened by the spread of White Nose Syndrome (WNS). While the suitable habitat may be present in the form of the trees required during the summer roosting periods, the EA study area is not within close proximity to a mapped/known hibernacula. Relying upon the findings of the 1/5/2016 Programmatic Biological Opinion for Final 4(d) Rule on the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions to fulfill our project-specific section 7 responsibilities, a determination of "not likely to adversely affect" for the section 7 determination was made.

Based upon on the analysis of the study area in which no physical observation of the federally listed species above were observed, combined with the lack of suitable habitat for those species, it is highly unlikely that development within the EA study area would impact any federally endangered or threatened species.

In addition to the species with federal listing status discussed above. Multiple species listed as state endangered or state threatened are known or likely to exist within a two mile radius of the EA study area. These species were also analyzed for potential impacts associated with development of the study area. Of the species returned in the VaFWIS search report seen in Exhibit 6, one, the <u>Atlantic Sturgeon (Acipenser oxyrinchus)</u> is an anadromous fish for which no suitable habitat exists within the survey area or anywhere in its proximity. Therefore development would have no effect on this species of fish.

In addition to the federally and state listed *Northern Long-eared Bat (Myotis setetnrionalis)*, two additional state endangered bats, the <u>Little Brown Bat (Myotis lucifiqus)</u>, and <u>the tricolored bat (Perimyotis subflavus)</u> were listed as potentially present but with no known observances within two miles. Due to the seasonal migratory nature of these species between cave hibernacula and summer roosts, such as hollowed trees and abandoned buildings, and the already robust surrounding development, combined with the distance from any known cave hibernacula, it is highly unlikely that development of the EA study area would cause any permanent negative impacts on the bats or their habitat.

One state endangered bivalve, the <u>Brook Floater (Alasmidonta varicosa)</u> has been historically observed within two miles of the EA study area in segments of Broad Run. There is no suitable riverine habitat for this species within the EA study area itself, only in segments of Broad Run in proximity. Development within the EA study area done in accordance with current erosion and sediment control regulations would likely not impact water quality within

the surrounding stretches of Broad Run, which is the only habitat possessing characteristics possible of supporting the Brook Floater. Thus development within the EA study are wouldhave no impact on the Brook Floater.

Four different avian species with state listing status of threatened were returned in the VaFWIS search report. These species include the <u>Peregrine falcon (Falco peregrinus)</u>, <u>Loggerhead Shrike (Lanius ludovicianus)</u>, <u>Henslow's sparrow (Ammodramus henslowii)</u>, and <u>Migrant Loggerhead Shrike (Lanius ludovicianus migrans)</u>. Due to the migratory nature of these species, as well as the development that currently surrounds the AOA, combined with the countermeasures associated the airport's wildlife management plan it is not surprising these species have not been observed within two miles of the EA study area. Further development in the EA study area is highly unlikely to have an adverse impact on these state listed species or their habitat.

Based upon on the analysis of the EA study area in which no physical observation of the state listed species above was noted, combined with the lack of suitable habitat, behaviorial charactertics of the species, and current countermeasures associated with the airport's wildlife management plan, it is highly unlikely that development within the EA study area would impact any of the state listed species in question.

The self certification letter associated with the conclusion table for this project review can be found in Exhibit 4. A coordination/response letter for input form VDCR can be found in Exhibit 7.

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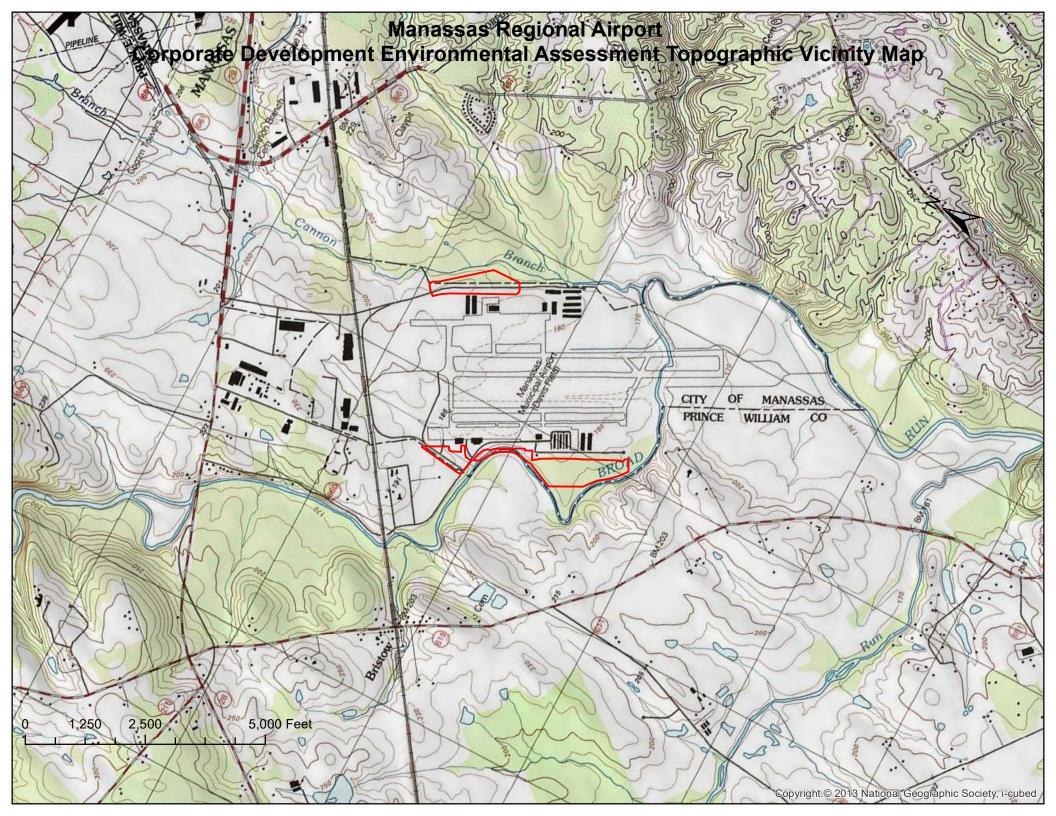
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# Exhibit 1 Project Location Map



# Exhibit 2 USGS Topographic Map



# Exhibit 3 USFWS Official Species List



## **United States Department of the Interior**

#### FISH AND WILDLIFE SERVICE

Virginia Ecological Services Field Office 6669 SHORT LANE GLOUCESTER, VA 23061

PHONE: (804)693-6694 FAX: (804)693-9032 URL: www.fws.gov/northeast/virginiafield/



Consultation Code: 05E2VA00-2017-SLI-0917 December 19, 2016

Event Code: 05E2VA00-2017-E-01187

Project Name: Manassas Regional Airport (HEF) Corporate Development EA

Subject: List of threatened and endangered species that may occur in your proposed project

location, and/or may be affected by your proposed project

#### To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and

endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan

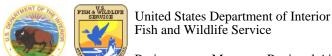
(http://www.fws.gov/windenergy/eagle\_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and

http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment



Project name: Manassas Regional Airport (HEF) Corporate Development EA

#### **Official Species List**

#### Provided by:

Virginia Ecological Services Field Office 6669 SHORT LANE GLOUCESTER, VA 23061 (804) 693-6694 http://www.fws.gov/northeast/virginiafield/

Consultation Code: 05E2VA00-2017-SLI-0917

Event Code: 05E2VA00-2017-E-01187

**Project Type:** Federal Grant / Loan Related

Project Name: Manassas Regional Airport (HEF) Corporate Development EA

**Project Description:** Manassas Regional Airport is conducting a FAA required Environmental Assessment (EA) for the purpose of corporate development within the outlined survey areas. In order to receive a decision for this EA, a survey of potential impacts to both federal and state listed species must be conducted to be in accordance with the NEPA requirements. RS&H Engineers on behalf of the Manassas Regional Airport recently hired Mill Creek Environmental Consultants, Ltd. to conduct the physical survey and proper coordination with regulatory agencies to satisfy this purpose.

**Please Note:** The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

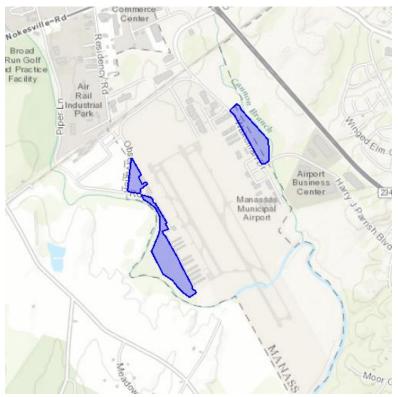




# United States Department of Interior Fish and Wildlife Service

Project name: Manassas Regional Airport (HEF) Corporate Development EA

#### **Project Location Map:**



**Project Coordinates:** The coordinates are too numerous to display here.

Project Counties: Manassas, VA | Prince William, VA



### **Endangered Species Act Species List**

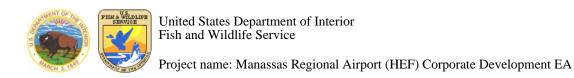
There are a total of 3 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Clams	Status	Has Critical Habitat	Condition(s)	
Dwarf wedgemussel (Alasmidonta	Endangered			
heterodon)				
Population: Wherever found				
Flowering Plants				
harperella ( <i>Ptilimnium nodosum</i> )  Population: Wherever found	Endangered			
Mammals				
Northern long-eared Bat (Myotis	Threatened			
septentrionalis)				
Population: Wherever found				



## Critical habitats that lie within your project area

There are no critical habitats within your project area.



# Appendix A: FWS National Wildlife Refuges and Fish Hatcheries

There are no refuges or fish hatcheries within your project area.

	Endangered, Threatened and Spe	Manassas Regional Air <sub>l</sub>	
		·	,
USFWS Species Concl	Exhibit 4 usion Table and Certifica	tion Letter	

## **Species Conclusions Table**

Project Name: Manassas Regional Airport Environmental Assessment for Corporate Development

Date: 19 December 2016

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
Dwarf wedgemussel (Alasmidonta heterodon)	No suitable habitat present	No effect	Typically, this species is found in shallow to deep quick running water on cobble, fine gravel, or on firm silt or sandy bottoms. Other habitats included are amongst submerged aquatic plants, and near stream banks underneath overhanging tree limbs. USFWS (1993) states the species commonly lives on muddy sand, sand, and gravel bottoms in creeks and rivers of various sizes. It requires areas of slow to moderate current, good water quality, and little silt deposits. This type of habitat does not fall within the boundaries of the survey area.  (http://explorer.natureserve.org/servlet/NatureServe?searchName=Alasmidonta+heterodon)
harperella (Ptilimnium nodosum)	No suitable habitat present	No effect	Occurs in three habitat types: rocky/gravelly shoals or cracks in bedrock outcrops beneath the water surface in clear, swift-flowing streams (usually in microsites that are sheltered from rapidly moving water); edges of intermittent pineland ponds or low, wet savannah meadows on the Coastal Plain; and granite outcrop seeps. In all habitat-types, the species occurs in a narrow range of water depths; it is intolerant of deep water and of conditions that are too dry. However, the plants readily tolerate periodic, moderate flooding - something to which few potential competitors are adapted. P. nodosum seeds generally germinate during short-duration spring floods and the plants have completed their life cycle by late summer or fall, just as water levels are lowest and competing species are moving in.  (http://explorer.natureserve.org/servlet/NatureServe?searchName=Ptilimnium+nodosum)
Northern Long- eared Bat (Myotis Septentrionalis)	Suitable habitat present	Not likely to Adversely Affect	Relying upon the findings of the 1/5/2016 Programmatic Biological Opinion for Final 4(d) Rule on the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions to fulfill our project-specific section 7 responsibilities. ( <i>Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions</i> ; USFWS Regions 2,3,4,5,6 USFW Midwest Regional Office, Bloomington, Minnesota, date: 5 January 2016)
Critical habitat	No critical habitat present	No effect	
Bald Eagle	Unlikely to disturb nesting bald eagles	No Eagle Act permit required	

Bald Eagle	Does not intersect with eagle concentration area	required	



# United States Department of the Interior

#### FISH AND WILDLIFE SERVICE

Virginia Field Office 6669 Short Lane Gloucester, VA 23061

Date: 21 December 2016

#### **Self-Certification Letter**

Project Name: Manassas Regional Airport Corporate Development EA 2016

#### Dear Applicant:

Thank you for using the U.S. Fish and Wildlife Service (Service) Virginia Ecological Services online project review process. By printing this letter in conjunction with your project review package, you are certifying that you have completed the online project review process for the project named above in accordance with all instructions provided, using the best available information to reach your conclusions. This letter, and the enclosed project review package, completes the review of your project in accordance with the Endangered Species Act of 1973 (16 U.S.C. . 1531-1544, 87 Stat. 884), as amended (ESA), and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c, 54 Stat. 250), as amended (Eagle Act). This letter also provides information for your project review under the National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, 83 Stat. 852), as amended. A copy of this letter and the project review package must be submitted to this office for this certification to be valid. This letter and the project review package will be maintained in our records.

The species conclusions table in the enclosed project review package summarizes your ESA and Eagle Act conclusions. These conclusions resulted in:

- "no effect" determinations for proposed/listed species and/or proposed/designated critical habitat; and/or
- "may affect, not likely to adversely affect" determinations for proposed/listed species and/or proposed/designated critical habitat; and/or
- "may affect, likely to adversely affect" determination for the Northern long-eared bat (*Myotis septentrionalis*) and relying on the findings of the January 5, 2016 Programmatic Biological Opinion for the Final 4(d) Rule on the Northern long-eared bat; and/or
- "no Eagle Act permit required" determinations for eagles.

Applicant Page 2

We certify that use of the online project review process in strict accordance with the instructions provided as documented in the enclosed project review package results in reaching the appropriate determinations. Therefore, we concur with the "no effect" or "not likely to adversely affect" determinations for proposed and listed species and proposed and designated critical habitat; the "may affect" determination for Northern long-eared bat; and/or the "no Eagle Act permit required" determinations for eagles. Additional coordination with this office is not needed.

Candidate species are not legally protected pursuant to the ESA. However, the Service encourages consideration of these species by avoiding adverse impacts to them. Please contact this office for additional coordination if your project action area contains candidate species.

Should project plans change or if additional information on the distribution of proposed or listed species, proposed or designated critical habitat, or bald eagles becomes available, this determination may be reconsidered. This certification letter is valid for 1 year.

Information about the online project review process including instructions and use, species information, and other information regarding project reviews within Virginia is available at our website http://www.fws.gov/northeast/virginiafield/endspecies/project\_reviews.html. If you have any questions, please contact Troy Andersen of this office at (804) 824-2428.

Sincerely,

Cindy Schulz Field Supervisor

Virginia Ecological Services

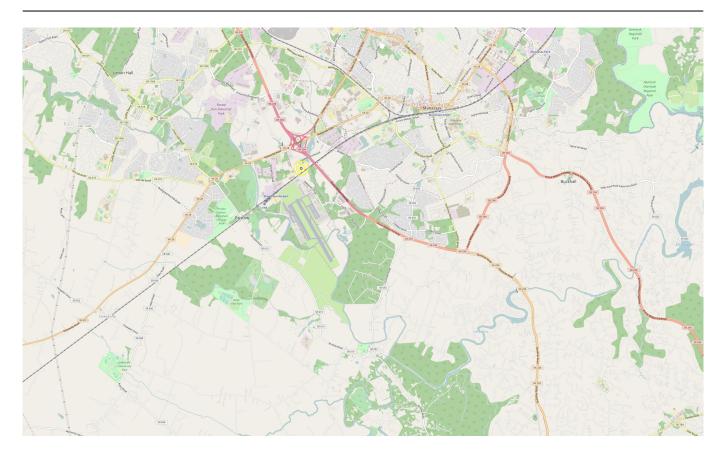
Cynthia a Schuly

Enclosures - project review package

# Exhibit 5 Bald Eagle Nest Buffer Map

### ×

### **CCB Mapping Portal**



Layers: VA Eagle Nest Locator, VA Eagle Nest Buffers

**Map Center [longitude, latitude]:** [-77.50262260437012, 38.72472659806434]

### Map Link:

 $\frac{\text{http://www.ccbbirds.org/maps/\#layer=VA+Eagle+Nest+Locator\&layer=VA+Eagle+Nest+Buffers\&zoom=14\&lat=38.72472659806434\&lng=-77.50262260437012\&legend=legend\_tab\_7c321b7e-e523-11e4-a0-0e0c41326911\&base=Street+Map+%28OSM%29}$ 

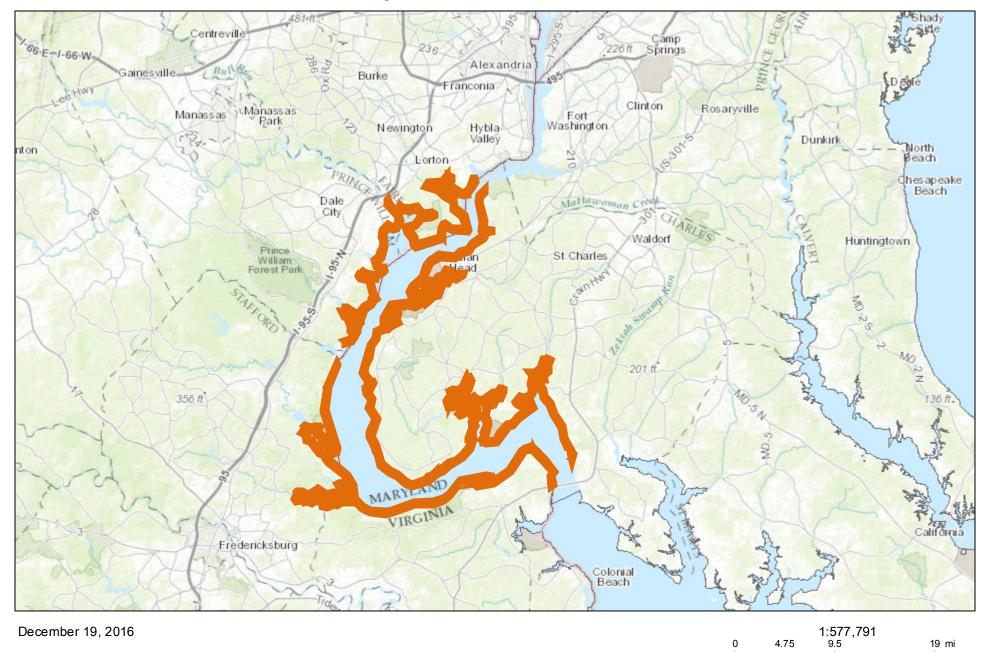
Report Generated On: 12/19/2016

The Center for Conservation Biology (CCB) provides certain data online as a free service to the public and the regulatory sector. CCB encourages the use of its data sets in wildlife conservation and management applications. These data are protected by intellectual property laws. All users are reminded to view the <u>Data Use Agreement</u> to ensure compliance with our data use policies. For additional data access questions, view our <u>Data Distribution Policy</u>, or contact our Data Manager, Marie Pitts, at mlpitts@wm.edu or 757-221-7503.

Report generated by  $\underline{\text{The Center for Conservation Biology Mapping Portal}}.$ 

To learn more about CCB visit ccbbirds.org or contact us at info@ccbbirds.org

### **Eagle Concentration Areas**



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey,

20 km

Endangered, Threatened and Special Concern Species Assessmen Manassas Regional Airport (HEF (+48 acres
(140 00703
Exhibit 6  VDGIF Virginia Fish and Wildlife Information Service (VAFWIS) Search Results

### VaFWIS Initial Project Assessment Report Compiled on 12/21/2016, 3:47:26

**Help** 

Known or likely to occur within a 2 mile radius around point 38.7230278 -77.5163887 in 153 Prince William County, 683 Manassas City, VA

View Map of **Site Location** 

548 Known or Likely Species ordered by Status Concern for Conservation (displaying first 23) (23 species with Status\* or Tier I\*\* or Tier II\*\*)

BOVA Code	Status*	Tier**	Common Name	Scientific Name	Confirmed	Database(s)
010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus		BOVA
050022	FTST	Ia	Bat, northern long-eared	Myotis septentrionalis		BOVA
050020	SE	Ia	Bat, little brown	Myotis lucifugus lucifugus		BOVA
050027	SE	Ia	Bat, tri-colored	Perimyotis subflavus		BOVA
060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes	BOVA,TEWaters,Habitat,SppObs
040096	ST	Ia	Falcon, peregrine	Falco peregrinus		BOVA
040293	ST	Ia	Shrike, loggerhead	Lanius ludovicianus		BOVA
040379	ST	Ia	Sparrow, Henslow's	Ammodramus henslowii		BOVA
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans		BOVA
030063	CC	IIIa	Turtle, spotted	Clemmys guttata		BOVA
030012	СС	IVa	Rattlesnake, timber	Crotalus horridus		BOVA
010077		Ia	Shiner, bridle	Notropis bifrenatus		BOVA
040306		Ia	Warbler, golden- winged	Vermivora chrysoptera		BOVA
100248		Ia	Fritillary, regal	Speyeria idalia idalia		BOVA
040213		Ic	Owl, northern saw-whet	Aegolius acadicus		BOVA
040052		IIa	Duck, American black	Anas rubripes		BOVA
040036		IIa	Night-heron, yellow-crowned	Nyctanassa violacea violacea		BOVA
040181		IIa	Tern, common	Sterna hirundo		BOVA
040320		IIa	Warbler, cerulean	Setophaga cerulea		BOVA
			Woodcock,			Solact+Ontions&comments=&renort=IDA&noi=

040140	IIa	<u>American</u>	Scolopax minor		BOVA
060029	IIa	Lance, yellow	Elliptio lanceolata	<u>Yes</u>	BOVA,SppObs
040203	IIb	Cuckoo, black- billed	Coccyzus erythropthalmus		BOVA
040105	IIb	Rail, king	Rallus elegans		BOVA

### To view All 548 species View 548

\*FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FC=Federal Candidate; CC=Collection Concern

- \*\*J=VA Wildlife Action Plan Tier I Critical Conservation Need; II=VA Wildlife Action Plan Tier II Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need Virginia Widlife Action Plan Conservation Opportunity Ranking:
- a On the ground management strategies/actions exist and can be feasibly implemented.;
- b On the ground actions or research needs have been identified but cannot feasibly be implemented at this time.;
- c No on the ground actions or research needs have been identified or all identified conservation opportunities have been exhausted.

Bat Colonies or Hibernacula: Not Known

### **Anadromous Fish Use Streams**

N/A

### **Colonial Water Bird Survey**

N/A

#### (1 Reach) **Threatened and Endangered Waters**

View Map of All **Threatened and Endangered Waters** 

			T&:	E Wat	ers Species		
Stream Name	Highest						View Map
	TE*	BOVA (	Code, St	atus <sup>*</sup> ,	Tier <sup>**</sup> , Comm	on & Scientific Name	
Broad Run (02070010)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	<u>Yes</u>

### **Managed Trout Streams**

N/A

### **Bald Eagle Concentration Areas and Roosts**

N/A

### **Bald Eagle Nests**

N/A

### Habitat Predicted for Aquatic WAP Tier I & II Species

### View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species

				Tier S	Species		
Stream Name	eam Name Highest TE* BOVA Code, Status*, Tier**, Common & Scientific Name					View Map	
Broad Run (20700102)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	Yes
Kettle Run (20700102)	SE	060006	SE	Ib	Floater, brook	Alasmidonta varicosa	<u>Yes</u>

### Habitat Predicted for Terrestrial WAP Tier I & II Species

N/A

### **Public Holdings:**

N/A

Compiled on 12/21/2016, 3:47:26 PM 1790825.0 report=IPA searchType= R dist= 3218 poi= 38.7230278 -77.5163887

Pixel Size = 64; Anadromous = 0.01207; BECAR = 0.010645; Bats = 0.00956; Buffer = 0.100288; County = 0.07283; Impediments = 0.01028; Init = 0.149316; Public Lands = 0.01739; SppObs = 0.140037; TEWaters = 0.029427; TierReaches = 0.042762; TierTerrestrial = 0.031725; Total = 0.716046; Tracking BOVA = 0.162724; Trout = 0.012359

### Exhibit 7 VDCR Coordination Letter

Molly Joseph Ward Secretary of Natural Resources

Clyde E. Cristman



Rochelle Altholz Deputy Director of Administration and Finance

David C. Dowling Deputy Director of Soil and Water Conservation and Dam Safety

Thomas L. Smith Deputy Director of Operations

January 26, 2017

Matthew Neely Mill Creek Environmental Consultants 11400 Longtown Drive Midlothian, VA 23112

Re: Manassas Regional Airport Corporate Development Project

Dear Mr. Neely:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in our files, the Broad Run Stream Conservation Unit (SCU) is located adjacent to the project site. SCUs identify stream reaches that contain aquatic natural heritage resources, including 2 miles upstream and 1 mile downstream of documented occurrences, and all tributaries within this reach. SCUs are also given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain. The Broad Run SCU has been given a biodiversity significance ranking of B3, which represents a site of high significance. The natural heritage resources of concern associated with this SCU are:

Alasmidonta varicosa Elliptio lanceolata

Brook floater Yellow lance G3/S1/NL/LE G2G3/S2S3/SOC/NL

The Brook floater, a small freshwater mussel species, is known from the northeastern United States primarily in the Atlantic Slope drainages (NatureServe, 2009). In Virginia, it is recorded from the Potomac River basin with a possible record from the James River. Of 14 documented records in Virginia, only two are thought to be viable. Population declines have been documented throughout its range (NatureServe, 2009). The Brook floater typically inhabits flowing-water habitats in and near riffles and rapids of smaller creeks with rocky or gravelly substrates (Nedeau et al., 2000 per NatureServe, 2009). Many facets of its life history are unknown including its fish host. Threats for the Brook floater in particular include poor water quality as this species does not tolerate silt or nutrient pollution well (Stevenson and Bruenderman, 1995). Please note that this species is currently listed as endangered by the Virginia Department of Game and Inland Fisheries (VDGIF).

The Yellow lance occurs in mid-sized rivers and second and third order streams. To survive, it needs a silt-free, stable streambed and well-oxygenated water that is free of pollutants. This species has been the subject of taxonomic debate in recent years (NatureServe, 2009). Currently in Virginia, the Yellow lance is recognized from populations in the Chowan, James, York, and Rappahannock drainages. Its range also extends into Neuse-Tar river system in North Carolina. In recent years, significant population declines have been noted across its range (NatureServe, 2009). The Yellow lance may be particularly sensitive to chemical pollutants and exposure to fine

600 East Main Street, 24th Floor | Richmond, Virginia 23219 | 804-786-6124

sediments from erosion (NatureServe, 2009). Please note that this species is currently classified as a species of concern by the United States Fish and Wildlife Service (USFWS); however, this designation has no official legal status.

Considered good indicators of the health of aquatic ecosystems, freshwater mussels are dependent on good water quality, good physical habitat conditions, and an environment that will support populations of host fish species (Williams et al., 1993). Because mussels are sedentary organisms, they are sensitive to water quality degradation related to increased sedimentation and pollution. They are also sensitive to habitat destruction through dam construction, channelization, and dredging, and the invasion of exotic mollusk species.

In addition, Broad Run has been designated by the VDGIF as a "Threatened and Endangered Species Water" for the Brook floater.

Please note according to DCR's species distribution model, potential may exist for the Dwarf wedgemussel (*Alasmidonta heterodon*, G1G2/S1/LE/LE) at the project location.

To minimize adverse impacts to the aquatic ecosystem as a result of the proposed activities, DCR recommends the implementation of and strict adherence to applicable state and local erosion and sediment control/storm water management laws and regulations. Due to the legal status of the Brook floater, DCR also recommends coordination with Virginia's regulatory authority for the management and protection of this species, the VDGIF, to ensure compliance with the Virginia Endangered Species Act (VA ST §§ 29.1-563 – 570).

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the DCR, DCR represents VDACS in comments regarding potential impacts on statelisted threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

New and updated information is continually added to Biotics. Please re-submit a completed order form and project map for an update on this natural heritage information if the scope of the project changes and/or six months has passed before it is utilized.

A fee of 125.00 has been assessed for the service of providing this information. Please find enclosed an invoice for that amount. Please return one copy of the invoice along with your remittance made payable to the Treasurer of Virginia, DCR - Division of Natural Heritage, 600 East Main Street, 24<sup>th</sup> Floor, Richmond, VA 23219. Payment is due within thirty days of the invoice date. Please note the change of address for remittance of payment as of July 1, 2013. Late payment may result in the suspension of project review service for future projects.

The VDGIF maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from <a href="http://vafwis.org/fwis/">http://vafwis.org/fwis/</a> or contact Ernie Aschenbach at 804-367-2733 or <a href="mailto:Ernie.Aschenbach@dgif.virginia.gov">Ernie.Aschenbach@dgif.virginia.gov</a>.

Should you have any questions or concerns, feel free to contact me at (804) 692-0984. Thank you for the opportunity to comment on this project.

Sincerely,

Alli Baird, LA, ASLA
Coastal Zone Locality Liaison

CC : Amy Ewing, VDGIF Troy Andersen, USFWS

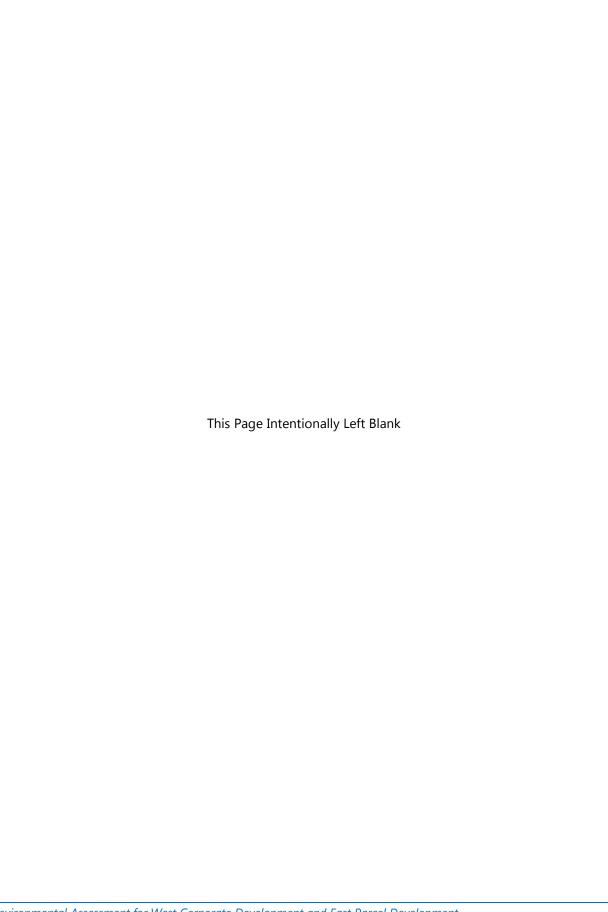
### Literature Cited

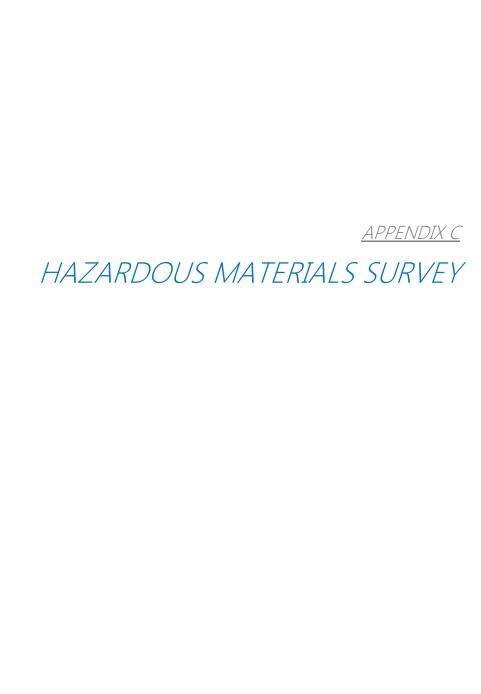
NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 16, 2010 and April 5, 2010).

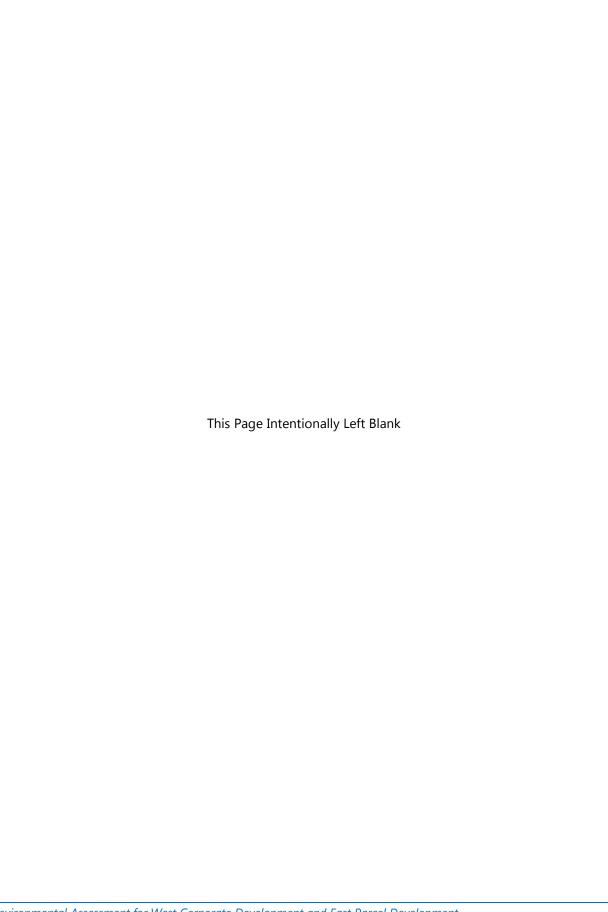
Nedeau, E.J., M.A. McCollough, and B.I. Swartz. 2000. The freshwater mussels of Maine. Maine Department of Inland Fisheries and Wildlife, Augusta, Maine. 118 pp.

Stevenson, Phillip H. and Sue A. Bruenderman 1995. A Guide to Endangered and Threatened Species of Virginia. K. Terwilliger ed. The McDonald and Woodward Publishing Company, Blacksburg, Virginia. p. 74.

Williams, J.D., M.L. Warren, Jr., K.S. Cummings, J.L. Harris, and R.J. Neves. 1993. Conservation status of freshwater mussels of the United States and Canada. Fisheries 18: 6-9.











# Survey and Analysis for Hazardous Materials/Sites Manassas Regional Airport (HEF) Environmental Assessment for Corporate Development Manassas, VA

Prepared for: RS&H 10748 Deerwood Park Blvd South Jacksonville, FL 32256-0597

Prepared by:

Matt Neely
Senior Environmental Scientist, PWD
Mill Creek Environmental Consultants

09 January 2017

### **Table of Contents**

1.0	Introduction	. 1
	Discussion	
	Findings	
	Conclusions	
	References	

### **Exhibits**

Exhibit 1 Project Study Area Map Exhibit 2 EDR Radius Map Report

### 1.0 Introduction

Mill Creek Environmental Consultant's, Ltd. recently completed a survey and analysis of  $\pm$  48 acres of land associated with Manassas Regional Airport (HEF) in Manassas Virginia. The analysis was conducted as part of a Federal Aviation Administration (FAA) mandated Environmental Assessment (EA) for the purpose of corporate development within the EA study area (see Exhibt 1). A main objective of the physical and historical investigation of the study area was to determine if the EA study area might contain uncontrolled hazardous substances or might possibly be contaminated by any hazardous materials/substances or wastes.

### 2.0 Discussion

In order to assess the possibility of an area being contaminated by hazardous materials or substances, an investigator must have knowledge of the definition of the following terms:

- a. <u>Hazardous Material</u> any substance or material that has been determined to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce (49 CFR part 172, table 172,.101). This includes hazardous substances and hazardous wastes.
- b. <u>Hazardous Substances</u> any element, compound, mixture, solution, or substances defined as a hazardous substance under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and listed in 40 CFR part 302. If released into the environment, hazardous substances may pose substantial harm to human health or the environment.
- c. <u>Hazardous Waste</u> under the Resource Conservation and Recovery Act (RCRA) a waste is considered hazardous, if it is listed in, or meets the characteristics described in 40 CFR part 261, including ignitability, corrosivity, reactivity, or toxicity.

Any reconnaissance of a project area for the presence of any of the defined and listed hazardous materials, substances, or waste must consider the geographical setting of the site, its natural environment, and historic use.

The EA study area is comprised of approximately + 48 acres adjacent to the Manassas Regional Airport in Manassas, Virginia. The EA study area is divided into three discontinuous parcels, two to the west (W) of the airport operations area (AOA) and one to the east (E). A map can be seen in (Exhibit 1). All three distinct parcels sit between elevations of 160-180'. Precipitation falling within the two parcels to the west (W) of the AOA makes its way via overland sheet-flow and groundwater movement to Broad Run immediately to the west (W) and south (S). Precipitation falling within the parcel to the east (E) makes its way via overland sheet-flow and groundwater movement down slope to the north (N) into Cannon Branch and eventually into Broad Run, which flows into the Middle Potomac-Anacostia-Occoquan basin (HUCO2070010).



### Area A (+ 25 acres)

The largest of the three parcels comprising the EA study area is area A (± 25 acres). Area A is immediately adjacent to the hangar, apron, and parking spaces on the west (W) side of the AOA between the fence line and Broad Run.



The vast majority of area A (± 22 acres) consists of mature, mixed hardwood forest. Upland vegetation is comprised of a mature over-story containing species such as white oak (*Quercus alba*), northern red oak (*Quercus rubra*), black oak (*Quercus velutina*), tuliptree (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), and various species of hickories (*Carya spp.*), with a limited shrub understory containing instances of deerberry (*Vaccinium stamineum*) and saplings of the over-story species listed above. Representative photos can be seen below.





Areas such as forested wetlands and others containing higher soil moisture content are dominated by species such as red maple (*Acer rubrum*), pin oak (*Quercus palustris*), willow oak (*Quercus phellos*), boxelder maple (*Acer negundo*), and sweetgum (*Liquidambar stryaciflua*). The shrub layer in these areas consisted of saplings of the species listed above, as well as a herbaceous layer containing species such as lizard's tail (*Saururus cernuus*), false nettle (*Boehmeria cylindrica*), shallow sedge (*Carex lurida*), and varying species of rushes (*Juncaceae spp.*). Representative photos can be seen below.





Animal species observed within or known to exist within the boundaries of this forested portion of the study area include white tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), Raccoon (*Procyon lotor* L.), Gray Squirrel (*Sciurus carolinensis L.*), Striped Skunk (*Memphitis memphitis L.*), Eastern Cottontail (*Sylvilagus floridanus L.*), Virginia Opossum (*Didelphis virginiana L.*), Eastern Box Turtle (*Terrapena carolina* L.), and the Black Racer (*Coluber constrictor*), and various species of frogs and skinks. Approximately three acres of EA study area A consists of graded maintained/mowed grass areas immediately adjacent to observation road. The area is characterized as a level, compactly graded lot maintained regularly by normal maintenace. Representative photo seen below.



### Area B (+ 7 acres)

Study area B consists of  $\pm$  7 on the west (W) side of the AOA between aircraft parking aprons, hangars, and taxiway spaces and observation road. It is characterized a by mostly level, compactly graded, grass surface that only changes in elevation as it slopes down to the significant stormwater ditch making its way through the EA study area.



The vegetation in this area consists of maintained fesuces (*festuca spp.*), and other weeds such as broom sedge (*Andropogon virginicus*). Representative photos can be seen below.





### Area C (+16 acres)

Study area C consists of  $\pm$  16 acres on the east (E) side of the AOA, immediately east (E) of wakeman drive and west (W) of Cannon Branch.



Almost all ± 16 acres consists of mature, mixed hardwood forest. Upland vegetation is comprised of a mature over-story containing species such as white oak (*Quercus alba*), northern red oak (*Quercus rubra*), black oak (*Quercus velutina*), tuliptree (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), eastern redcedar (*Juniperus virginiana*) and various species of hickories (*Carya spp.*), with a limited shrub understory containing instances of deerberry (*Vaccinium stamineum*) and saplings of the over-story species listed above. Representative photos can be seen below.





Areas such as forested wetlands and others containing higher soil moisture content are dominated by species such as red maple (*Acer rubrum*), pin oak (*Quercus palustris*), willow oak (*Quercus phellos*), boxelder maple (*Acer negundo*), and sweetgum (*Liquidambar stryaciflua*). The shrub layer in these areas consisted of saplings of the species listed above, as well as a herbaceous layer containing species such as lizard's tail (*Saururus cernuus*), false nettle (*Boehmeria cylindrica*), shallow sedge (*Carex lurida*), and varying species of rushes (*Juncaceae spp.*). Representative photos can be seen below.





Animal species observed within or known to exist within the boundaries of this forested portion of the study area include white tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), Raccoon (*Procyon lotor* L.), Gray Squirrel (*Sciurus carolinensis L.*), Striped Skunk (*Memphitis memphitis L.*), Eastern Cottontail (*Sylvilagus floridanus L.*), Virginia Opossum (*Didelphis virginiana L.*), Eastern Box Turtle (*Terrapena carolina* L.), and the Black Racer (*Coluber constrictor*), and various species of frogs and skinks.

### 3.0 Findings

Physical inspection of the EA study area revealed no hazardous waste, toxic materials or potential origins of hazardous waste production. As a whole the EA study area appears clear of trash or any other materials that may be detrimental to the overall environment or small ecosystems. Normal debris/trash was seen on the grounds, but nothing significant.

As a component of the Hazardous Materials Site Survey for the EA, Mill Creek Environmental Consultants, Ltd. also obtained an Environmental Phase I Report from Environmental Data Resources, Inc.. This report included a search of all Federal, State, and local databases for instances of pollution or environmental contamination in accordance with the radius associated with ASTM standards for the EA study area.

The radius report did not reveal any listed sites within any of the boundaries associated with the EA study area. However, there were listed sites within the external search radius of the EA studya area. Detailed information and maps of these surrounding sites can be seen in Exhibit 2.

### 4.0 Conclusions

Ground examination of the EA study area showed that the location appears free and clear of hazardous materials and/or toxic substances. The overall environment of the EA study area was extremely clean compared to sites of its same nature and size. There does not appear to be any cases of dumping or storing toxic or hazardous materials within the EA study area boundaries.

Development within the study area is unlikely to introduce any hazardous waste or materials to the site.

### 5.0 References

Bregman, J.I., Craig Kelley, and James R. Melchor. 1996. <u>Environmental Compliance Handbook</u>, CRC Lewis Publishers, Boca Raton, FL, 417 pp.

Jain, R.K., L.V. Urban, G.S. Stacey, and H.E. Balbach. 1993. <u>Environmental Assessment</u>. McGraw-Hill, Inc., New York, NY, 526 pp.

US Department of Transportation. 2004. <u>Federal Aviation Administration Order 1050.1E Subj:</u> <u>Environmental Impacts: Policies and Procedures</u>, Washington, DC, 185 pp.

# Exhibit 1 Project Study Area Map



# Exhibit 2 EDR Radius Map Report

Manassas Regional Airport 10600 Harry J Parrish Blvd Manassas, VA 20110

Inquiry Number: 4820776.2s

January 05, 2017

### The EDR Radius Map™ Report



6 Armstrong Road, 4th floor Shelton, CT 06484 Toll Free: 800.352.0050 www.edrnet.com

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GEOCHECK ADDENDUM	

**GeoCheck - Not Requested** 

**Thank you for your business.**Please contact EDR at 1-800-352-0050 with any questions or comments.

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A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

### TARGET PROPERTY INFORMATION

### **ADDRESS**

10600 HARRY J PARRISH BLVD MANASSAS, VA 20110

### COORDINATES

Latitude (North): 38.7235980 - 38° 43' 24.95" Longitude (West): 77.5172620 - 77° 31' 2.14"

Universal Tranverse Mercator: Zone 18 UTM X (Meters): 281159.3 UTM Y (Meters): 4288905.5

Elevation: 177 ft. above sea level

### USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map: 5950529 NOKESVILLE, VA

Version Date: 2013

Southeast Map: 5950785 INDEPENDENT HILL, VA

Version Date: 2013

### AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from: 20140826 Source: USDA

### MAPPED SITES SUMMARY

Target Property Address: 10600 HARRY J PARRISH BLVD MANASSAS, VA 20110

Click on Map ID to see full detail.

MAP				RELATIVE	DIST (ft. & mi.)
ID Ad	SITE NAME	ADDRESS	DATABASE ACRONYMS	ELEVATION	DIRECTION
A1		10677 AVIATION LN	EDR Hist Auto	Higher	1 ft.
A2	COLGAN AIR	10677 AVIATION LANE	PA MANIFEST	Higher	1 ft.
A3		10677 AVIATION LANE	RCRA NonGen / NLR	Higher	1 ft.
A4		10678 AVIATION LANE	RCRA-CESQG, FINDS, NJ MANIFEST, ECHO	Higher	1 ft.
A5	COLGAN AIR	10677 AVIATION LN	PA MANIFEST	Higher	1 ft.
B6		10527 TERMINAL RD	RCRA-CESQG, FINDS, ECHO	Higher	1 ft.
7		10501 OBSERVATION RO	RCRA-CESQG	Lower	1 ft.
B8	DULLES AVIATION INCO	10522 TERMINAL RD	VA LTANKS	Higher	1 ft.
B9	MANASSAS REGIONAL AI	10522 TERMINAL RD	VA UST	Higher	1 ft.
B10	MANASSAS MUNICIPAL A	10522 TERMINAL ROAD	VA LUST	Higher	1 ft.
C11	GATEWAY GENERATION	10453 WAKEMAN DR	VA AST	Lower	1 ft.
C12	MANASSAS REGIONAL AI	10451 WAKEMAN DR	VA AST	Lower	1 ft.
13		9998 WAKEMAN DR.	RCRA-CESQG	Higher	1 ft.
14	AURORA FLIGHT SCIENC	9950 WAKEMAN DR	VA UST	Higher	506, 0.096, North
D15	VA RAILWAY EXPRESS B	10637 PIPER LN	VA UST, VA Financial Assurance	Higher	1122, 0.213, WNW
D16	VA RAILWAY EXPRESS B	10637 PIPER LN	VA AST	Higher	1122, 0.213, WNW
17		10599 RESIDENCY ROAD	RCRA-SQG	Higher	1240, 0.235, WNW
18	VDOT - MANASSAS AREA	10228 RESIDENCY RD	VA LTANKS	Higher	1325, 0.251, NW
19	LONG VERA RESIDENCE	11726 BRISTOW RD	VA LTANKS	Higher	2401, 0.455, South

### TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

### **DATABASES WITH NO MAPPED SITES**

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

### STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list	
NPL	
Proposed NPL	Proposed National Priority List Sites
NPL LIENS	- rederal Superfulid Liens
Federal Delisted NPL site lis	st
Delisted NPL	National Priority List Deletions
Federal CERCLIS list	
FEDERAL FACILITY	Federal Facility Site Information listing
	Superfund Enterprise Management System
Federal CERCLIS NFRAP si	te list
SEMS-ARCHIVE	Superfund Enterprise Management System Archive
Federal RCRA CORRACTS	facilities list
CORRACTS	. Corrective Action Report
Federal RCRA non-CORRA	CTS TSD facilities list
RCRA-TSDF	RCRA - Treatment, Storage and Disposal
Federal RCRA generators li	st
RCRA-LQG	RCRA - Large Quantity Generators
Federal institutional control	ls / engineering controls registries
LUCIS	Land Use Control Information System
US ENG CONTROLS	Engineering Controls Sites List
US INST CONTROL	Sites with Institutional Controls
Federal ERNS list	
	Francisco December Notification Cont
EKNS	Emergency Response Notification System

State- and tribal - equivalent	CERCLIS
VA SHWS	This state does not maintain a SHWS list. See the Federal CERCLIS list and Federal NPL list.
State and tribal landfill and/	or solid waste disposal site lists
VA SWF/LF	Solid Waste Management Facilities
State and tribal leaking store	age tank lists
INDIAN LUST	Leaking Underground Storage Tanks on Indian Land
State and tribal registered s	torage tank lists
FEMA USTINDIAN UST	Underground Storage Tank Listing Underground Storage Tanks on Indian Land
State and tribal institutional	control / engineering control registries
	Engineering Controls Sites Listing Voluntary Remediation Program Database
VA INST CONTROL	Voluntary Remediation Frogram Database
State and tribal voluntary cl	eanup sites
	Voluntary Remediation Program Voluntary Cleanup Priority Listing
State and tribal Brownfields	sites
VA BROWNFIELDS	Brownfields Site Specific Assessments
ADDITIONAL ENVIRONMENTAL	RECORDS
Local Brownfield lists	
US BROWNFIELDS	A Listing of Brownfields Sites
Local Lists of Landfill / Solid	d Waste Disposal Sites
	Report on the Status of Open Dumps on Indian Lands
ODI. DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations
IHS OPEN DUMPS	Open Dumps on Indian Land
Local Lists of Hazardous wa	aste / Contaminated Sites
	Delisted National Clandestine Laboratory Register National Clandestine Laboratory Register

Local Land Records

LIENS 2..... CERCLA Lien Information

### Records of Emergency Release Reports

HMIRS..... Hazardous Materials Information Reporting System VA SPILLS..... Prep/Spills Database Listing

VA SPILLS 90. SPILLS 90 data from FirstSearch

#### Other Ascertainable Records

SCRD DRYCLEANERS...... State Coalition for Remediation of Drycleaners Listing

TRIS...... Toxic Chemical Release Inventory System

RAATS RCRA Administrative Action Tracking System

ICIS...... Integrated Compliance Information System

Act)/TSCA (Toxic Substances Control Act)

COAL ASH EPA..... Coal Combustion Residues Surface Impoundments List

PCB TRANSFORMER\_\_\_\_\_PCB Transformer Registration Database

RADINFO...... Radiation Information Database

HIST FTTS......FIFRA/TSCA Tracking System Administrative Case Listing

DOT OPS...... Incident and Accident Data

CONSENT..... Superfund (CERCLA) Consent Decrees

INDIAN RESERV..... Indian Reservations

FUSRAP\_\_\_\_\_Formerly Utilized Sites Remedial Action Program

UMTRA..... Uranium Mill Tailings Sites

LEAD SMELTERS..... Lead Smelter Sites

US AIRS..... Aerometric Information Retrieval System Facility Subsystem

US MINES..... Mines Master Index File

DOCKET HWC..... Hazardous Waste Compliance Docket Listing

VA NPDES..... Comprehensive Environmental Data System

VA COAL ASH..... Coal Ash Disposal Sites

VA DRYCLEANERS..... Drycleaner List

VA ENF..... Enforcement Actions Data VA TIER 2..... Tier 2 Information Listing

ABANDONED MINES..... Abandoned Mines

### **EDR HIGH RISK HISTORICAL RECORDS**

### **EDR Exclusive Records**

EDR MGP..... EDR Proprietary Manufactured Gas Plants

EDR Hist Cleaner..... EDR Exclusive Historic Dry Cleaners

### **EDR RECOVERED GOVERNMENT ARCHIVES**

#### Exclusive Recovered Govt. Archives

### **SURROUNDING SITES: SEARCH RESULTS**

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property. Page numbers and map identification numbers refer to the EDR Radius Map report where detailed

Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in **bold italics** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

#### STANDARD ENVIRONMENTAL RECORDS

### Federal RCRA generators list

RCRA-SQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

A review of the RCRA-SQG list, as provided by EDR, and dated 06/21/2016 has revealed that there is 1 RCRA-SQG site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
Not reported	10599 RESIDENCY ROAD	WNW 1/8 - 1/4 (0.235 mi.)	17	123

RCRA-CESQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

A review of the RCRA-CESQG list, as provided by EDR, and dated 06/21/2016 has revealed that there are 4 RCRA-CESQG sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
Not reported	10678 AVIATION LANE	0 - 1/8 (0.000 mi.)	A4	21
Not reported	10527 TERMINAL RD	0 - 1/8 (0.000 mi.)	B6	38

Equal/Higher Elevation	Address	<b>Direction / Distance</b>	Map ID	Page	
Not reported 9998 WAKEMAN DR.		0 - 1/8 (0.000 mi.)		116	
Lower Elevation	Address	Direction / Distance	Map ID	Page	
Not reported	10501 OBSERVATION RO	0 - 1/8 (0.000 mi.)	7	40	

### State and tribal leaking storage tank lists

VA LUST: The Leaking Underground Storage Tank Database.

A review of the VA LUST list, as provided by EDR, has revealed that there is 1 VA LUST site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MANASSAS MUNICIPAL A	10522 TERMINAL ROAD	0 - 1/8 (0.000 mi.)	B10	58
Database: LUST REG NO, Date of 0	Government Version: 05/18/2004			
Facility Status: Closed				
Pollution Complaint #: 87-0385				
Pollution Complaint #: 99-3317				
Closed Date: 8/23/1994				
Closed Date: 4/19/1999				
Facility ID: 3900476				

VA LTANKS: The Leaking Tanks Database contains current Leaking petroleum tanks. The data comes from the Department of Environmental Quality.

A review of the VA LTANKS list, as provided by EDR, and dated 08/01/2016 has revealed that there are 3 VA LTANKS sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page	
DULLES AVIATION INCO Facility Status: Closed CEDS Facility Id: 200000078840 Pollution Complaint #: 20013062 Pollution Complaint #: 19910187 Pollution Complaint #: 19870385	10522 TERMINAL RD	0 - 1/8 (0.000 mi.)	B8	42	
VDOT - MANASSAS AREA Facility Status: Closed CEDS Facility Id: 200000096828 Pollution Complaint #: 19900438	10228 RESIDENCY RD	NW 1/4 - 1/2 (0.251 mi.)	18	124	
LONG VERA RESIDENCE Facility Status: Closed CEDS Facility Id: 200000204654 Pollution Complaint #: 20023078	11726 BRISTOW RD	S 1/4 - 1/2 (0.455 mi.)	19	124	

#### State and tribal registered storage tank lists

VA UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Environmental Quality's Underground Storage Tank Data Notification Information.

A review of the VA UST list, as provided by EDR, and dated 08/02/2016 has revealed that there are 3 VA UST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MANASSAS REGIONAL AI Tank Status: CLS IN GRD Tank Status: PERM OUT OF USE Facility Id: 3001899 CEDS Facility ID: 200000078840	10522 TERMINAL RD	0 - 1/8 (0.000 mi.)	B9	43
AURORA FLIGHT SCIENC Tank Status: REM FROM GRD Facility Id: 3042584 CEDS Facility ID: 200000873735	9950 WAKEMAN DR	N 0 - 1/8 (0.096 mi.)	14	118
VA RAILWAY EXPRESS B Tank Status: CURR IN USE Facility Id: 3041755 CEDS Facility ID: 200000850922	10637 PIPER LN	WNW 1/8 - 1/4 (0.213 mi.)	D15	119

VA AST: The Aboveground Storage Tank database contains registered ASTs. The data come from the Department of Environmental Quality's Aboveground Storage Tank Data Notification Information.

A review of the VA AST list, as provided by EDR, and dated 08/02/2016 has revealed that there are 3 VA AST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page	
VA RAILWAY EXPRESS B Facility ID: 3041755 CEDS Facility ID: 200000850922	10637 PIPER LN WNW 1/8 - 1/4 (0.213 mi.)		D16	121	
Lower Elevation	Address	Direction / Distance	Map ID	Page	
GATEWAY GENERATION Facility ID: 3038092 CEDS Facility ID: 200000203272	10453 WAKEMAN DR	0 - 1/8 (0.000 mi.)	C11	59	
MANASSAS REGIONAL AI Facility ID: 3034616 Facility ID: 3038736 CEDS Facility ID: 200000077992 CEDS Facility ID: 200000208957	10451 WAKEMAN DR	0 - 1/8 (0.000 mi.)	C12	62	

#### ADDITIONAL ENVIRONMENTAL RECORDS

#### Other Ascertainable Records

RCRA NonGen / NLR: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 06/21/2016 has revealed that there is 1 RCRA NonGen / NLR site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
Not reported	10677 AVIATION LANE	0 - 1/8 (0.000 mi.)	A3	17

NJ MANIFEST: Hazardous waste manifest information.

A review of the NJ MANIFEST list, as provided by EDR, and dated 12/31/2015 has revealed that there is 1 NJ MANIFEST site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page	
Not reported	10678 AVIATION LANE	0 - 1/8 (0.000 mi.)	A4	21	
EPA Id: VAR000500389					

PA MANIFEST: Hazardous waste manifest information.

A review of the PA MANIFEST list, as provided by EDR, and dated 12/31/2015 has revealed that there are 2 PA MANIFEST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	<b>Direction / Distance</b>	Map ID	Page	
COLGAN AIR Generator EPA Id: VAR000504332	10677 AVIATION LANE	0 - 1/8 (0.000 mi.)	A2	8	
COLGAN AIR Generator EPA Id: VAP000015896	10677 AVIATION LN	0 - 1/8 (0.000 mi.)	A5	28	

#### **EDR HIGH RISK HISTORICAL RECORDS**

#### **EDR Exclusive Records**

EDR Hist Auto: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station,

service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

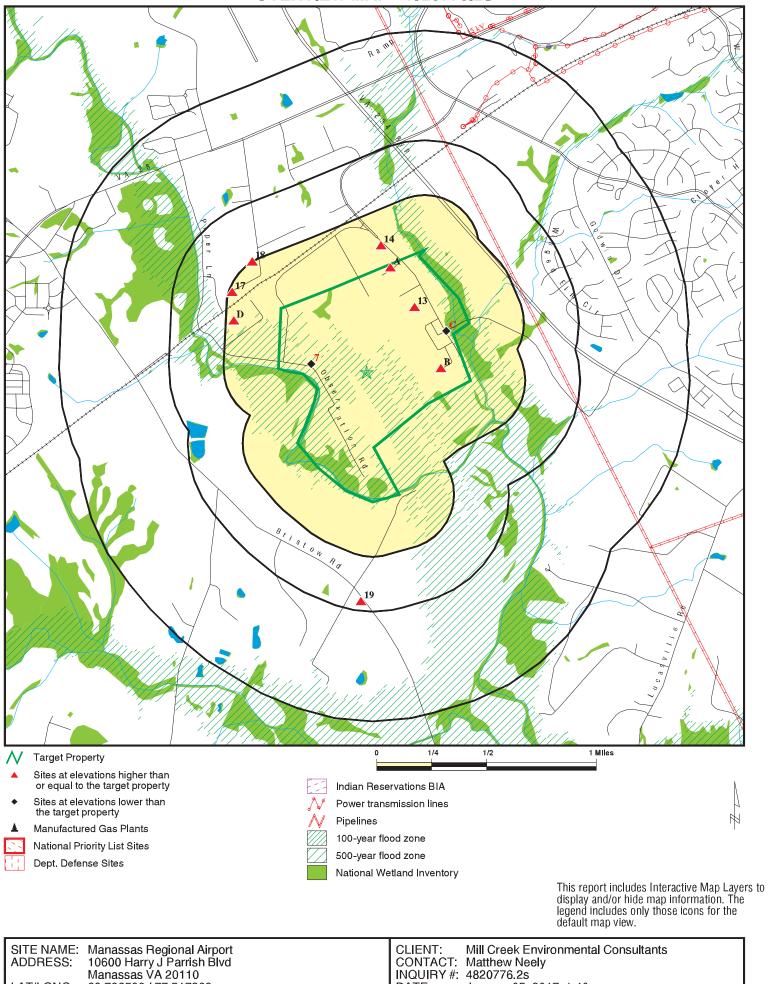
A review of the EDR Hist Auto list, as provided by EDR, has revealed that there is 1 EDR Hist Auto site within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	<b>Direction / Distance</b>	Map ID	Page
Not reported	10677 AVIATION LN	0 - 1/8 (0.000 mi.)	A1	8

Due to poor or inadequate address information, the following sites were not mapped. Count: 6 records.

Site Name	Database(s)
COLONIAL PIPELINE - BULL RUN	VA LUST
AT&T INDEPENDENT HILL	VA LUST
MANASSAS AIRPORT	VA SPILLS
MANASSAS AIRPORT	VA SPILLS
MANASSAS AIRPORT PUMP STATION	VA SPILLS
DULLES AVIATION, INC/MANASSAS AIRP	VA RGA LUST

## **OVERVIEW MAP - 4820776.2S**



CLIENT: Mill Creek Envir CONTACT: Matthew Neely Mill Creek Environmental Consultants

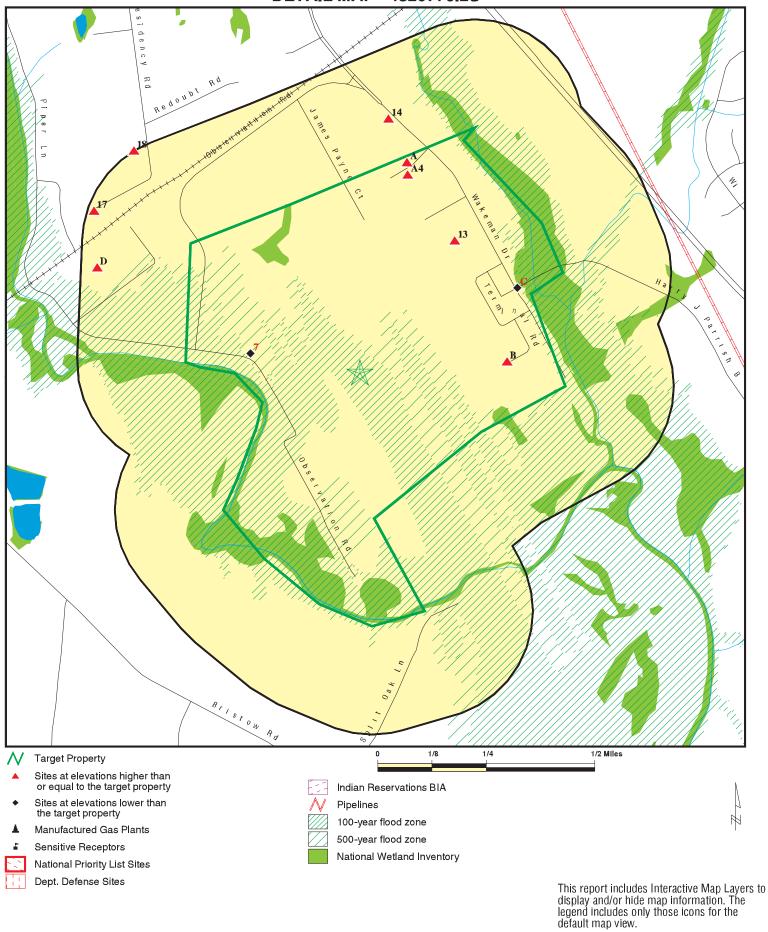
INQUIRY#: 4820776.2s

January 05, 2017 1:40 pm DATE:

LAT/LONG:

38.723598 / 77.517262

## **DETAIL MAP - 4820776.2S**



SITE NAME: Manassas Regional Airport
ADDRESS: 10600 Harry J Parrish Blvd
Manassas VA 20110
LAT/LONG: 38.723598 / 77.517262

CLIENT: Mill Creek Environmental Consultants
CONTACT: Matthew Neely
INQUIRY #: 4820776.2s
DATE: January 05, 2017 1:42 pm

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENT	TAL RECORDS							
Federal NPL site list								
NPL Proposed NPL NPL LIENS	1.000 1.000 TP		0 0 NR	0 0 NR	0 0 NR	0 0 NR	NR NR NR	0 0 0
Federal Delisted NPL sit	te list							
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY SEMS	0.500 0.500		0 0	0 0	0 0	NR NR	NR NR	0 0
Federal CERCLIS NFRA	P site list							
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRAC	TS facilities li	st						
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-COR	RACTS TSD f	acilities list						
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generator	rs list							
RCRA-LQG RCRA-SQG RCRA-CESQG	0.250 0.250 0.250		0 0 4	0 1 0	NR NR NR	NR NR NR	NR NR NR	0 1 4
Federal institutional con engineering controls reg								
LUCIS US ENG CONTROLS US INST CONTROL	0.500 0.500 0.500		0 0 0	0 0 0	0 0 0	NR NR NR	NR NR NR	0 0 0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equiva	alent CERCLIS	8						
VA SHWS	N/A		N/A	N/A	N/A	N/A	N/A	N/A
State and tribal landfill a solid waste disposal site								
VA SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking	storage tank l	ists						
VA LUST INDIAN LUST VA LTANKS	0.500 0.500 0.500		1 0 1	0 0 0	0 0 2	NR NR NR	NR NR NR	1 0 3
State and tribal registere	ed storage tar	ık lists						
FEMA UST	0.250		0	0	NR	NR	NR	0

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
VA UST VA AST INDIAN UST	0.250 0.250 0.250		2 2 0	1 1 0	NR NR NR	NR NR NR	NR NR NR	3 3 0
State and tribal institution control / engineering con								
VA ENG CONTROLS VA INST CONTROL	0.500 0.500		0 0	0 0	0 0	NR NR	NR NR	0 0
State and tribal voluntary	cleanup sites	;						
VA VCP INDIAN VCP	0.500 0.500		0 0	0 0	0 0	NR NR	NR NR	0 0
State and tribal Brownfield	lds sites							
VA BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENT	TAL RECORDS							
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / So Waste Disposal Sites	olid							
INDIAN ODI ODI DEBRIS REGION 9	0.500 0.500 0.500		0 0 0	0 0 0	0 0 0	NR NR NR	NR NR NR	0 0 0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous Contaminated Sites	waste /							
US HIST CDL US CDL	TP TP		NR NR	NR NR	NR NR	NR NR	NR NR	0 0
Local Land Records								
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency R	elease Report	s						
HMIRS VA SPILLS VA SPILLS 90	TP TP TP		NR NR NR	NR NR NR	NR NR NR	NR NR NR	NR NR NR	0 0 0
Other Ascertainable Reco	ords							
RCRA NonGen / NLR FUDS DOD SCRD DRYCLEANERS US FIN ASSUR EPA WATCH LIST 2020 COR ACTION TSCA	0.250 1.000 1.000 0.500 TP TP 0.250		1 0 0 0 NR NR 0 NR	0 0 0 0 NR NR 0 NR	NR 0 0 0 NR NR NR	NR 0 0 NR NR NR NR	NR NR NR NR NR NR	1 0 0 0 0 0 0

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP TP		NR	NR NB	NR	NR	NR NB	0
RAATS	TP		NR NB	NR NB	NR	NR	NR NB	0
PRP PADS	TP		NR NR	NR NR	NR NR	NR NR	NR NR	0 0
ICIS	TP		NR NR	NR NR	NR NR	NR NR	NR NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	Ö
RADINFO	TP		NR	NR	NR	NR	NR	Ö
HIST FTTS	TP		NR	NR	NR	NR	NR	Ö
DOT OPS	TP		NR	NR	NR	NR	NR	Ö
CONSENT	1.000		0	0	0	0	NR	Ö
INDIAN RESERV	1.000		0	Ō	Ö	Ō	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
VA AIRS	TP		NR	NR	NR	NR	NR	0
VA NPDES	TP		NR	NR	NR	NR	NR	0
VA COAL ASH	0.500		0	0	0	NR	NR	0
VA DRYCLEANERS	0.250		0	0	NR	NR	NR	0
VA ENF	TP		NR	NR	NR	NR	NR	0
VA Financial Assurance	TP		NR	NR	NR	NR	NR	0
NJ MANIFEST	0.250		1	0	NR	NR	NR	1
PA MANIFEST	0.250		2 ND	0 ND	NR	NR	NR	2
VA TIER 2	TP TP		NR	NR	NR	NR	NR	0
VA UIC FUELS PROGRAM	0.250		NR 0	NR 0	NR NR	NR NR	NR NR	0 0
ECHO	0.250 TP		NR	NR	NR	NR	NR	0
ABANDONED MINES	0.500		0	0	0	NR	NR	0
EDR HIGH RISK HISTORICA	AL RECORDS							
EDR Exclusive Records								
	1.000		^	0	^	^	NID	^
EDR MGP	1.000		0	0 ND	0 ND	0 ND	NR	0
EDR Hist Auto	0.125		1	NR NB	NR ND	NR	NR NB	1
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
EDR RECOVERED GOVERN	IMENT ARCHI	/ES						
Exclusive Recovered Go	vt. Archives							
VA RGA LF	TP		NR	NR	NR	NR	NR	0

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
VA RGA LUST	TP		NR	NR	NR	NR	NR	0
- Totals		0	15	3	2	0	0	20

### NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

N/A = This State does not maintain a SHWS list. See the Federal CERCLIS list.

MAP FINDINGS Map ID Direction

Distance **EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

Α1 **EDR Hist Auto** 1015143456 10677 AVIATION LN

N/A

1007116771

N/A

< 1/8 MANASSAS, VA 20110 1 ft.

Site 1 of 5 in cluster A

**EDR Historical Auto Stations:** Relative:

MARSHALL AUTO CTR INC Higher Name:

Year: 2003

Actual: Address: 10677 AVIATION LN

197 ft.

**COLGAN AIR** PA MANIFEST **A2** 

**10677 AVIATION LANE** < 1/8 MANASSAS, VA 20110

Site 2 of 5 in cluster A

Relative:

1 ft.

Manifest Details:

Year: 2008 Higher

Actual: 197 ft.

Manifest Number: 000839248JJK Manifest Type: TSD Copy Generator EPA Id: VAR000504332 Generator Date: 06/19/2008 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC

TSD Facility Address: 550 INDUSTRIAL DRIVE TSD Facility City: **LEWISBERRY** 

TSD Facility State: PA

Facility Telephone: Not reported

Page Number: Line Number: 2 D001 Waste Number:

Container Number:

Date TSP Sig:

Container Type: Metal drums, barrels, kegs

Not reported

Waste Quantity: 300 Unit: Pounds Handling Code: Not reported TSP EPA Id: Not reported

Year: 2008

004469812JJK Manifest Number: Manifest Type: TSD Copy Generator EPA Id: VAR000504332 Generator Date: 08/15/2008 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: **LEWISBERRY** 

TSD Facility State: PΑ

Direction Distance Elevation

Site Database(s) **EPA ID Number** 

**COLGAN AIR (Continued)** 

1007116771

**EDR ID Number** 

Facility Telephone: Not reported

Page Number: Line Number: 2 Waste Number: x99x Container Number:

Metal drums, barrels, kegs Container Type:

Waste Quantity: 75 Unit: Pounds Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

2008 Year:

Manifest Number: 004469812JJK Manifest Type: TSD Copy Generator EPA Id: VAR000504332 Generator Date: 08/15/2008 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: **LEWISBERRY** 

TSD Facility State: PΑ

Facility Telephone: Not reported

Page Number: Line Number: 1 Waste Number: D001 Container Number:

Metal drums, barrels, kegs Container Type:

Waste Quantity:

Gallons (liquids only) Unit:

Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

2008 Year:

Manifest Number: 000839939JJK Manifest Type: TSD Copy Generator EPA Id: VAR000504332 Generator Date: 01/25/2008 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported CYCLE CHEM INC TSD Facility Name: TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: **LEWISBERRY** 

TSD Facility State:

Facility Telephone: Not reported

Page Number: Line Number: 4

Direction Distance Elevation

tion Site Database(s) EPA ID Number

**COLGAN AIR (Continued)** 

1007116771

**EDR ID Number** 

Waste Number: XXXX Container Number: 1

Container Type: Metal drums, barrels, kegs

Waste Quantity: 200
Unit: Pounds
Handling Code: Not reported
TSP EPA Id: Not reported
Date TSP Sig: Not reported

Year: 2008

000839248JJK Manifest Number: Manifest Type: TSD Copy VAR000504332 Generator EPA Id: Generator Date: 06/19/2008 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: Not reported

Page Number: 1
Line Number: 3
Waste Number: x99x
Container Number: 2

Container Type: Metal drums, barrels, kegs

Waste Quantity: 500
Unit: Pounds
Handling Code: Not reported
TSP EPA Id: Not reported
Date TSP Sig: Not reported

Year: 2008

Manifest Number: 000838040JJK Manifest Type: TSD Copy VAR000504332 Generator EPA Id: Generator Date: 06/05/2008 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: Not reported

Page Number: 1
Line Number: 1
Waste Number: F005
Container Number: 5

Container Type: Fiberboard or plastic drums, barrels, kegs

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

**COLGAN AIR (Continued)** 1007116771

Waste Quantity: 800 Pounds Unit: Not reported Handling Code: TSP EPA Id: Not reported Date TSP Sig: Not reported

2008 Year:

Manifest Number: 000839248JJK Manifest Type: TSD Copy Generator EPA Id: VAR000504332 06/19/2008 Generator Date: Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported 703-331-3122 Contact Phone: TSD EPA Id: PAD067098822 TSD Date: Not reported CYCLE CHEM INC TSD Facility Name: TSD Facility Address: 550 INDUSTRIAL DRIVE

**LEWISBERRY** TSD Facility City:

TSD Facility State: PΑ

Facility Telephone: Not reported

Page Number: 1 Line Number: Waste Number: D001 Container Number:

Container Type: Metal drums, barrels, kegs

Waste Quantity: 300 Unit: Pounds Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

Year: 2008

Manifest Number: 000839939JJK Manifest Type: TSD Copy Generator EPA Id: VAR000504332 Generator Date: 01/25/2008 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: **LEWISBERRY** 

TSD Facility State: PΑ

Facility Telephone: Not reported

Page Number: Line Number: 3 Waste Number: D035 Container Number:

Container Type: Metal drums, barrels, kegs

Waste Quantity: 200 Unit: Pounds Handling Code: Not reported

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

**COLGAN AIR (Continued)** 1007116771

TSP EPA Id: Not reported Date TSP Sig: Not reported

2008 Year:

Manifest Number: 000839939JJK TSD Copy Manifest Type: Generator EPA Id: VAR000504332 Generator Date: 01/25/2008 Mailing Address: Not reported Mailing City, St, Zip: Not reported Not reported Contact Name: Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported CYCLE CHEM INC TSD Facility Name: TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: **LEWISBERRY** 

TSD Facility State: PΑ

Facility Telephone: Not reported

Page Number: Line Number: 2 Waste Number: D001 Container Number: 2

Container Type: Metal drums, barrels, kegs

Waste Quantity: 120 Unit: Pounds Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

2008 Year:

Manifest Number: 000839939JJK TSD Copy Manifest Type: Generator EPA Id: VAR000504332 01/25/2008 Generator Date: Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC 550 INDUSTRIAL DRIVE TSD Facility Address:

TSD Facility City: **LEWISBERRY** 

TSD Facility State: PΑ

Facility Telephone: Not reported

Page Number: Line Number: Waste Number: F005 Container Number:

Container Type: Metal drums, barrels, kegs

Waste Quantity: Pounds Unit: Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

MAP FINDINGS Map ID Direction

Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

**COLGAN AIR (Continued)** 1007116771

Year: 2008

Manifest Number: 000839939JJK Manifest Type: TSD Copy Generator EPA Id: VAR000504332 Generator Date: 01/25/2008 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: **LEWISBERRY** 

TSD Facility State:

Facility Telephone: Not reported

Page Number: Line Number: 1 Waste Number: F003 Container Number:

Container Type: Metal drums, barrels, kegs

Waste Quantity: 200 Unit: **Pounds** Handling Code: Not reported TSP EPA Id: Not reported Not reported Date TSP Sig:

Year: 2008

004469812JJK Manifest Number: TSD Copy Manifest Type: Generator EPA Id: VAR000504332 Generator Date: 08/15/2008 Mailing Address: Not reported Mailing City, St, Zip: Not reported Not reported Contact Name: Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC 550 INDUSTRIAL DRIVE TSD Facility Address:

TSD Facility City: **LEWISBERRY** 

TSD Facility State: PΑ

Facility Telephone: Not reported

Page Number: Line Number: 1 Waste Number: F005 Container Number:

Container Type: Metal drums, barrels, kegs

Waste Quantity:

Unit: Gallons (liquids only)

Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

Year: 2008

Manifest Number: 000838040JJK Manifest Type: TSD Copy

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

**COLGAN AIR (Continued)** 

1007116771

Generator EPA Id: VAR000504332 06/05/2008 Generator Date: Not reported Mailing Address: Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

**LEWISBERRY** TSD Facility City:

TSD Facility State: PΑ

Facility Telephone: Not reported

Page Number: Line Number: D035 Waste Number: Container Number:

Container Type: Fiberboard or plastic drums, barrels, kegs

Waste Quantity: 800 Unit: Pounds Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

2008 Year:

Manifest Number: 000838040JJK **TSD Copy** Manifest Type: Generator EPA Id: VAR000504332 06/05/2008 Generator Date: Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: 703-331-3122 PAD067098822 TSD EPA Id: TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: **LEWISBERRY** 

TSD Facility State: PΑ

Facility Telephone: Not reported

Page Number: 1 Line Number: Waste Number: D001 Container Number: 5

Container Type: Fiberboard or plastic drums, barrels, kegs

Waste Quantity: 800 Unit: Pounds Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

Year: 2008

000839939JJK Manifest Number: Manifest Type: TSD Copy VAR000504332 Generator EPA Id: Generator Date: 01/25/2008 Mailing Address: Not reported

Distance

Elevation Site Database(s) EPA ID Number

COLGAN AIR (Continued) 1007116771

Mailing City, St, Zip:
Contact Name:
Not reported
Contact Phone:
TSD EPA Id:
TSD Date:
TSD Facility Name:
TSD Facility Address:
Not reported
CYCLE CHEM INC
TSD Facility Address:
TSD Not reported
CYCLE CHEM INC
TSD Facility Address:
TSD Facility Address:

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: Not reported

Page Number: 1
Line Number: 2
Waste Number: D018
Container Number: 2

Container Type: Metal drums, barrels, kegs

Waste Quantity: 120
Unit: Pounds
Handling Code: Not reported
TSP EPA Id: Not reported
Date TSP Sig: Not reported

Year: 2008

Manifest Number: 000839248JJK Manifest Type: TSD Copy Generator EPA Id: VAR000504332 Generator Date: 06/19/2008 Mailing Address: Not reported Mailing City, St, Zip: Not reported Not reported Contact Name: Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: Not reported

Page Number: 1
Line Number: 4
Waste Number: x99x
Container Number: 1

Container Type: Metal drums, barrels, kegs

Waste Quantity: 250
Unit: Pounds
Handling Code: Not reported
TSP EPA Id: Not reported
Date TSP Sig: Not reported

Year: 2008

Manifest Number: 004469812JJK TSD Copy Manifest Type: Generator EPA Id: VAR000504332 08/15/2008 Generator Date: Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: 703-331-3122

Distance

Elevation Site Database(s) EPA ID Number

COLGAN AIR (Continued) 1007116771

TSD EPA Id: PAD067098822
TSD Date: Not reported
TSD Facility Name: CYCLE CHEM INC
TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: Not reported

 Page Number:
 1

 Line Number:
 1

 Waste Number:
 F003

 Container Number:
 9

Container Type: Metal drums, barrels, kegs

Waste Quantity: 495

Unit: Gallons (liquids only)

Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

Year: 2008

000838040JJK Manifest Number: Manifest Type: TSD Copy VAR000504332 Generator EPA Id: Generator Date: 06/05/2008 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: Not reported

 Page Number:
 1

 Line Number:
 1

 Waste Number:
 F003

 Container Number:
 5

Container Type: Fiberboard or plastic drums, barrels, kegs

Waste Quantity: 800
Unit: Pounds
Handling Code: Not reported
TSP EPA Id: Not reported
Date TSP Sig: Not reported

Year: 2008

Manifest Number: 000839939JJK Manifest Type: TSD Copy VAR000504332 Generator EPA Id: Generator Date: 01/25/2008 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

**COLGAN AIR (Continued)** 1007116771

TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: **LEWISBERRY** 

TSD Facility State: PΑ

Facility Telephone: Not reported

Page Number: Line Number: Waste Number: D001 Container Number:

Container Type: Metal drums, barrels, kegs

Waste Quantity: 200 Unit: Pounds Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

Year: 2008

004469812JJK Manifest Number: TSD Copy Manifest Type: VAR000504332 Generator EPA Id: 08/15/2008 Generator Date: Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: **LEWISBERRY** 

TSD Facility State: PΑ

Facility Telephone: Not reported

Page Number: 1 Line Number: Waste Number: D035 Container Number:

Container Type: Metal drums, barrels, kegs

Waste Quantity:

Unit: Gallons (liquids only)

Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

> Click this hyperlink while viewing on your computer to access 40 additional PA\_MANIFEST: record(s) in the EDR Site Report.

А3 RCRA NonGen / NLR 1015751558

**10677 AVIATION LANE** < 1/8 MANASSAS, VA 20110

1 ft.

Site 3 of 5 in cluster A

RCRA NonGen / NLR: Relative:

Date form received by agency: 07/03/2012 Higher Facility name: Not reported

Actual: Facility address: 10677 AVIATION LANE 197 ft.

MANASSAS, VA 20110

VAR000504332 EPA ID: Mailing address: **AVIATION LANE**  VAR000504332

Direction Distance

Elevation Site Database(s) **EPA ID Number** 

(Continued) 1015751558

MANASSAS, VA 201102701 Contact: KENNETH CERRETTI Contact address: 10677 AVIATION LANE

MANASSAS, VA 201102701

Contact country: US

(703) 331-3122 Contact telephone: Contact email: Not reported EPA Region: Not reported Land type: Private Classification: Non-Generator

Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:

CITY OF MANASSAS Owner/operator name:

Owner/operator address: Not reported

Not reported Not reported

Owner/operator country: Owner/operator telephone: Not reported Legal status: Municipal Owner/Operator Type: Owner Not reported Owner/Op start date: Owner/Op end date: Not reported

COLGAN AIR INC. Owner/operator name: Owner/operator address: Not reported

Not reported

Owner/operator country: US

Owner/operator telephone: Not reported Legal status: Private Operator Owner/Operator Type: Owner/Op start date: 01/01/2007 Owner/Op end date: Not reported

COLGAN AIR, INC Owner/operator name:

Owner/operator address: PINNACLE AIRLINES CORP. 40 SOUTH MAIN ST

MEMPHIS, TN 38103

Owner/operator country:

Owner/operator telephone: (901) 348-4100

Legal status: Private Owner/Operator Type: Owner Owner/Op start date: 01/01/2007 Owner/Op end date: Not reported

Handler Activities Summary:

U.S. importer of hazardous waste: No Mixed waste (haz. and radioactive): No Recycler of hazardous waste: No Transporter of hazardous waste: No No Treater, storer or disposer of HW: Underground injection activity: No On-site burner exemption: No Furnace exemption: No Used oil fuel burner: No Used oil processor: No User oil refiner: No Used oil fuel marketer to burner: No

Direction Distance

Elevation Site Database(s) EPA ID Number

(Continued) 1015751558

Used oil Specification marketer: No Used oil transfer facility: No Used oil transporter: No

**Historical Generators:** 

Date form received by agency: 10/18/2002 Site name: COLGAN AIR

Classification: Small Quantity Generator

Waste code: D001

Waste name: IGNITABLE WASTE

Waste code: D035

. Waste name: METHYL ETHYL KETONE

. Waste code: F005

. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL

KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE,

2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001. F002. OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF

THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Facility Has Received Notices of Violations:

Regulation violated: Not reported

Area of violation: Generators - Manifest

Date violation determined:
Date achieved compliance:
Violation lead agency:
Enforcement action:
Enforcement action date:
Enf. disposition status:
Enf. disp. status date:
Enforcement lead agency:
Not reported
Not reported
Not reported
Not reported
Not reported
Not reported

Enf. disp. status date: Not reported Enforcement lead agency: Proposed penalty amount: Not reported Not reported Paid penalty amount: Not reported Not reported Not reported

Regulation violated: Not reported

Area of violation: Generators - General

Date violation determined: 10/26/2006
Date achieved compliance: 11/03/2006
Violation lead agency: State

Enforcement action: VERBAL INFORMAL

Enforcement action date: 11/16/2006
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State

Proposed penalty amount: Not reported Final penalty amount: Not reported Paid penalty amount: Not reported Not reported

Regulation violated: Not reported

Area of violation: TSD IS-Container Use and Management

Date violation determined: 10/26/2006

Direction Distance

Elevation Site Database(s) EPA ID Number

(Continued) 1015751558

Date achieved compliance: 11/03/2006 Violation lead agency: State

Enforcement action: VERBAL INFORMAL

Enforcement action date: 11/16/2006
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported

Area of violation: Generators - Pre-transport

Date violation determined: 10/26/2006
Date achieved compliance: 11/03/2006
Violation lead agency: State

Enforcement action: VERBAL INFORMAL

Enforcement action date: 11/16/2006
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State

Proposed penalty amount: Not reported Final penalty amount: Not reported Paid penalty amount: Not reported Not reported

**Evaluation Action Summary:** 

Evaluation date: 05/02/2008

Evaluation: NON-FINANCIAL RECORD REVIEW

Area of violation: Generators - Manifest

Date achieved compliance: 05/13/2008 Evaluation lead agency: State

Evaluation date: 10/26/2006

Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE

Area of violation: Generators - Pre-transport

Date achieved compliance: 11/03/2006 Evaluation lead agency: State

Evaluation date: 10/26/2006

Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE

Area of violation: Generators - General

Date achieved compliance: 11/03/2006 Evaluation lead agency: State

Evaluation date: 10/26/2006

Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE

Area of violation: TSD IS-Container Use and Management

Date achieved compliance: 11/03/2006 Evaluation lead agency: State

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

Α4 RCRA-CESQG 1004791730 **10678 AVIATION LANE FINDS** VAR000500389

< 1/8 MANASSAS, VA 20110 1 ft.

Site 4 of 5 in cluster A

RCRA-CESQG: Relative:

Higher Date form received by agency: 12/11/2000 Facility name: Not reported

Actual: Facility address: 10678 AVIATION LANE 197 ft.

MANASSAS, VA 201102729

EPA ID: VAR000500389 PAUL WUTTKE Contact: Contact address: 10678 AVIATION LANE

MANASSAS, VA 201102729

Contact country:

Contact telephone: (703) 632-4033 Contact email: Not reported EPA Region: Not reported Land type: Municipal

Classification: Conditionally Exempt Small Quantity Generator

Description: Handler: generates 100 kg or less of hazardous waste per calendar

> month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from

**NJ MANIFEST** 

**ECHO** 

the cleanup of a spill, into or on any land or water, of acutely

hazardous waste

Owner/Operator Summary: Owner/operator name:

Owner/operator address: PO BOX 807

BRISTOW, VA 20136

Owner/operator country: Not reported (703) 632-4000 Owner/operator telephone:

Legal status: Federal Owner/Operator Type: Owner Owner/Op start date: Not reported Owner/Op end date: Not reported

Handler Activities Summary:

U.S. importer of hazardous waste: No Mixed waste (haz. and radioactive): No Recycler of hazardous waste: No Transporter of hazardous waste: No Treater, storer or disposer of HW: No Underground injection activity: No On-site burner exemption: No Furnace exemption: No Used oil fuel burner: No Used oil processor: No

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

(Continued) 1004791730

User oil refiner: No Used oil fuel marketer to burner: No Used oil Specification marketer: No Used oil transfer facility: No Used oil transporter: No

Waste code: D001

**IGNITABLE WASTE** Waste name:

Violation Status: No violations found

**Evaluation Action Summary:** 

Evaluation date: 10/26/2006

COMPLIANCE EVALUATION INSPECTION ON-SITE Evaluation:

Not reported Area of violation: Date achieved compliance: Not reported Evaluation lead agency: State

FINDS:

Registry ID: 110005291745

Environmental Interest/Information System

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and

corrective action activities required under RCRA.

NJ MANIFEST:

EPA Id: VAR000500389 Mail Address: 10678 AVIATION LANE Mail City/State/Zip: MANASSAS 20110 Facility Phone: 7033303691 **Emergency Phone:** Not reported Contact: THOMAS CRANE Comments: Not reported SIC Code: Not reported

County: 00 Municipal: 00

Previous EPA Id: Not reported

Gen Flag:

Trans Flag: Not reported TSDF Flag: Not reported Name Change: Not reported Not reported Date Change:

Manifest:

NJA5309787 Manifest Number: EPA ID: VAR000500389 Date Shipped: 06/09/2006 TSDF EPA ID: NJD002182897 Transporter EPA ID: TXR000050930 Transporter 2 EPA ID: Not reported Transporter 3 EPA ID: Not reported

Map ID MAP FINDINGS
Direction

Distance Elevation

Site Database(s) EPA ID Number

(Continued) 1004791730

Transporter 4 EPA ID: Not reported Not reported Transporter 5 EPA ID: Not reported Transporter 6 EPA ID: Transporter 7 EPA ID: Not reported Transporter 8 EPA ID: Not reported Transporter 9 EPA ID: Not reported Not reported Transporter 10 EPA ID: Date Trans1 Transported Waste: 06/09/2006 Date Trans2 Transported Waste: Not reported Date Trans3 Transported Waste: Not reported Date Trans4 Transported Waste: Not reported Date Trans5 Transported Waste: Not reported Date Trans6 Transported Waste: Not reported Date Trans7 Transported Waste: Not reported Date Trans8 Transported Waste: Not reported Not reported Date Trans9 Transported Waste: Not reported Date Trans10 Transported Waste: Date TSDF Received Waste: 06/14/2006 TSDF EPA Facility Name: Not reported QTY Units: Not reported Transporter SEQ ID: Not reported Transporter-1 Date: Not reported Waste SEQ ID: Not reported Waste Type Code 2: Not reported Waste Type Code 3: Not reported Not reported Waste Type Code 4: Waste Type Code 5: Not reported Waste Type Code 6: Not reported Date Accepted: Not reported Manifest Discrepancy Type: Not reported Data Entry Number: 07240621

Was Load Rejected: MANASSAS 20110
Reason Load Was Rejected: Not reported

Manifest Number: NJA5072103 EPA ID: VAR000500389 Date Shipped: 12/03/2004 TSDF EPA ID: NJD002182897 Transporter EPA ID: TXR000050930 Transporter 2 EPA ID: Not reported Not reported Transporter 3 EPA ID: Transporter 4 EPA ID: Not reported Transporter 5 EPA ID: Not reported Transporter 6 EPA ID: Not reported Transporter 7 EPA ID: Not reported Transporter 8 EPA ID: Not reported Transporter 9 EPA ID: Not reported Transporter 10 EPA ID: Not reported Date Trans1 Transported Waste: 12/03/2004 Not reported Date Trans2 Transported Waste: Not reported Date Trans3 Transported Waste: Date Trans4 Transported Waste: Not reported Date Trans5 Transported Waste: Not reported Date Trans6 Transported Waste: Not reported Date Trans7 Transported Waste: Not reported Date Trans8 Transported Waste: Not reported

Not reported

Date Trans9 Transported Waste:

Map ID MAP FINDINGS
Direction

Distance Elevation

Site Database(s) EPA ID Number

(Continued) 1004791730

Date Trans10 Transported Waste: Not reported Date TSDF Received Waste: 12/12/2004 TSDF EPA Facility Name: Not reported QTY Units: Not reported Transporter SEQ ID: Not reported Transporter-1 Date: Not reported Not reported Waste SEQ ID: Not reported Waste Type Code 2: Waste Type Code 3: Not reported Waste Type Code 4: Not reported Waste Type Code 5: Not reported Waste Type Code 6: Not reported Date Accepted: Not reported Manifest Discrepancy Type: Not reported Data Entry Number: 01210521

Was Load Rejected: MANASSAS 20110

Reason Load Was Rejected: Not reported

Manifest Number: NJA5250977 EPA ID: VAR000500389 Date Shipped: 11/04/2005 TSDF EPA ID: NJD002182897 Transporter EPA ID: TXR000050930 Transporter 2 EPA ID: Not reported Transporter 3 EPA ID: Not reported Transporter 4 EPA ID: Not reported Transporter 5 EPA ID: Not reported Transporter 6 EPA ID: Not reported Transporter 7 EPA ID: Not reported Transporter 8 EPA ID: Not reported Not reported Transporter 9 EPA ID: Transporter 10 EPA ID: Not reported Date Trans1 Transported Waste: 11/04/2005 Date Trans2 Transported Waste: Not reported Not reported Date Trans3 Transported Waste: Not reported Date Trans4 Transported Waste: Date Trans5 Transported Waste: Not reported Date Trans6 Transported Waste: Not reported Date Trans7 Transported Waste: Not reported Date Trans8 Transported Waste: Not reported Date Trans9 Transported Waste: Not reported Date Trans10 Transported Waste: Not reported Date TSDF Received Waste: 11/10/2005 TSDF EPA Facility Name: Not reported Not reported QTY Units: Transporter SEQ ID: Not reported Transporter-1 Date: Not reported Waste SEQ ID: Not reported Waste Type Code 2: Not reported Waste Type Code 3: Not reported Waste Type Code 4: Not reported Waste Type Code 5: Not reported Not reported Waste Type Code 6: Date Accepted: Not reported Manifest Discrepancy Type: Not reported

Was Load Rejected: MANASSAS 20110

01180625

Data Entry Number:

Map ID MAP FINDINGS
Direction

Distance Elevation

Site Database(s) EPA ID Number

(Continued) 1004791730

Reason Load Was Rejected: Not reported

Manifest Number: NJA5070800 VAR000500389 EPA ID: Date Shipped: 03/14/2005 TSDF EPA ID: NJD002182897 Transporter EPA ID: TXR000050930 Transporter 2 EPA ID: Not reported Transporter 3 EPA ID: Not reported Transporter 4 EPA ID: Not reported Transporter 5 EPA ID: Not reported Transporter 6 EPA ID: Not reported Transporter 7 EPA ID: Not reported Transporter 8 EPA ID: Not reported Transporter 9 EPA ID: Not reported Transporter 10 EPA ID: Not reported 03/14/2005 Date Trans1 Transported Waste: Date Trans2 Transported Waste: Not reported Date Trans3 Transported Waste: Not reported Date Trans4 Transported Waste: Not reported Date Trans5 Transported Waste: Not reported Date Trans6 Transported Waste: Not reported Date Trans7 Transported Waste: Not reported Date Trans8 Transported Waste: Not reported Date Trans9 Transported Waste: Not reported Not reported Date Trans10 Transported Waste: Date TSDF Received Waste: 03/21/2005 TSDF EPA Facility Name: Not reported QTY Units: Not reported Transporter SEQ ID: Not reported Transporter-1 Date: Not reported Waste SEQ ID: Not reported Waste Type Code 2: Not reported Waste Type Code 3: Not reported Not reported Waste Type Code 4: Waste Type Code 5: Not reported Waste Type Code 6: Not reported Date Accepted: Not reported Manifest Discrepancy Type: Not reported Data Entry Number: 05110521 Was Load Rejected: MANASSAS 20110

Manifest Number: NJA5070132 EPA ID: VAR000500389 Date Shipped: 08/02/2004 TSDF EPA ID: NJD002182897 Transporter EPA ID: TXR000050930 Transporter 2 EPA ID: Not reported Transporter 3 EPA ID: Not reported Transporter 4 EPA ID: Not reported Transporter 5 EPA ID: Not reported Transporter 6 EPA ID: Not reported Transporter 7 EPA ID: Not reported Transporter 8 EPA ID: Not reported Transporter 9 EPA ID: Not reported Transporter 10 EPA ID: Not reported

Not reported

Reason Load Was Rejected:

Direction Distance Elevation

levation Site Database(s) EPA ID Number

(Continued) 1004791730

Date Trans1 Transported Waste: 08/02/2004 Date Trans2 Transported Waste: Not reported Date Trans3 Transported Waste: Not reported Date Trans4 Transported Waste: Not reported Date Trans5 Transported Waste: Not reported Date Trans6 Transported Waste: Not reported Date Trans7 Transported Waste: Not reported Not reported Date Trans8 Transported Waste: Date Trans9 Transported Waste: Not reported Date Trans10 Transported Waste: Not reported 08/06/2004 Date TSDF Received Waste: TSDF EPA Facility Name: Not reported QTY Units: Not reported Transporter SEQ ID: Not reported Transporter-1 Date: Not reported Waste SEQ ID: Not reported Not reported Waste Type Code 2: Waste Type Code 3: Not reported Waste Type Code 4: Not reported Waste Type Code 5: Not reported Waste Type Code 6: Not reported Date Accepted: Not reported Manifest Discrepancy Type: Not reported Data Entry Number: 08300425

Was Load Rejected: MANASSAS 20110

Reason Load Was Rejected: Not reported

Manifest Number: NJA5094858 EPA ID: VAR000500389 Date Shipped: 04/16/2004 TSDF EPA ID: NJD002182897 TXR000050930 Transporter EPA ID: Transporter 2 EPA ID: Not reported Transporter 3 EPA ID: Not reported Transporter 4 EPA ID: Not reported Transporter 5 EPA ID: Not reported Transporter 6 EPA ID: Not reported Transporter 7 EPA ID: Not reported Transporter 8 EPA ID: Not reported Transporter 9 EPA ID: Not reported Transporter 10 EPA ID: Not reported 04/16/2004 Date Trans1 Transported Waste: Date Trans2 Transported Waste: Not reported Date Trans3 Transported Waste: Not reported Date Trans4 Transported Waste: Not reported Date Trans5 Transported Waste: Not reported Date Trans6 Transported Waste: Not reported Date Trans7 Transported Waste: Not reported Date Trans8 Transported Waste: Not reported Date Trans9 Transported Waste: Not reported Date Trans10 Transported Waste: Not reported Date TSDF Received Waste: 04/26/2004 TSDF EPA Facility Name: Not reported QTY Units: Not reported Transporter SEQ ID: Not reported Transporter-1 Date: Not reported Waste SEQ ID: Not reported

Direction Distance Elevation

on Site Database(s) EPA ID Number

(Continued) 1004791730

Waste Type Code 2: Not reported
Waste Type Code 3: Not reported
Waste Type Code 4: Not reported
Waste Type Code 5: Not reported
Waste Type Code 6: Not reported
Date Accepted: Not reported
Manifest Discrepancy Type: Not reported

Manifest Discrepancy Type: Not reported
Data Entry Number: 05110421
Was Load Rejected: MANASSAS 20110

Reason Load Was Rejected: Not reported NJA5068386 Manifest Number: EPA ID: VAR000500389 Date Shipped: 06/29/2005 TSDF EPA ID: NJD002182897 Transporter EPA ID: TXR000050930 Transporter 2 EPA ID: Not reported Transporter 3 EPA ID: Not reported Transporter 4 EPA ID: Not reported Transporter 5 EPA ID: Not reported Transporter 6 EPA ID: Not reported Transporter 7 EPA ID: Not reported Transporter 8 EPA ID: Not reported Transporter 9 EPA ID: Not reported Transporter 10 EPA ID: Not reported Date Trans1 Transported Waste: 06/29/2005 Date Trans2 Transported Waste: Not reported Date Trans3 Transported Waste: Not reported Date Trans4 Transported Waste: Not reported Date Trans5 Transported Waste: Not reported Date Trans6 Transported Waste: Not reported Date Trans7 Transported Waste: Not reported Date Trans8 Transported Waste: Not reported Date Trans9 Transported Waste: Not reported Date Trans10 Transported Waste: Not reported Date TSDF Received Waste: 07/06/2005 TSDF EPA Facility Name: Not reported QTY Units: Not reported Transporter SEQ ID: Not reported Transporter-1 Date: Not reported Not reported Waste SEQ ID: Not reported Waste Type Code 2: Waste Type Code 3: Not reported Not reported Waste Type Code 4:

Was Load Rejected: MANASSAS 20110
Reason Load Was Rejected: Not reported

Waste Type Code 5: Waste Type Code 6:

Data Entry Number:

Manifest Discrepancy Type:

Date Accepted:

Not reported

Not reported

Not reported

Not reported

07280525

 Manifest Number:
 NJA5259467

 EPA ID:
 VAR000500389

 Date Shipped:
 02/15/2006

 TSDF EPA ID:
 NJD002182897

 Transporter EPA ID:
 TXR000050930

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

(Continued) 1004791730

Transporter 2 EPA ID: Not reported Not reported Transporter 3 EPA ID: Transporter 4 EPA ID: Not reported Transporter 5 EPA ID: Not reported Transporter 6 EPA ID: Not reported Transporter 7 EPA ID: Not reported Not reported Transporter 8 EPA ID: Not reported Transporter 9 EPA ID: Transporter 10 EPA ID: Not reported Date Trans1 Transported Waste: 02/15/2006 Date Trans2 Transported Waste: Not reported Not reported Date Trans3 Transported Waste: Date Trans4 Transported Waste: Not reported Date Trans5 Transported Waste: Not reported Date Trans6 Transported Waste: Not reported Date Trans7 Transported Waste: Not reported Date Trans8 Transported Waste: Not reported Date Trans9 Transported Waste: Not reported Date Trans10 Transported Waste: Not reported 02/21/2006 Date TSDF Received Waste: TSDF EPA Facility Name: Not reported QTY Units: Not reported Not reported Transporter SEQ ID: Transporter-1 Date: Not reported Not reported Waste SEQ ID: Not reported Waste Type Code 2: Waste Type Code 3: Not reported Waste Type Code 4: Not reported Waste Type Code 5: Not reported Waste Type Code 6: Not reported Not reported Date Accepted: Manifest Discrepancy Type: Not reported Data Entry Number: 04040621

MANASSAS 20110 Was Load Rejected: Reason Load Was Rejected: Not reported

ECHO:

1004791730 Envid: Registry ID: 110005291745

DFR URL: http://echo.epa.gov/detailed\_facility\_report?fid=110005291745

**PA MANIFEST** S107694170 Α5 **COLGAN AIR** 

**10677 AVIATION LN** < 1/8 MANASSAS, VA 20110

1 ft.

Higher

Site 5 of 5 in cluster A

Manifest Details: Relative:

Year:

2007

Manifest Number: 003301820JJK Actual: Manifest Type: Not reported 197 ft. Generator EPA Id: VAP000015896 Generator Date: 06/20/2007

Mailing Address: Not reported Mailing City, St, Zip: Not reported N/A

Direction Distance Elevation

Site Database(s) EPA ID Number

COLGAN AIR (Continued)

Contact Name: KEN CERRETI
Contact Phone: 703-331-3122
TSD EPA Id: PAD067098822
TSD Date: Not reported
TSD Facility Name: CYCLE CHEM INC
TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: Not reported

Page Number: 1
Line Number: 3
Waste Number: D001
Container Number: 2

Container Type: Metal drums, barrels, kegs

Waste Quantity: 400
Unit: Pounds
Handling Code: Not reported
TSP EPA Id: Not reported
Date TSP Sig: Not reported

Year: 2007

Manifest Number: 003301820JJK Manifest Type: Not reported VAP000015896 Generator EPA Id: 06/20/2007 Generator Date: Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: KEN CERRETI Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: Not reported

Page Number: 1
Line Number: 1
Waste Number: D001
Container Number: 4

Container Type: Metal drums, barrels, kegs

Waste Quantity: 900
Unit: Pounds
Handling Code: Not reported
TSP EPA Id: Not reported
Date TSP Sig: Not reported

Year: 2007

Manifest Number: 000839062JJK Manifest Type: Not reported VAP000015896 Generator EPA Id: Generator Date: 07/31/2007 Not reported Mailing Address: Mailing City, St, Zip: Not reported Contact Name: KEN CERRETI Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 **EDR ID Number** 

S107694170

Direction Distance

Elevation Site Database(s) EPA ID Number

COLGAN AIR (Continued) S107694170

TSD Date: Not reported
TSD Facility Name: CYCLE CHEM INC
TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: Not reported

Page Number: 1
Line Number: 1
Waste Number: D035
Container Number: 1

Container Type: Metal drums, barrels, kegs

Waste Quantity: 55

Unit: Gallons (liquids only)

Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

Year: 2007

Manifest Number: 003301820JJK Manifest Type: Not reported VAP000015896 Generator EPA Id: Generator Date: 06/20/2007 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: KEN CERRETI Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: Not reported

Page Number: 1
Line Number: 2
Waste Number: D006
Container Number: 1

Container Type: Fiberboard or plastic drums, barrels, kegs

Waste Quantity: 50
Unit: Pounds
Handling Code: Not reported
TSP EPA Id: Not reported
Date TSP Sig: Not reported

Year: 2007

003301820JJK Manifest Number: Manifest Type: Not reported VAP000015896 Generator EPA Id: Generator Date: 06/20/2007 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: KEN CERRETI Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

Direction Distance

Elevation Site Database(s) **EPA ID Number** 

**COLGAN AIR (Continued)** 

S107694170

**EDR ID Number** 

TSD Facility City: **LEWISBERRY** 

TSD Facility State: PΑ Facility Telephone: Not reported

Page Number: Line Number: Waste Number: F005 Container Number:

Container Type: Metal drums, barrels, kegs

Waste Quantity: 900 Unit: Pounds Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

Year: 2007

003301820JJK Manifest Number: Manifest Type: Not reported VAP000015896 Generator EPA Id: Generator Date: 06/20/2007 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: KEN CERRETI Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported CYCLE CHEM INC TSD Facility Name: TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: **LEWISBERRY** 

TSD Facility State: PA

Facility Telephone: Not reported

Page Number: Line Number: 3 Waste Number: D018 Container Number:

Container Type: Metal drums, barrels, kegs

400 Waste Quantity: Unit: Pounds Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

2007 Year:

Manifest Number: 000839062JJK Manifest Type: Not reported Generator EPA Id: VAP000015896 07/31/2007 Generator Date: Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: KEN CERRETI Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: **LEWISBERRY** 

TSD Facility State: PA

Facility Telephone: Not reported

Direction Distance Elevation

Site Database(s) EPA ID Number

#### **COLGAN AIR (Continued)**

S107694170

**EDR ID Number** 

Page Number: 1
Line Number: 3
Waste Number: NONE
Container Number: 1

Container Type: Metal drums, barrels, kegs

Waste Quantity: 55

Unit: Gallons (liquids only)
Handling Code: Not reported

TSP EPA Id: Not reported Date TSP Sig: Not reported

Year: 2007

000839062JJK Manifest Number: Manifest Type: Not reported VAP000015896 Generator EPA Id: Generator Date: 07/31/2007 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: KEN CERRETI Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: Not reported

Page Number: 1
Line Number: 2
Waste Number: F003
Container Number: 1

Container Type: Metal drums, barrels, kegs

Waste Quantity: 75
Unit: Pounds
Handling Code: Not reported
TSP EPA Id: Not reported
Date TSP Sig: Not reported

Year: 2007

003301820JJK Manifest Number: Manifest Type: Not reported Generator EPA Id: VAP000015896 Generator Date: 06/20/2007 Mailing Address: Not reported Mailing City, St, Zip: Not reported KEN CERRETI Contact Name: Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: Not reported

Page Number: 1
Line Number: 1
Waste Number: F003

Direction Distance Elevation

Site Database(s) **EPA ID Number** 

**COLGAN AIR (Continued)** 

S107694170

**EDR ID Number** 

Container Number:

Metal drums, barrels, kegs Container Type:

Waste Quantity: 900 Unit: **Pounds** Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

2007 Year:

Manifest Number: 000839062JJK Manifest Type: Not reported Generator EPA Id: VAP000015896 07/31/2007 Generator Date: Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: KEN CERRETI Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: **LEWISBERRY** 

TSD Facility State: PA

Facility Telephone: Not reported

Page Number: Line Number: 1 Waste Number: D001 Container Number:

Container Type: Metal drums, barrels, kegs

Waste Quantity:

Gallons (liquids only) Unit:

Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

2007 Year:

Manifest Number: 000839062JJK Manifest Type: Not reported VAP000015896 Generator EPA Id: Generator Date: 07/31/2007 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: KEN CERRETI Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: **LEWISBERRY** 

TSD Facility State: PA Facility Telephone: Not reported

Page Number: Line Number: Waste Number: F003 Container Number:

Container Type: Metal drums, barrels, kegs

Waste Quantity:

Distance Elevation

tion Site Database(s) EPA ID Number

COLGAN AIR (Continued) S107694170

Unit: Gallons (liquids only)

Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

Year: 2007

000839062JJK Manifest Number: Manifest Type: Not reported Generator EPA Id: VAP000015896 Generator Date: 07/31/2007 Mailing Address: Not reported Not reported Mailing City, St, Zip: Contact Name: KEN CERRETI Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC 550 INDUSTRIAL DRIVE TSD Facility Address:

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: Not reported

Page Number: 1
Line Number: 2
Waste Number: D018
Container Number: 1

Container Type: Metal drums, barrels, kegs

Waste Quantity: 75
Unit: Pounds
Handling Code: Not reported
TSP EPA Id: Not reported
Date TSP Sig: Not reported

Year: 2007

Manifest Number: 003301820JJK Not reported Manifest Type: Generator EPA Id: VAP000015896 Generator Date: 06/20/2007 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: KEN CERRETI Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: Not reported

Page Number: 1
Line Number: 1
Waste Number: D035
Container Number: 4

Container Type: Metal drums, barrels, kegs

Waste Quantity: 900
Unit: Pounds
Handling Code: Not reported
TSP EPA Id: Not reported

**EDR ID Number** 

Direction Distance Elevation

tance EDR ID Number vation Site Database(s) EPA ID Number

COLGAN AIR (Continued) S107694170

Date TSP Sig: Not reported

Year: 2007

Manifest Number: 000839062JJK Manifest Type: Not reported Generator EPA Id: VAP000015896 Generator Date: 07/31/2007 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: KEN CERRETI Contact Phone: 703-331-3122 TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: Not reported

Page Number: 1
Line Number: 1
Waste Number: F005
Container Number: 1

Container Type: Metal drums, barrels, kegs

Waste Quantity: 59

Unit: Gallons (liquids only)

Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

2006 Year: Manifest Number: PAH193449 Manifest Type: TSD Copy Generator EPA Id: VAP000015896 02/15/2006 Generator Date: Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: Not reported PAD067098822 TSD EPA Id: TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: 703-331-3122

Page Number: 1
Line Number: 4
Waste Number: D001
Container Number: 1

Container Type: Fiberboard or plastic drums, barrels, kegs

Waste Quantity: 5

Unit: Pounds
Handling Code: Not reported
TSP EPA Id: Not reported
Date TSP Sig: Not reported

Year: 2006

Direction Distance Elevation

on Site Database(s) EPA ID Number

COLGAN AIR (Continued)

S107694170

**EDR ID Number** 

Manifest Number: PAH193449 Manifest Type: TSD Copy Generator EPA Id: VAP000015896 Generator Date: 02/15/2006 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: Not reported TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: 703-331-3122

Page Number: 1
Line Number: 3
Waste Number: D007
Container Number: 1

Container Type: Fiberboard or plastic drums, barrels, kegs

Waste Quantity: 15
Unit: Pounds
Handling Code: Not reported
TSP EPA Id: Not reported
Date TSP Sig: Not reported

Year: 2006 Manifest Number: PAH193449 Manifest Type: TSD Copy Generator EPA Id: VAP000015896 Generator Date: 02/15/2006 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: Not reported TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: LEWISBERRY

TSD Facility State: PA

Facility Telephone: 703-331-3122

Page Number: 1
Line Number: 1
Waste Number: D001
Container Number: 2

Container Type: Metal drums, barrels, kegs

Waste Quantity: 500
Unit: Pounds
Handling Code: Not reported
TSP EPA Id: Not reported
Date TSP Sig: Not reported

 Year:
 2006

 Manifest Number:
 PAH193449

 Manifest Type:
 TSD Copy

 Generator EPA Id:
 VAP000015896

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

**COLGAN AIR (Continued)** S107694170

Generator Date: 02/15/2006 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: Not reported TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: **LEWISBERRY** 

TSD Facility State: PA

Facility Telephone: 703-331-3122

Page Number: 1 Line Number: 4 Waste Number: D007 Container Number:

Fiberboard or plastic drums, barrels, kegs Container Type:

Waste Quantity:

Unit: Pounds Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

Year: 2006 PAH193449 Manifest Number: TSD Copy Manifest Type: VAP000015896 Generator EPA Id: Generator Date: 02/15/2006 Mailing Address: Not reported Mailing City, St, Zip: Not reported Contact Name: Not reported Contact Phone: Not reported TSD EPA Id: PAD067098822 TSD Date: Not reported CYCLE CHEM INC TSD Facility Name: 550 INDUSTRIAL DRIVE TSD Facility Address:

TSD Facility City: **LEWISBERRY** 

TSD Facility State: PΑ

Facility Telephone: 703-331-3122

Page Number: 1 Line Number: 3 Waste Number: D002 Container Number:

Container Type: Fiberboard or plastic drums, barrels, kegs

Waste Quantity: 15 Unit: **Pounds** Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

Year: 2006 Manifest Number: PAH193449 TSD Copy Manifest Type: Generator EPA Id: VAP000015896 Generator Date: 02/15/2006 Mailing Address: Not reported Mailing City, St, Zip: Not reported

Direction Distance

**EDR ID Number** Elevation Site **EPA ID Number** Database(s)

**COLGAN AIR (Continued)** S107694170

Contact Name: Not reported Not reported Contact Phone: TSD EPA Id: PAD067098822 TSD Date: Not reported TSD Facility Name: CYCLE CHEM INC TSD Facility Address: 550 INDUSTRIAL DRIVE

TSD Facility City: **LEWISBERRY** 

TSD Facility State: PΑ

Facility Telephone: 703-331-3122

Page Number: Line Number: 2 Waste Number: D002 Container Number:

Container Type: Fiberboard or plastic drums, barrels, kegs

Waste Quantity: Unit: **Pounds** Handling Code: Not reported TSP EPA Id: Not reported Date TSP Sig: Not reported

> Click this hyperlink while viewing on your computer to access 11 additional PA\_MANIFEST: record(s) in the EDR Site Report.

**B6** RCRA-CESQG 1004791360 10527 TERMINAL RD **FINDS** VAR000010157

< 1/8

MANASSAS, VA 20110

1 ft.

Site 1 of 4 in cluster B

RCRA-CESQG: Relative:

Higher Date form received by agency: 02/09/1998 Facility name: Not reported

Actual: Facility address: 10527 TERMINAL RD 184 ft. MANASSAS, VA 20110

EPA ID: VAR000010157

Mailing address: PO BOX 529

MANASSAS, VA 20108 RONALD POHL Contact: Contact address: PO BOX 529

MANASSAS, VA 20108

Contact country:

Contact telephone: (703) 361-4996 Contact email: Not reported EPA Region: Not reported

Classification: Conditionally Exempt Small Quantity Generator

Description: Handler: generates 100 kg or less of hazardous waste per calendar

> month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely

**ECHO** 

Distance Elevation

Site Database(s) EPA ID Number

(Continued) 1004791360

hazardous waste

Owner/Operator Summary:

Owner/operator name: T HANGARS OF VA INC

Owner/operator address: PO BOX 529

MANASSAS, VA 20108

Owner/operator country: Not reported
Owner/operator telephone: (703) 361-4996

Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:

U.S. importer of hazardous waste: No Mixed waste (haz. and radioactive): No Recycler of hazardous waste: No Transporter of hazardous waste: No Treater, storer or disposer of HW: No Underground injection activity: No On-site burner exemption: No Furnace exemption: No Used oil fuel burner: No Used oil processor: No User oil refiner: Nο Used oil fuel marketer to burner: Nο Used oil Specification marketer: No Used oil transfer facility: No Used oil transporter: No

. Waste code: F002

Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS: TETRACHLOROETHYLENE,

METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE,

CHLOROBENZENE, 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE,

ORTHO-DICHLOROBENZENE, TRICHLOROFLUOROMETHANE, AND 1,1,2,

TRICHLOROETHANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND

SPENT SOLVENT MIXTURES.

Violation Status: No violations found

FINDS:

Registry ID: 110005288027

Environmental Interest/Information System

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

**EDR ID Number** 

Direction Distance

Elevation Site **EPA ID Number** Database(s)

(Continued) 1004791360

ECHO:

1004791360 Envid: Registry ID: 110005288027

DFR URL: http://echo.epa.gov/detailed\_facility\_report?fid=110005288027

**RCRA-CESQG** 7 1000281347 VAD982704686

10501 OBSERVATION ROAD < 1/8 MANASSAS, VA 20110

1 ft.

RCRA-CESQG:

Date form received by agency: 11/13/2003 Relative: Facility name: Not reported Lower

> Facility address: 10501 OBSERVATION ROAD

Actual: MANASSAS, VA 20110

174 ft. EPA ID: VAD982704686

> Mailing address: **OBSERVATION ROAD**

> > MANASSAS, VA 20110

JOSEPH H GARDNER Contact:

Contact address: Not reported

Not reported

Contact country: US

Contact telephone: (703) 361-2171 Not reported Contact email: EPA Region: Not reported Land type: Municipal

Classification: Conditionally Exempt Small Quantity Generator

Handler: generates 100 kg or less of hazardous waste per calendar Description:

month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste, or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from

the cleanup of a spill, into or on any land or water, of acutely

hazardous waste

Owner/Operator Summary:

Owner/operator name: **OPERNAME** Owner/operator address: **OPERSTREET** 

OPERCITY, AK 99999

Owner/operator country: Not reported Owner/operator telephone: (215) 555-1212 Legal status: Private

Owner/Operator Type: Operator Owner/Op start date: Not reported Owner/Op end date: Not reported

Owner/operator name: AIRPORT DIRECTOR

Owner/operator address: Not reported

Not reported

Owner/operator country: Not reported **EDR ID Number** 

Direction Distance Elevation

ance EDR ID Number vation Site Database(s) EPA ID Number

(Continued) 1000281347

Owner/operator telephone: Not reported Legal status: Municipal Owner/Operator Type: Operator Owner/Op start date: 01/01/1963 Owner/Op end date: Not reported

Owner/operator name: CITY OF MANASSAS

Owner/operator address: Not reported

Not reported

Owner/operator country: Not reported
Owner/operator telephone: Not reported
Legal status: Municipal
Owner/Operator Type: Owner
Owner/Op start date: 01/01/1963
Owner/Op end date: Not reported

Owner/operator name: GARDNER BELTON, H

Owner/operator address: OWNERSTREET

OWNERCITY, AK 99999

Owner/operator country: Not reported
Owner/operator telephone: (215) 555-1212
Legal status: Private

Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

## Handler Activities Summary:

U.S. importer of hazardous waste: No Mixed waste (haz. and radioactive): No Recycler of hazardous waste: No Transporter of hazardous waste: No Treater, storer or disposer of HW: No Underground injection activity: No On-site burner exemption: No Furnace exemption: No Used oil fuel burner: No Used oil processor: No User oil refiner: No Used oil fuel marketer to burner: No Used oil Specification marketer: No Used oil transfer facility: No Used oil transporter: No

Waste code: D001

Waste name: IGNITABLE WASTE

. Waste code: D008
. Waste name: LEAD
. Waste code: D018

Historical Generators:

Waste name:

Date form received by agency: 12/06/1989

Site name: DULLES AVIATION INC

Classification: Conditionally Exempt Small Quantity Generator

**BENZENE** 

Direction Distance

Elevation Site **EPA ID Number** Database(s)

(Continued) 1000281347

Waste code: D001

**IGNITABLE WASTE** Waste name:

Waste code:

Waste name: **CORROSIVE WASTE** 

Waste code: F001

Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING:

TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED

FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE

SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Waste code: U002

Waste name: 2-PROPANONE (I) (OR) ACETONE (I)

Waste code: U154

METHANOL (I) (OR) METHYL ALCOHOL (I) Waste name:

Waste code:

Waste name: 2-BUTANONE (I,T) (OR) METHYL ETHYL KETONE (MEK) (I,T)

Facility Has Received Notices of Violations: Regulation violated: SR - 262.11

Area of violation: Generators - General

Date violation determined: 08/02/2003 Date achieved compliance: 10/16/2003 Violation lead agency: State

INSPECTOR FACT FINDING LETTER - Warning letter Enforcement action:

Enforcement action date: 09/04/2003 Enf. disposition status: Not reported Not reported Enf. disp. status date: Enforcement lead agency: State Proposed penalty amount: Not reported Final penalty amount: Not reported Paid penalty amount: Not reported

**Evaluation Action Summary:** 

Evaluation date: 08/02/2003

COMPLIANCE EVALUATION INSPECTION ON-SITE Evaluation:

Area of violation: Generators - General

Date achieved compliance: 10/16/2003 Evaluation lead agency: State

**B8 DULLES AVIATION INCORPORATED - MANASSAS AIRPORT**  VA LTANKS \$104896778

N/A

**EDR ID Number** 

10522 TERMINAL RD < 1/8 MANASSAS, VA 22110

1 ft.

Site 2 of 4 in cluster B

LTANKS: Relative:

Region: **NVRO** Higher

200000078840 CEDS Facility Id: Actual: Case Status: Closed 184 ft. Pollution Complaint #: 20013062

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

#### **DULLES AVIATION INCORPORATED - MANASSAS AIRPORT (Continued)**

S104896778

VA UST U004189327

N/A

Reported: 09/25/2000

**NVRO** Region:

CEDS Facility Id: 200000078840 Case Status: Closed Pollution Complaint #: 19910187 08/21/1990 Reported:

**NVRO** Region:

CEDS Facility Id: 200000078840 Case Status: Closed Pollution Complaint #: 19870385 12/09/1986 Reported:

В9 MANASSAS REGIONAL AIRPORT

10522 TERMINAL RD

< 1/8 MANASSAS, VA 22110

1 ft.

Site 3 of 4 in cluster B

Facility: Relative:

Higher Facility Id: 3001899 Facility Type: LOCAL

Actual: CEDS Facility ID: 200000078840

184 ft.

Owner:

Owner Id: 36274

Owner Name: MANASSAS Regional Airport

PO BOX 560 Owner Address: Owner Address2: Not reported

Owner City, State, Zip: MANASSAS, VA 22110

Owner Type: LOCAL Number of Active AST: 0 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 13

UST:

Facility ID: 3001899 Federally Regulated: Yes

Tank Number: COLGAN-1 Tank Capacity: 4000 Tank Contents: **GASOLINE** Tank Status: **CLS IN GRD** 

Tank Type: UST

Tank Material:

Install Date: 4/3/1966 Tank Materials: Bare Steel Yes Tank Materials: Cath Protect Steel No Tank Materials: Epoxy Steel No Tank Materials: Fiberglass No Tank Materials: Concrete No Tank Materials: Composite No Tank Materials: Double Walled No Tank Materials: Lined Interior No Tank Materials: Excav Liner Nο

Direction Distance Elevation

Site Database(s) **EPA ID Number** 

## MANASSAS REGIONAL AIRPORT (Continued)

U004189327

**EDR ID Number** 

Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No

Tank Materials: Other Note Not reported

#### Release Detection:

Tank Release Detection: Leak Deferred No Tank Release Detection: Manual Gauge No Tank Release Detection: Auto Gauge No Tank Release Detection: Tank Tightness No Tank Release Detection: Vapor Monitor No Tank Release Detection: Inventory No Tank Release Detection: Stat Invent Recon No Tank Release Detection: Spill Install No Tank Release Detection: Overfill Install No Tank Release Detection: Groundwater No Tank Release Detection: Int Sec Containment No Tank Release Detection: Int Double Walled No Tank Release Detection: Other Method No

Tank Release Detection: Other Note Not reported Pipe Release Detection: Leak Deferred Not reported Pipe Release Detection: Autoleak Not reported

Pipe Release Detection: Line Tightness No Pipe Release Detection: Stat Invent Recon No Pipe Release Detection: Groundwater No Pipe Release Detection: Int Sec Containment No Pipe Release Det: Interior Double Walled No Pipe Release Detection: Other Method No

Pipe Release Detection: Other Note Not reported

Pipe Type: **UNKNOWN** 

Pipe Materials: Bare Steel No Pipe Materials: Galvanized Steel Yes Pipe Materials: Copper No Pipe Materials: Fiberglass No Pipe Materials: Cath Protect No Pipe Materials: Double Walled No Pipe Materials: Sec Containment No Pipe Materials: Repaired No Pipe Materials: Unknown No Pipe Materials: Other No

Pipe Materials: Other Note Not reported

3001899 Facility ID: Federally Regulated: Yes

COLGAN-2 Tank Number: Tank Capacity: 4000 Tank Contents: **GASOLINE** Tank Status: **CLS IN GRD** UST

Tank Type:

Tank Material:

4/3/1966 Install Date: Tank Materials: Bare Steel Yes

Direction Distance Elevation

Site Database(s)

## MANASSAS REGIONAL AIRPORT (Continued)

U004189327

**EDR ID Number** 

**EPA ID Number** 

Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	No
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No

Tank Materials: Other Note Not reported

#### Release Detection:

Tank Release Detection: Leak Deferred No Tank Release Detection: Manual Gauge No Tank Release Detection: Auto Gauge No Tank Release Detection: Tank Tightness No Tank Release Detection: Vapor Monitor No Tank Release Detection: Inventory Nο Tank Release Detection: Stat Invent Recon No Tank Release Detection: Spill Install No Tank Release Detection: Overfill Install No Tank Release Detection: Groundwater No Tank Release Detection: Int Sec Containment No Tank Release Detection: Int Double Walled No Tank Release Detection: Other Method No

Tank Release Detection: Other Note
Pipe Release Detection: Leak Deferred
Pipe Release Detection: Autoleak
Pipe Release Detection: Line Tightness
Pipe Release Detection: Stat Invent Recon

Pipe Release Detection: Ellit Ingliticss
No
Pipe Release Detection: Stat Invent Recon
No
Pipe Release Detection: Groundwater
No
Pipe Release Detection: Int Sec Containment
No
Pipe Release Detection: Other Method
No

Pipe Release Detection: Other Note Not reported

UNKNOWN Pipe Type: Pipe Materials: Bare Steel No Pipe Materials: Galvanized Steel Yes Pipe Materials: Copper No Pipe Materials: Fiberglass No Pipe Materials: Cath Protect No Pipe Materials: Double Walled No Pipe Materials: Sec Containment No Pipe Materials: Repaired No Pipe Materials: Unknown No

Pipe Materials: Other

Pipe Materials: Other Note Not reported

No

Facility ID: 3001899
Federally Regulated: Yes

Tank Number: COLGAN-3

Direction
Distance
Elevation

n Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

U004189327

**EDR ID Number** 

Tank Capacity:	4000
Tank Contents:	GASOLINE
Tank Status:	CLS IN GRD
Tank Type:	UST

#### Tank Material:

4/3/1966 Install Date: Tank Materials: Bare Steel Yes Tank Materials: Cath Protect Steel No Tank Materials: Epoxy Steel No Tank Materials: Fiberglass No Tank Materials: Concrete No Tank Materials: Composite Nο Tank Materials: Double Walled No Tank Materials: Lined Interior No Tank Materials: Excav Liner No Tank Materials: Insulated Tank Jacket No Tank Materials: Repaired No Tank Materials: Unknown No Tank Materials: Other No

Tank Materials: Other Note Not reported

#### Release Detection:

Tank Release Detection: Leak Deferred No Tank Release Detection: Manual Gauge No Tank Release Detection: Auto Gauge Nο Tank Release Detection: Tank Tightness No Tank Release Detection: Vapor Monitor No Tank Release Detection: Inventory No Tank Release Detection: Stat Invent Recon No Tank Release Detection: Spill Install No Tank Release Detection: Overfill Install No Tank Release Detection: Groundwater No Tank Release Detection: Int Sec Containment No Tank Release Detection: Int Double Walled No Tank Release Detection: Other Method No

Tank Release Detection: Other Note
Pipe Release Detection: Leak Deferred
Pipe Release Detection: Autoleak
Pipe Release Detection: Line Tightness
Not reported
No

Pipe Release Detection: Line Tightness No
Pipe Release Detection: Stat Invent Recon No
Pipe Release Detection: Groundwater No
Pipe Release Detection: Int Sec Containment No
Pipe Release Det: Interior Double Walled No
Pipe Release Detection: Other Method No

Pipe Release Detection: Other Note Not reported

Pipe Type: UNKNOWN
Pipe Materials: Bare Steel No
Pipe Materials: Galvanized Steel Yes
Pipe Materials: Copper No
Pipe Materials: Fiberglass No

Pipe Materials: Cath Protect
No
Pipe Materials: Double Walled
No
Pipe Materials: Sec Containment
No
Pipe Materials: Repaired
No

Direction Distance Elevation

Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

U004189327

**EDR ID Number** 

Pipe Materials: Other No

Pipe Materials: Other Note Not reported

Facility ID: 3001899
Federally Regulated: Yes

 Tank Number:
 COLGAN-4

 Tank Capacity:
 4000

 Tank Contents:
 GASOLINE

 Tank Status:
 CLS IN GRD

 Tank Type:
 UST

Tank Material:

4/3/1966 Install Date: Tank Materials: Bare Steel Yes Tank Materials: Cath Protect Steel No Tank Materials: Epoxy Steel No Tank Materials: Fiberglass No Tank Materials: Concrete No Tank Materials: Composite No Tank Materials: Double Walled Nο Tank Materials: Lined Interior No Tank Materials: Excav Liner No Tank Materials: Insulated Tank Jacket No Tank Materials: Repaired No Tank Materials: Unknown Nο

Tank Materials: Other No Tank Materials: Other Note Not reported

#### Release Detection:

Tank Release Detection: Leak Deferred No Tank Release Detection: Manual Gauge No Tank Release Detection: Auto Gauge No No Tank Release Detection: Tank Tightness Tank Release Detection: Vapor Monitor No Tank Release Detection: Inventory No Tank Release Detection: Stat Invent Recon No Tank Release Detection: Spill Install No Tank Release Detection: Overfill Install No Tank Release Detection: Groundwater No Tank Release Detection: Int Sec Containment No Tank Release Detection: Int Double Walled No Tank Release Detection: Other Method No

Tank Release Detection: Other Note
Pipe Release Detection: Leak Deferred
Pipe Release Detection: Autoleak
Not reported
Not reported

Pipe Release Detection: Line Tightness No
Pipe Release Detection: Stat Invent Recon No
Pipe Release Detection: Groundwater No
Pipe Release Detection: Int Sec Containment No
Pipe Release Det: Interior Double Walled No
Pipe Release Detection: Other Method No

Pipe Release Detection: Other Note Not reported

Pipe Type: UNKNOWN

Pipe Materials: Bare Steel No

Direction
Distance
Elevation

ce EDR ID Number ion Site Database(s) EPA ID Number

Not reported

#### MANASSAS REGIONAL AIRPORT (Continued)

U004189327

Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No

Pipe Materials: Other Note Not reported

Facility ID: 3001899
Federally Regulated: Yes

Tank Number: COLGAN-5
Tank Capacity: 10000
Tank Contents: JET FUEL
Tank Status: CLS IN GRD

Tank Type: UST

## Tank Material:

Install Date: 4/3/1972 Tank Materials: Bare Steel No Tank Materials: Cath Protect Steel No Tank Materials: Epoxy Steel No Tank Materials: Fiberglass Yes Tank Materials: Concrete No Tank Materials: Composite No Tank Materials: Double Walled No Tank Materials: Lined Interior No Tank Materials: Excav Liner No Tank Materials: Insulated Tank Jacket No Tank Materials: Repaired No Tank Materials: Unknown No Tank Materials: Other No

# Tank Materials: Other Note

Release Detection:

Tank Release Detection: Leak Deferred No Tank Release Detection: Manual Gauge No Tank Release Detection: Auto Gauge No Tank Release Detection: Tank Tightness No Tank Release Detection: Vapor Monitor No Tank Release Detection: Inventory No Tank Release Detection: Stat Invent Recon No Tank Release Detection: Spill Install No Tank Release Detection: Overfill Install No Tank Release Detection: Groundwater No Tank Release Detection: Int Sec Containment No Tank Release Detection: Int Double Walled No Tank Release Detection: Other Method No

Tank Release Detection: Other NoteNot reportedPipe Release Detection: Leak DeferredNot reportedPipe Release Detection: AutoleakNot reported

Pipe Release Detection: Line Tightness No Pipe Release Detection: Stat Invent Recon No

Direction Distance Elevation

Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

U004189327

**EDR ID Number** 

Pipe Release Detection: Groundwater No
Pipe Release Detection: Int Sec Containment No
Pipe Release Det: Interior Double Walled No
Pipe Release Detection: Other Method No

Pipe Release Detection: Other Note Not reported

UNKNOWN Pipe Type: Pipe Materials: Bare Steel No Pipe Materials: Galvanized Steel Yes Pipe Materials: Copper No Pipe Materials: Fiberglass No Pipe Materials: Cath Protect No Pipe Materials: Double Walled No Pipe Materials: Sec Containment No Pipe Materials: Repaired No

Pipe Materials: Unknown No Pipe Materials: Other No

Pipe Materials: Other Note Not reported

Facility ID: 3001899 Federally Regulated: Yes

Tank Number: COLGAN-6
Tank Capacity: 550
Tank Contents: UNKNOWN
Tank Status: CLS IN GRD

Tank Type: UST

Tank Material:

Install Date: Not reported

Tank Materials: Bare Steel Yes Tank Materials: Cath Protect Steel No Tank Materials: Epoxy Steel No Tank Materials: Fiberglass No Tank Materials: Concrete No Tank Materials: Composite No Tank Materials: Double Walled No Tank Materials: Lined Interior No Tank Materials: Excav Liner No Tank Materials: Insulated Tank Jacket No Tank Materials: Repaired No Tank Materials: Unknown No Tank Materials: Other No

Tank Materials: Other Note Not reported

Release Detection:

Tank Release Detection: Leak Deferred No Tank Release Detection: Manual Gauge No Tank Release Detection: Auto Gauge No Tank Release Detection: Tank Tightness No Tank Release Detection: Vapor Monitor No Tank Release Detection: Inventory No Tank Release Detection: Stat Invent Recon No Tank Release Detection: Spill Install No Tank Release Detection: Overfill Install No Tank Release Detection: Groundwater No

Direction Distance Elevation

Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

U004189327

**EDR ID Number** 

Tank Release Detection: Int Sec Containment
Tank Release Detection: Int Double Walled
No
Tank Release Detection: Other Method
No

Tank Release Detection: Other Note
Pipe Release Detection: Leak Deferred
Pipe Release Detection: Autoleak
Not reported
Not reported

Pipe Release Detection: Line Tightness No
Pipe Release Detection: Stat Invent Recon No
Pipe Release Detection: Groundwater No
Pipe Release Detection: Int Sec Containment No
Pipe Release Det: Interior Double Walled No
Pipe Release Detection: Other Method No

Pipe Release Detection: Other Note Not reported

UNKNOWN Pipe Type: Pipe Materials: Bare Steel No Pipe Materials: Galvanized Steel Yes Pipe Materials: Copper No Pipe Materials: Fiberglass No Pipe Materials: Cath Protect No Pipe Materials: Double Walled No Pipe Materials: Sec Containment No Pipe Materials: Repaired No Pipe Materials: Unknown No

Pipe Materials: Other No
Pipe Materials: Other Note Not reported

Facility ID: 3001899
Federally Regulated: Yes

 Tank Number:
 COLGAN-7

 Tank Capacity:
 275

 Tank Contents:
 UNKNOWN

 Tank Status:
 CLS IN GRD

 Tank Type:
 UST

Tank Material:

Install Date: Not reported

Tank Materials: Bare Steel Yes Tank Materials: Cath Protect Steel No Tank Materials: Epoxy Steel No Tank Materials: Fiberglass No Tank Materials: Concrete No Tank Materials: Composite No Tank Materials: Double Walled Nο Tank Materials: Lined Interior No Tank Materials: Excav Liner No Tank Materials: Insulated Tank Jacket No Tank Materials: Repaired No Tank Materials: Unknown No Tank Materials: Other No

Tank Materials: Other Note Not reported

Release Detection:

Tank Release Detection: Leak Deferred No Tank Release Detection: Manual Gauge No

Direction Distance Elevation

Site Database(s) **EPA ID Number** 

#### MANASSAS REGIONAL AIRPORT (Continued)

U004189327

**EDR ID Number** 

Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	Nο

Tank Release Detection: Other Note Not reported Not reported Pipe Release Detection: Leak Deferred Pipe Release Detection: Autoleak Not reported

Pipe Release Detection: Line Tightness No Pipe Release Detection: Stat Invent Recon No Pipe Release Detection: Groundwater No Pipe Release Detection: Int Sec Containment No Pipe Release Det: Interior Double Walled No Pipe Release Detection: Other Method No

Pipe Release Detection: Other Note Not reported

Pipe Type: **UNKNOWN** Pipe Materials: Bare Steel No Pipe Materials: Galvanized Steel Yes No Pipe Materials: Copper Pipe Materials: Fiberglass No Pipe Materials: Cath Protect No Pipe Materials: Double Walled No Pipe Materials: Sec Containment No Pipe Materials: Repaired No Pipe Materials: Unknown No

Pipe Materials: Other Note Not reported

No

Facility ID: 3001899 Federally Regulated: Yes

COLGAN-8 Tank Number: Tank Capacity: 275 Tank Contents: UNKNOWN Tank Status: **CLS IN GRD** UST

Tank Type:

Tank Material:

Pipe Materials: Other

Install Date: Not reported

Tank Materials: Bare Steel Yes Tank Materials: Cath Protect Steel No Tank Materials: Epoxy Steel No Tank Materials: Fiberglass No Tank Materials: Concrete No Tank Materials: Composite No Tank Materials: Double Walled No Tank Materials: Lined Interior No Tank Materials: Excav Liner No Tank Materials: Insulated Tank Jacket No Tank Materials: Repaired No

Direction
Distance
Elevation

Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

U004189327

**EDR ID Number** 

Tank Materials: Unknown No Tank Materials: Other No

Tank Materials: Other Note Not reported

Release Detection:

Tank Release Detection: Leak Deferred No Tank Release Detection: Manual Gauge No Tank Release Detection: Auto Gauge No Tank Release Detection: Tank Tightness No Tank Release Detection: Vapor Monitor No Tank Release Detection: Inventory No Tank Release Detection: Stat Invent Recon Nο Tank Release Detection: Spill Install No Tank Release Detection: Overfill Install No Tank Release Detection: Groundwater No Tank Release Detection: Int Sec Containment No Tank Release Detection: Int Double Walled No Tank Release Detection: Other Method No

Tank Release Detection: Other Note
Pipe Release Detection: Leak Deferred
Pipe Release Detection: Autoleak
Not reported
Not reported

Pipe Release Detection: Line Tightness No
Pipe Release Detection: Stat Invent Recon No
Pipe Release Detection: Groundwater No
Pipe Release Detection: Int Sec Containment No
Pipe Release Det: Interior Double Walled No
Pipe Release Detection: Other Method No

Pipe Release Detection: Other Note Not reported

Pipe Type: UNKNOWN

Pipe Materials: Bare Steel No Pipe Materials: Galvanized Steel Yes Pipe Materials: Copper No Pipe Materials: Fiberglass No Pipe Materials: Cath Protect No Pipe Materials: Double Walled No Pipe Materials: Sec Containment No Pipe Materials: Repaired No Pipe Materials: Unknown No Pipe Materials: Other No

Pipe Materials: Other Note Not reported

Facility ID: 3001899
Federally Regulated: Yes

Tank Number: DULLESAV-1 Tank Capacity: 10000

Tank Contents: GASOLINE: AVIATION GAS

Tank Status: CLS IN GRD

Tank Type: UST

Tank Material:

Install Date: 4/3/1972
Tank Materials: Bare Steel Yes
Tank Materials: Cath Protect Steel No
Tank Materials: Epoxy Steel No

Direction Distance Elevation

Site Database(s) EPA ID Number

#### MANASSAS REGIONAL AIRPORT (Continued)

U004189327

**EDR ID Number** 

Tank Materials: Fiberglass	No
Tank Materials: Concrete	No
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No

Tank Materials: Other Note Not reported

#### Release Detection:

Tank Release Detection: Leak Deferred No Tank Release Detection: Manual Gauge No Tank Release Detection: Auto Gauge No Tank Release Detection: Tank Tightness No Tank Release Detection: Vapor Monitor No Tank Release Detection: Inventory No Tank Release Detection: Stat Invent Recon No Tank Release Detection: Spill Install Nο Tank Release Detection: Overfill Install No Tank Release Detection: Groundwater No Tank Release Detection: Int Sec Containment No Tank Release Detection: Int Double Walled No Tank Release Detection: Other Method Nο

Tank Release Detection: Other Note
Pipe Release Detection: Leak Deferred
Pipe Release Detection: Autoleak
Not reported
Not reported

Pipe Release Detection: Line Tightness No
Pipe Release Detection: Stat Invent Recon No
Pipe Release Detection: Groundwater No
Pipe Release Detection: Int Sec Containment No
Pipe Release Det: Interior Double Walled No
Pipe Release Detection: Other Method No

Pipe Release Detection: Other Note Not reported

Pipe Type: UNKNOWN

Pipe Materials: Bare Steel No Pipe Materials: Galvanized Steel Yes Pipe Materials: Copper No Pipe Materials: Fiberglass No Pipe Materials: Cath Protect No Pipe Materials: Double Walled No Pipe Materials: Sec Containment No Pipe Materials: Repaired No Pipe Materials: Unknown No Pipe Materials: Other No

Pipe Materials: Other Note Not reported

Facility ID: 3001899 Federally Regulated: Yes

Tank Number: DULLESAV-2
Tank Capacity: 10000

Tank Contents: GASOLINE: AVIATION GAS

Map ID Direction Distance Elevation

Site

**CLS IN GRD** 

EDR ID Number
Database(s) EPA ID Number

# MANASSAS REGIONAL AIRPORT (Continued)

Tank Status:

U004189327

Tank Status: Tank Type:	UST IN GRD
••	001
Tank Material:	
Install Date:	4/3/1972
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	No
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported
Release Detection:	
Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No .
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
	•
Pipe Type:	UNKNOWN
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported
•	1

Direction Distance Elevation

Site Database(s) EPA ID Number

#### MANASSAS REGIONAL AIRPORT (Continued)

U004189327

**EDR ID Number** 

Facility ID: 3001899 Federally Regulated: Yes

Tank Number: DULLESAV-3
Tank Capacity: 12000
Tank Contents: JET FUEL
Tank Status: CLS IN GRD

Tank Type: UST

Tank Material:

Install Date: 4/3/1972 Tank Materials: Bare Steel Yes Tank Materials: Cath Protect Steel Nο Tank Materials: Epoxy Steel No Tank Materials: Fiberglass No Tank Materials: Concrete No Tank Materials: Composite No Tank Materials: Double Walled No Tank Materials: Lined Interior No Tank Materials: Excav Liner No Tank Materials: Insulated Tank Jacket No Tank Materials: Repaired Nο Tank Materials: Unknown No Tank Materials: Other No

Tank Materials: Other Note Not reported

#### Release Detection:

Tank Release Detection: Leak Deferred No Tank Release Detection: Manual Gauge No Tank Release Detection: Auto Gauge No Tank Release Detection: Tank Tightness No Tank Release Detection: Vapor Monitor No Tank Release Detection: Inventory No Tank Release Detection: Stat Invent Recon No Tank Release Detection: Spill Install No Tank Release Detection: Overfill Install No Tank Release Detection: Groundwater No Tank Release Detection: Int Sec Containment No Tank Release Detection: Int Double Walled No Tank Release Detection: Other Method No

Tank Release Detection: Other Note
Pipe Release Detection: Leak Deferred
Pipe Release Detection: Autoleak

Not reported
Not reported

Pipe Release Detection: Line Tightness

Pipe Release Detection: Stat Invent Recon

Pipe Release Detection: Groundwater

No

Pipe Release Detection: Int Sec Containment

Pipe Release Det: Interior Double Walled

Pipe Release Detection: Other Method

No

Pipe Release Detection: Other Note Not reported

Pipe Type: UNKNOWN

Pipe Materials: Bare Steel No
Pipe Materials: Galvanized Steel Yes
Pipe Materials: Copper No
Pipe Materials: Fiberglass No
Pipe Materials: Cath Protect No

Direction Distance Elevation

Site Database(s) EPA ID Number

Not reported

No

No

No

No

No

#### MANASSAS REGIONAL AIRPORT (Continued)

U004189327

**EDR ID Number** 

Pipe Materials: Double Walled No
Pipe Materials: Sec Containment No
Pipe Materials: Repaired No
Pipe Materials: Unknown No
Pipe Materials: Other No

Pipe Materials: Other Note Not reported

Facility ID: 3001899 Federally Regulated: Yes

Tank Number: DULLESAV-4
Tank Capacity: 2000
Tank Contents: GASOLINE
Tank Status: CLS IN GRD
Tank Type: UST

#### Tank Material:

Install Date: 4/3/1972 Tank Materials: Bare Steel Yes Tank Materials: Cath Protect Steel No Tank Materials: Epoxy Steel Nο Tank Materials: Fiberglass No Tank Materials: Concrete No Tank Materials: Composite No Tank Materials: Double Walled No Tank Materials: Lined Interior Nο Tank Materials: Excav Liner No Tank Materials: Insulated Tank Jacket No Tank Materials: Repaired No Tank Materials: Unknown No Tank Materials: Other No

#### Release Detection:

Tank Materials: Other Note

Tank Release Detection: Leak Deferred No Tank Release Detection: Manual Gauge No Tank Release Detection: Auto Gauge No Tank Release Detection: Tank Tightness No Tank Release Detection: Vapor Monitor No Tank Release Detection: Inventory No Tank Release Detection: Stat Invent Recon No Tank Release Detection: Spill Install No Tank Release Detection: Overfill Install No Tank Release Detection: Groundwater No Tank Release Detection: Int Sec Containment No Tank Release Detection: Int Double Walled No Tank Release Detection: Other Method No Tank Release Detection: Other Note Not reported Not reported Pipe Release Detection: Leak Deferred Pipe Release Detection: Autoleak Not reported Pipe Release Detection: Line Tightness No

Pipe Release Detection: Stat Invent Recon

Pipe Release Det: Interior Double Walled

Pipe Release Detection: Other Method

Pipe Release Detection: Int Sec Containment

Pipe Release Detection: Groundwater

Direction Distance Elevation

Site Database(s) EPA ID Number

No

#### MANASSAS REGIONAL AIRPORT (Continued)

U004189327

**EDR ID Number** 

Pipe Release Detection: Other Note	Not reported
------------------------------------	--------------

UNKNOWN Pipe Type: Pipe Materials: Bare Steel No Pipe Materials: Galvanized Steel Yes Pipe Materials: Copper No Pipe Materials: Fiberglass No Pipe Materials: Cath Protect No Pipe Materials: Double Walled No Pipe Materials: Sec Containment No Pipe Materials: Repaired No Pipe Materials: Unknown No

Pipe Materials: Other Note Not reported

Facility ID: 3001899
Federally Regulated: No

Tank Number: DULLESAV-5
Tank Capacity: Not reported
Tank Contents: HEATING OIL
Tank Status: PERM OUT OF USE

Tank Type: UST

#### Tank Material:

Pipe Materials: Other

Install Date: 4/3/1972 Tank Materials: Bare Steel Yes Tank Materials: Cath Protect Steel No Tank Materials: Epoxy Steel No Tank Materials: Fiberglass No Tank Materials: Concrete No Tank Materials: Composite No Tank Materials: Double Walled No Tank Materials: Lined Interior No Tank Materials: Excav Liner No Tank Materials: Insulated Tank Jacket No Tank Materials: Repaired No Tank Materials: Unknown No Tank Materials: Other No

Tank Materials: Other Note Not reported

#### Release Detection:

Tank Release Detection: Leak Deferred No Tank Release Detection: Manual Gauge No Tank Release Detection: Auto Gauge No Tank Release Detection: Tank Tightness No Tank Release Detection: Vapor Monitor No Tank Release Detection: Inventory No Tank Release Detection: Stat Invent Recon No Tank Release Detection: Spill Install No Tank Release Detection: Overfill Install No Tank Release Detection: Groundwater No Tank Release Detection: Int Sec Containment No Tank Release Detection: Int Double Walled No Tank Release Detection: Other Method No

Tank Release Detection: Other Note Not reported

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

## MANASSAS REGIONAL AIRPORT (Continued)

U004189327

VA LUST

S104406772

N/A

Pipe Release Detection: Leak Deferred Not reported Not reported Pipe Release Detection: Autoleak

Pipe Release Detection: Line Tightness No Pipe Release Detection: Stat Invent Recon No Pipe Release Detection: Groundwater No Pipe Release Detection: Int Sec Containment No Pipe Release Det: Interior Double Walled No Pipe Release Detection: Other Method No

Pipe Release Detection: Other Note Not reported

UNKNOWN Pipe Type:

Pipe Materials: Bare Steel No Pipe Materials: Galvanized Steel Yes Pipe Materials: Copper No Pipe Materials: Fiberglass No Pipe Materials: Cath Protect No Pipe Materials: Double Walled No Pipe Materials: Sec Containment No Pipe Materials: Repaired No Pipe Materials: Unknown No Pipe Materials: Other No

Pipe Materials: Other Note Not reported

B10 **MANASSAS MUNICIPAL AIRPORT** 

10522 TERMINAL ROAD

< 1/8 PRINCE WILLIAM, VA 20110

1 ft.

### Site 4 of 4 in cluster B

LUST REG NO: Relative:

Region: NO Higher Facility ID: 3900476

Actual: Status: Closed 184 ft. Tank Size:

Product: Not reported Release Date: 12/09/1986 8/23/1994 Closed Date: Case Type: Article 11

Case Officer: Thomas R. Lancaster, P.G.

Pollution Complaint #: 87-0385 Permit Number: 0 Priority:

NO Region: Facility ID: 3900476 Status: Closed Tank Size: other

Product: see comments Release Date: 03/22/1999 Closed Date: 4/19/1999 Case Type: Article 11

Case Officer: Thomas R. Lancaster, P.G.

Pollution Complaint #: 99-3317 Permit Number: Not reported Priority: Not reported

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

C11 **GATEWAY GENERATION** VA AST A100251685 10453 WAKEMAN DR N/A

< 1/8 MANASSAS, VA 20110 1 ft.

Site 1 of 2 in cluster C

Relative: Lower

AST:

Facility ID: 3038092 Facility Type: LOCAL CEDS Facility ID: 200000203272

Actual: 176 ft.

Tank Info:

Owner:

36616 Owner Id:

Owner Name: City of Manassas Owner Address: 8500 Public Works Dr

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110

Owner Type: LOCAL Number of Active AST: 2 Number of Active UST: 0 0 Number of Inactive AST: Number of Inactive UST: 0

Fed Regulated: No Tank Number: GDT-1 Tank Type: **AST** Tank Capacity: 1000 Tank Contents: DIESEL Tank Status: **CURR IN USE** 

Tank Containment:

Install Date: 1/1/1997 Containment: Curbing No Containment: Weirs No Containment: Sorbent No Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike No Containment: Unknown No Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water No Release Detection: Visual No Release Detection: Vapor No Release Detection: Interstitial No Release Detection: None No Release Detection: Other No

Release Detection: Other Note Not reported

Release Prevention: Double Bottom No Release Prevention: Double Walled Yes

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No

MAP FINDINGS Map ID Direction

Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

#### **GATEWAY GENERATION (Continued)**

A100251685

Release Prevention: Other No

Release Prevention: Other Note Not reported

Tank Foundation: Steel No Tank Foundation: Earthen No Tank Foundation: Concrete Imp Yes Tank Foundation: Unknown No Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather Not reported Tank Roof: Dbldeck Not reported Tank Roof: Pontoon Not reported Tank Roof: Balloon Not reported Tank Roof: Lifter Not reported Not reported Tank Roof: Pan

Tank Roof: Other Yes

Tank Roof: Other Note Shop fabricated horizontal tank

#### Tank Material:

Tank Materials: Bare Steel Yes Tank Materials: Concrete No Tank Materials: Insulated Tank Jacket No Tank Materials: Unknown No Tank Materials: Other Nο

Tank Materials: Other Note Not reported

Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

#### Owner:

Owner Id: 36616

Owner Name: City of Manassas Owner Address: 8500 Public Works Dr

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110

Owner Type: LOCAL Number of Active AST: 2 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Fed Regulated: No Tank Number: GW1

Direction Distance Elevation

Site Database(s) EPA ID Number

## **GATEWAY GENERATION (Continued)**

A100251685

**EDR ID Number** 

Tank Type: AST
Tank Capacity: 10000
Tank Contents: DIESEL
Tank Status: CURR IN USE

#### Tank Containment:

4/1/1996 Install Date: Containment: Curbing Yes Containment: Weirs No Containment: Sorbent Yes Containment: Culvert No Containment: Diversion Nο Containment: Retention No Containment: Dike Yes Containment: Unknown No Containment: Other No

Containment: Other Note Not reported

#### Release Detection:

Release Detection: Ground Water
Release Detection: Visual
Release Detection: Vapor
Release Detection: Interstitial
Release Detection: None
Release Detection: Other
No

Release Detection: Other Note Not reported

Release Prevention: Double Bottom No Release Prevention: Double Walled Yes

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other No

Release Prevention: Other Note Not reported

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp Yes
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather Not reported Tank Roof: Dbldeck Not reported Tank Roof: Pontoon Not reported Tank Roof: Balloon Not reported Tank Roof: Lifter Not reported Tank Roof: Pan Not reported Tank Roof: Other No

Tank Roof: Other Note Not reported

#### Tank Material:

Tank Materials: Bare Steel No Tank Materials: Concrete No Tank Materials: Insulated Tank Jacket No

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

## **GATEWAY GENERATION (Continued)**

A100251685

VA AST

A100204553

N/A

Tank Materials: Unknown No Tank Materials: Other No

Tank Materials: Other Note Not reported

Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

C12 **MANASSAS REGIONAL AIRPORT** 

10451 WAKEMAN DR MANASSAS, VA 20110

< 1/8 1 ft.

Site 2 of 2 in cluster C

Owner Type:

Relative:

Facility ID: Lower

3034616 Facility Type: **AIRLINE** Actual:

176 ft.

CEDS Facility ID: 200000077992

Tank Info:

Owner:

AST:

40266 Owner Id:

Geneva Air Service Owner Name: Owner Address: 10500 Terminal Rd Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110

COMMERCIAL

Number of Active AST: 1 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Fed Regulated: No Tank Number: Tank Type: **AST** Tank Capacity: 12000 Tank Contents: JET FUEL **CURR IN USE** Tank Status:

Tank Containment:

Install Date: Not reported

Containment: Curbing No Containment: Weirs No Containment: Sorbent No Containment: Culvert No Containment: Diversion No

Direction
Distance
Elevation

n Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Containment: Retention No
Containment: Dike Yes
Containment: Unknown No
Containment: Other No

Containment: Other Note Not reported

#### Release Detection:

Release Detection: Ground Water
Release Detection: Visual
Release Detection: Vapor
Release Detection: Interstitial
Release Detection: None
Release Detection: Other
No

Release Detection: Other Note Not reported

Release Prevention: Double Bottom No Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other Yes

Release Prevention: Other Note 110% Volume Dike

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp No
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather Not reported Tank Roof: Dbldeck Not reported Not reported Tank Roof: Pontoon Tank Roof: Balloon Not reported Tank Roof: Lifter Not reported Tank Roof: Pan Not reported Tank Roof: Other No Tank Roof: Other Note Not reported

Tank Material:

Tank Materials: Bare Steel No
Tank Materials: Concrete No
Tank Materials: Insulated Tank Jacket No
Tank Materials: Unknown No
Tank Materials: Other No

Tank Materials: Other Note Not reported

Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

# MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Tank Type Horizontal: Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

Owner:

42777 Owner Id: Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Owner Address2: Not reported

Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: **PRIVATE** Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 42779

Owner Name: M J Colgan Associates Owner Address: 5418 Ancestry Ct Not reported Owner Address2: Owner City/State/Zip:

Gainesville, VA 20155 **COMMERCIAL** 

Owner Type:

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 48850

Owner Name: Manassas FBO LLC dba APP Jet Center Manassas

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110 Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

44504 Owner Id:

Owner Name: Volo Holdings Manassas Limited Liability Corp

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110 COMMERCIAL Owner Type:

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id:

**Dulles Aviation Incorporated** Owner Name: Owner Address: 10501 Observation Rd

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110 **COMMERCIAL** Owner Type:

Direction Distance Elevation

ance EDR ID Number
vation Site Database(s) EPA ID Number

#### MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 43640

Owner Name: Chantilly Air Incorporated
Owner Address: 10761 James Payne Ct

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

 Fed Regulated:
 No

 Tank Number:
 T001

 Tank Type:
 AST

 Tank Capacity:
 12000

 Tank Contents:
 JET FUEL

 Tank Status:
 CURR IN USE

#### Tank Containment:

Install Date: 2/2/1995 Containment: Curbing No Containment: Weirs No Containment: Sorbent Yes Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown No Containment: Other No

Containment: Other Note Not reported

# Release Detection:

Release Detection: Ground Water
Release Detection: Visual
Release Detection: Vapor
Release Detection: Interstitial
Release Detection: None
Release Detection: Other
No

Release Detection: Other Note Not reported

Release Prevention: Double Bottom No Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other No

Release Prevention: Other Note Not reported

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp Yes

Direction Distance

Elevation Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Tank Foundation: Unknown No Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather Not reported Tank Roof: Dbldeck Not reported Tank Roof: Pontoon Not reported Tank Roof: Balloon Not reported Tank Roof: Lifter Not reported Tank Roof: Pan Not reported

Tank Roof: Other Yes

Tank Roof: Other Note none-horizontal tank

#### Tank Material:

Tank Materials: Bare Steel No
Tank Materials: Concrete No
Tank Materials: Insulated Tank Jacket No
Tank Materials: Unknown No
Tank Materials: Other Yes

Tank Materials: Other Note bare steel welded, single wall, totally above the ground, horizontal

Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

#### Owner:

Owner Id: 42777
Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Owner Address2: Not reported

Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: PRIVATE
Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42779

Owner Name: M J Colgan Associates
Owner Address: 5418 Ancestry Ct
Owner Address2: Not reported
Owner City/State/Zip: Gainesville, VA 20155

Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Number of Inactive AST: Number of Inactive UST: 0

Owner Id: 48850

Manassas FBO LLC dba APP Jet Center Manassas Owner Name:

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110 Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id:

Owner Name: Volo Holdings Manassas Limited Liability Corp

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Manassas, VA 20110 Owner City/State/Zip:

**COMMERCIAL** Owner Type:

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 42776

Owner Name: **Dulles Aviation Incorporated** 

Owner Address: 10501 Observation Rd

Not reported Owner Address2:

Owner City/State/Zip: Manassas, VA 20110 Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 43640

Owner Name: Chantilly Air Incorporated 10761 James Payne Ct Owner Address:

Not reported Owner Address2:

Manassas, VA 20110 Owner City/State/Zip: Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Fed Regulated: No Tank Number: T002 Tank Type: AST Tank Capacity: 20000 Tank Contents: JET FUEL **CURR IN USE** Tank Status:

Tank Containment:

Install Date: Not reported

Containment: Curbing No

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Containment: Weirs No Containment: Sorbent No Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown No Containment: Other No

Containment: Other Note Not reported

#### Release Detection:

Release Detection: Ground Water No Release Detection: Visual Yes Release Detection: Vapor No Release Detection: Interstitial No Release Detection: None No Release Detection: Other No

Release Detection: Other Note Not reported

Release Prevention: Double Bottom No Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other

Release Prevention: Other Note concrete containment w/oil/water sepe\\arator

Tank Foundation: Steel No Tank Foundation: Earthen No Tank Foundation: Concrete Imp Yes Tank Foundation: Unknown No Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather Not reported Tank Roof: Dbldeck Not reported Tank Roof: Pontoon Not reported Not reported Tank Roof: Balloon Tank Roof: Lifter Not reported Tank Roof: Pan Not reported

Tank Roof: Other

Tank Roof: Other Note none-horizontal tank

## Tank Material:

Tank Materials: Bare Steel Yes Tank Materials: Concrete No Tank Materials: Insulated Tank Jacket No Tank Materials: Unknown No Tank Materials: Other No

Tank Materials: Other Note Not reported

Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

# MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Tank Type Potable/Skid: Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

Owner:

Owner Id: 42777 Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Owner Address2: Not reported

Owner City/State/Zip: Kennesaw, GA 30144

**PRIVATE** Owner Type: Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 42779

M J Colgan Associates Owner Name: Owner Address: 5418 Ancestry Ct Owner Address2: Not reported Owner City/State/Zip: Gainesville, VA 20155

Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 48850

Manassas FBO LLC dba APP Jet Center Manassas Owner Name:

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110 **COMMERCIAL** Owner Type:

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 44504

Owner Name: Volo Holdings Manassas Limited Liability Corp

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110

COMMERCIAL Owner Type:

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id:

Owner Name: **Dulles Aviation Incorporated** 

Direction Distance Elevation

evation Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Owner Address: 10501 Observation Rd

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 43640

Owner Name: Chantilly Air Incorporated Owner Address: 10761 James Payne Ct

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Fed Regulated: No
Tank Number: T003
Tank Type: AST
Tank Capacity: 15000

Tank Contents: GASOLINE: AVIATION GAS

Tank Status: CURR IN USE

Tank Containment:

1/1/1990 Install Date: Containment: Curbing No Containment: Weirs No Containment: Sorbent No Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown No Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water
Release Detection: Visual
Release Detection: Vapor
Release Detection: Interstitial
Release Detection: None
Release Detection: Other
No

Release Detection: Other Note Not reported

Release Prevention: Double Bottom No

Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other Yes

Release Prevention: Other Note concrete containment w/ oil-water separator

Direction Distance Elevation

EDR ID Number
Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather Not reported Tank Roof: Dbldeck Not reported Tank Roof: Pontoon Not reported Tank Roof: Balloon Not reported Tank Roof: Lifter Not reported Tank Roof: Pan Not reported Not reported Tank Roof: Pan Not reported

Tank Roof: Other Yes

Tank Roof: Other Note none-horizontal tank

#### Tank Material:

Tank Materials: Bare Steel Yes
Tank Materials: Concrete No
Tank Materials: Insulated Tank Jacket No
Tank Materials: Unknown No
Tank Materials: Other No

Tank Materials: Other Note Not reported

Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

# Owner:

Owner Id: 42777
Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Owner Address2: Not reported

Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: PRIVATE
Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42779

Owner Name: M J Colgan Associates
Owner Address: 5418 Ancestry Ct
Owner Address2: Not reported

Owner City/State/Zip: Gainesville, VA 20155

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

## MANASSAS REGIONAL AIRPORT (Continued)

Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 48850

Manassas FBO LLC dba APP Jet Center Manassas Owner Name:

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110

COMMERCIAL Owner Type:

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 44504

Owner Name: Volo Holdings Manassas Limited Liability Corp

9998 Wakeman Dr Owner Address: Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110 Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 42776

Owner Name: **Dulles Aviation Incorporated** Owner Address: 10501 Observation Rd

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110 Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 43640

Owner Name: Chantilly Air Incorporated Owner Address: 10761 James Payne Ct

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110 Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Fed Regulated: No Tank Number: T005 Tank Type: AST Tank Capacity: 20000 Tank Contents: JET FUEL Tank Status: **CURR IN USE**  A100204553

Direction Distance Elevation

Site Database(s) **EPA ID Number** 

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Tank Containment:

1/28/1993 Install Date: Containment: Curbing Nο Containment: Weirs No Containment: Sorbent Yes Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown No Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water No Release Detection: Visual Yes Release Detection: Vapor No Release Detection: Interstitial No Release Detection: None No Release Detection: Other No

Release Detection: Other Note Not reported

Release Prevention: Double Bottom No Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No

Release Prevention: Other

Yes Release Prevention: Other Note concrete containment w/ oil-water separator

Tank Foundation: Steel No Tank Foundation: Earthen No Tank Foundation: Concrete Imp Yes Tank Foundation: Unknown No Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather Not reported Tank Roof: Dbldeck Not reported Tank Roof: Pontoon Not reported Tank Roof: Balloon Not reported Tank Roof: Lifter Not reported Tank Roof: Pan Not reported

Tank Roof: Other Yes

Tank Roof: Other Note None-horizontal tank

Tank Material:

Tank Materials: Bare Steel No Tank Materials: Concrete No Tank Materials: Insulated Tank Jacket No Tank Materials: Unknown No Tank Materials: Other

Tank Materials: Other Note single wall, totally above the ground, lined interior, horizontal

Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν

Direction Distance

Elevation Site Database(s) EPA ID Number

# MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Tank Type Double Wall: Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

Owner:

Owner Id: 42777
Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Owner Address2: Not reported

Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: PRIVATE
Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42779

Owner Name: M J Colgan Associates
Owner Address: 5418 Ancestry Ct
Owner Address2: Not reported

Owner City/State/Zip: Gainesville, VA 20155 Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 48850

Owner Name: Manassas FBO LLC dba APP Jet Center Manassas

Owner Address: 9998 Wakeman Dr
Owner Address2: Not reported
Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 44504

Owner Name: Volo Holdings Manassas Limited Liability Corp

Owner Address: 9998 Wakeman Dr
Owner Address2: Not reported
Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Owner Id: 42776

**Dulles Aviation Incorporated** Owner Name:

Owner Address: 10501 Observation Rd

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110 Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 43640

Chantilly Air Incorporated Owner Name: Owner Address: 10761 James Payne Ct

Owner Address2: Not reported

Manassas, VA 20110 Owner City/State/Zip: Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 0 Number of Inactive AST: Number of Inactive UST: 0

Fed Regulated: No Tank Number: T006 Tank Type: **AST** Tank Capacity: 15000

Tank Contents: **GASOLINE: AVIATION GAS** 

Tank Status: **CURR IN USE** 

Tank Containment:

Install Date: 1/28/1993 Containment: Curbing No Containment: Weirs No Containment: Sorbent Yes Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown No Containment: Other No

Not reported Containment: Other Note

Release Detection:

Release Detection: Ground Water No Release Detection: Visual Yes Release Detection: Vapor No Release Detection: Interstitial No Release Detection: None No Release Detection: Other No

Release Detection: Other Note Not reported

Release Prevention: Double Bottom No Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No

Direction Distance Elevation

vation Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Release Prevention: Other Yes

Release Prevention: Other Note concrete containment w/ oil-water separator

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather
Tank Roof: Dbldeck
Tank Roof: Pontoon
Tank Roof: Pontoon
Tank Roof: Balloon
Tank Roof: Lifter
Tank Roof: Lifter
Not reported
Tank Roof: Pan
Not reported
Not reported

Tank Roof: Other Yes

Tank Roof: Other Note none-horizontal tank

#### Tank Material:

Tank Materials: Bare Steel No Tank Materials: Concrete No Tank Materials: Insulated Tank Jacket No Tank Materials: Unknown No Tank Materials: Other Nο Tank Materials: Other Note welded Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

#### Owner:

Owner Id: 42777
Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Owner Address2: Not reported

Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: PRIVATE
Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42779

Owner Name: M J Colgan Associates

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

### MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Owner Address: 5418 Ancestry Ct Not reported Owner Address2: Owner City/State/Zip: Gainesville, VA 20155

Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 48850

Manassas FBO LLC dba APP Jet Center Manassas Owner Name:

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110 Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 44504

Owner Name: Volo Holdings Manassas Limited Liability Corp

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Manassas, VA 20110 Owner City/State/Zip: Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 42776

Owner Name: **Dulles Aviation Incorporated** Owner Address: 10501 Observation Rd

Not reported Owner Address2:

Owner City/State/Zip: Manassas, VA 20110 Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 43640

Chantilly Air Incorporated Owner Name: Owner Address: 10761 James Payne Ct

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110 Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Fed Regulated: No Tank Number: T007 Tank Type: AST Tank Capacity: 20000

Direction Distance Elevation

nce EDR ID Number tition Site Database(s) EPA ID Number

#### MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Tank Contents: JET FUEL
Tank Status: CURR IN USE

Tank Containment:

Install Date: 3/18/2005 Containment: Curbing No Containment: Weirs No Containment: Sorbent Yes Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown No Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water
Release Detection: Visual
Release Detection: Vapor
Release Detection: Interstitial
Release Detection: None
Release Detection: Other
No

Release Prevention: Double Bottom No Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other Yes

Release Prevention: Other Note concrete w/ coating, containment w/ oil-water separator

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather Not reported Tank Roof: Dbldeck Not reported Tank Roof: Pontoon Not reported Tank Roof: Balloon Not reported Tank Roof: Lifter Not reported Tank Roof: Pan Not reported Not reported

Tank Roof: Other Yes

Tank Roof: Other Note None-horizontal tank

Tank Material:

Tank Materials: Bare Steel Yes
Tank Materials: Concrete No
Tank Materials: Insulated Tank Jacket No
Tank Materials: Unknown No
Tank Materials: Other No

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Tank Materials: Other Note Not reported Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν

Owner:

Tank Type Other Specify:

Owner Id: 42777 Owner Name: FlightWorks

600 Town Park Ln Ste 550 Owner Address:

Ν

Not reported Owner Address2:

Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: **PRIVATE** Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 42779

Owner Name: M J Colgan Associates Owner Address: 5418 Ancestry Ct Owner Address2: Not reported

Gainesville, VA 20155 Owner City/State/Zip: Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id:

Manassas FBO LLC dba APP Jet Center Manassas Owner Name:

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110 Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 0 Number of Inactive AST: 0 Number of Inactive UST:

Owner Id: 44504

Owner Name: Volo Holdings Manassas Limited Liability Corp

9998 Wakeman Dr Owner Address: Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110 Owner Type: **COMMERCIAL** 

Number of Active AST: 10

Direction Distance Elevation

on Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42776

Owner Name: Dulles Aviation Incorporated Owner Address: 10501 Observation Rd

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 43640

Owner Name: Chantilly Air Incorporated Owner Address: 10761 James Payne Ct

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Fed Regulated: No
Tank Number: T008
Tank Type: AST
Tank Capacity: 15000

Tank Contents: GASOLINE: AVIATION GAS

Tank Status: CURR IN USE

Tank Containment:

2/28/2005 Install Date: Containment: Curbing No Containment: Weirs No Containment: Sorbent Yes Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown No Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water
Release Detection: Visual
Release Detection: Vapor
Release Detection: Interstitial
Release Detection: None
Release Detection: Other
No

Release Prevention: Double Bottom No Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

**EDR ID Number** 

A100204553

Direction Distance Elevation

on Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other Yes

Release Prevention: Other Note coated concrete, oil water separator

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather Not reported
Tank Roof: Dbldeck Not reported
Tank Roof: Pontoon Not reported
Tank Roof: Balloon Not reported
Tank Roof: Lifter Not reported
Tank Roof: Pan Not reported

Tank Roof: Other Yes

Tank Roof: Other Note None-horizontal tank

#### Tank Material:

Tank Materials: Bare Steel No
Tank Materials: Concrete No
Tank Materials: Insulated Tank Jacket No
Tank Materials: Unknown No
Tank Materials: Other No

Tank Materials: Other Note Not reported

Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

#### Owner:

Owner Id: 42777
Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Owner Address2: Not reported

Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: PRIVATE
Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0

Direction Distance

Elevation Site Database(s) EPA ID Number

### MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Number of Inactive UST:

Owner Id: 42779

Owner Name: M J Colgan Associates
Owner Address: 5418 Ancestry Ct
Owner Address2: Not reported

Owner City/State/Zip: Gainesville, VA 20155 Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 48850

Owner Name: Manassas FBO LLC dba APP Jet Center Manassas

Owner Address: 9998 Wakeman Dr
Owner Address2: Not reported
Owner City/State/Zip: Manassas, VA 20110

Owner City/State/Zip: Manassas, VA 2011
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 44504

Owner Name: Volo Holdings Manassas Limited Liability Corp

Owner Address: 9998 Wakeman Dr
Owner Address2: Not reported
Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42776

Owner Name: Dulles Aviation Incorporated
Owner Address: 10501 Observation Rd

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 43640

Owner Name: Chantilly Air Incorporated
Owner Address: 10761 James Payne Ct
Owner Address2: Not reported

Owner Address2: Not reported
Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Direction Distance Elevation

EDR ID Number
Site Database(s) EPA ID Number

### MANASSAS REGIONAL AIRPORT (Continued)

A100204553

 Fed Regulated:
 No

 Tank Number:
 T009

 Tank Type:
 AST

 Tank Capacity:
 20000

 Tank Contents:
 JET FUEL

 Tank Status:
 CURR IN USE

Tank Containment:

Install Date: 2/28/2005 Containment: Curbing No Containment: Weirs No Containment: Sorbent Yes Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown No Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water
Release Detection: Visual
Release Detection: Vapor
Release Detection: Interstitial
Release Detection: None
Release Detection: Other
No

Release Detection: Other Note Not reported

Release Prevention: Double Bottom No Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other Yes

Release Prevention: Other Note coated concrete, oil/water separator

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather

Tank Roof: Dbldeck

Tank Roof: Pontoon

Tank Roof: Balloon

Tank Roof: Balloon

Tank Roof: Lifter

Tank Roof: Pan

Not reported

Not reported

Not reported

Not reported

Not reported

Yes

Tank Roof: Other Note None-horizontal tank

Tank Material:

Tank Materials: Bare Steel No

Distance

Elevation Site Database(s) EPA ID Number

# MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Tank Materials: Concrete No Tank Materials: Insulated Tank Jacket No Tank Materials: Unknown No Tank Materials: Other No Tank Materials: Other Note welded Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

Owner:

Owner Id: 42777
Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Owner Address2: Not reported

Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: PRIVATE
Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42779

Owner Name: M J Colgan Associates
Owner Address: 5418 Ancestry Ct
Owner Address2: Not reported
Owner City/State/Zip: Gainesville, VA 20155
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 48850

Owner Name: Manassas FBO LLC dba APP Jet Center Manassas

Owner Address: 9998 Wakeman Dr
Owner Address2: Not reported
Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 44504

Owner Name: Volo Holdings Manassas Limited Liability Corp

Owner Address: 9998 Wakeman Dr

Direction Distance Elevation

Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Owner Address2: Not reported Owner City/State/Zip: Manassas, V

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42776

Owner Name: Dulles Aviation Incorporated Owner Address: 10501 Observation Rd

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 43640

Owner Name: Chantilly Air Incorporated Owner Address: 10761 James Payne Ct

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Fed Regulated:

Tank Number:

Tank Type:

Tank Capacity:

Tank Contents:

Tank Status:

No
To10

AST

20000

JET FUEL

CURR IN USE

Tank Containment:

Install Date: Not reported

Containment: Curbing No Containment: Weirs No Containment: Sorbent Yes Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown No Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water
Release Detection: Visual
Release Detection: Vapor
Release Detection: Interstitial
Release Detection: None
Release Detection: Other
No

Direction Distance Elevation

Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Release Detection: Other Note Not reported Release Prevention: Double Bottom No

Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other Yes

Release Prevention: Other Note coated concrete.\\, oil/water separator

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather Not reported
Tank Roof: Dbldeck Not reported
Tank Roof: Pontoon Not reported
Tank Roof: Balloon Not reported
Tank Roof: Lifter Not reported
Tank Roof: Pan Not reported
Tank Roof: Pan Not reported

Tank Roof: Other Yes

Tank Roof: Other Note None-Horizontal tank

### Tank Material:

Tank Materials: Bare Steel No
Tank Materials: Concrete No
Tank Materials: Insulated Tank Jacket No
Tank Materials: Unknown No
Tank Materials: Other No

Tank Materials: Other Note Not reported

Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

#### Owner:

Owner Id: 42777
Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Owner Address2: Not reported

Owner City/State/Zip: Kennesaw, GA 30144

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Owner Type: **PRIVATE** Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 42779

Owner Name: M J Colgan Associates Owner Address: 5418 Ancestry Ct Owner Address2: Not reported Gainesville, VA 20155 Owner City/State/Zip:

COMMERCIAL Owner Type:

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

48850 Owner Id:

Owner Name: Manassas FBO LLC dba APP Jet Center Manassas

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110 Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 44504

Owner Name: Volo Holdings Manassas Limited Liability Corp

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110

Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 42776

Owner Name: **Dulles Aviation Incorporated** Owner Address: 10501 Observation Rd

Owner Address2: Not reported

Manassas, VA 20110 Owner City/State/Zip: Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 43640

Owner Name: Chantilly Air Incorporated 10761 James Payne Ct Owner Address:

Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110 Owner Type: COMMERCIAL

Number of Active AST: 10

Direction Distance Elevation

tion Site Database(s) EPA ID Number

# MANASSAS REGIONAL AIRPORT (Continued)

Number of Active UST:

Number of Inactive AST: Number of Inactive UST:

**EDR ID Number** 

A100204553

Fed Regulated: No
Tank Number: T011
Tank Type: AST
Tank Capacity: 1000
Tank Contents: GASOLINE
Tank Status: CURR IN USE

0

0

Tank Containment:

Install Date: 5/5/1993 Containment: Curbing No Containment: Weirs No Containment: Sorbent Yes Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown Nο Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water
Release Detection: Visual
Release Detection: Vapor
Release Detection: Interstitial
Release Detection: None
Release Detection: Other
No

Release Detection: Other Note Not reported

Release Prevention: Double Bottom No Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other Yes

Release Prevention: Other Note COncrete containment w/ OWS

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported Tank Roof: Float No

Tank Roof: Cone No

Tank Roof: Breather Not reported
Tank Roof: Dbldeck Not reported
Tank Roof: Pontoon Not reported
Tank Roof: Balloon Not reported
Tank Roof: Lifter Not reported
Tank Roof: Pan Not reported

Tank Roof: Other Yes

Direction
Distance
Elevation

tion Site Database(s) EPA ID Number

### MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Tank Roof: Other Note

None-horizontal Tank

#### Tank Material:

Tank Materials: Bare Steel Yes
Tank Materials: Concrete No
Tank Materials: Insulated Tank Jacket No
Tank Materials: Unknown No
Tank Materials: Other No

Tank Materials: Other Note Not reported

Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

#### Tank Info:

#### Owner:

Owner Id: 40266

Owner Name: Geneva Air Service
Owner Address: 10500 Terminal Rd
Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110

Owner Type: COMMERCIAL

Number of Active AST: 1
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Fed Regulated: No
Tank Number: 1
Tank Type: AST
Tank Capacity: 12000
Tank Contents: JET FUEL
Tank Status: CURR IN USE

#### Tank Containment:

Install Date: Not reported

Containment: Curbing No Containment: Weirs No Containment: Sorbent No Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown No

Direction Distance Elevation

Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water
Release Detection: Visual
Release Detection: Vapor
Release Detection: Interstitial
Release Detection: None
Release Detection: Other
No

Release Prevention: Double Bottom No

Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported Release Prevention: Poly Jacket No

Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other Yes

Release Prevention: Other Note 110% Volume Dike

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp No
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather

Tank Roof: Dbldeck

Tank Roof: Pontoon

Tank Roof: Balloon

Tank Roof: Balloon

Tank Roof: Lifter

Tank Roof: Pan

Not reported

Tank Roof: Other Note Not reported

#### Tank Material:

Tank Type Other:

Tank Materials: Bare Steel No Tank Materials: Concrete No Tank Materials: Insulated Tank Jacket No Tank Materials: Unknown No Tank Materials: Other No

Tank Materials: Other Note Not reported

Ν

Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν

Direction Distance Elevation

vation Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Tank Type Other Specify:

Owner:

Owner Id: 42777
Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Ν

Owner Address2: Not reported

Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: PRIVATE
Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42779

Owner Name: M J Colgan Associates
Owner Address: 5418 Ancestry Ct
Owner Address2: Not reported

Owner City/State/Zip: Gainesville, VA 20155
Owner Type: COMMERCIAL

Owner Type: COMMERCI.
Number of Active AST: 10

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 48850

Owner Name: Manassas FBO LLC dba APP Jet Center Manassas

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110

Owner Type: COMMERCIAL Number of Active AST: 10

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 44504

Owner Name: Volo Holdings Manassas Limited Liability Corp

Owner Address: 9998 Wakeman Dr
Owner Address2: Not reported
Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42776

Owner Name: Dulles Aviation Incorporated
Owner Address: 10501 Observation Rd

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0

Direction Distance Elevation

Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Number of Inactive UST:

Owner Id: 43640

Owner Name: Chantilly Air Incorporated Owner Address: 10761 James Payne Ct

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Fed Regulated:

Tank Number:

Tank Type:

AST

Tank Capacity:

Tank Contents:

JET FUEL

Tank Status:

No

T001

T2001

T2000

T

Tank Containment:

Install Date: 2/2/1995 Containment: Curbing No Containment: Weirs No Containment: Sorbent Yes Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown No Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water
Release Detection: Visual
Release Detection: Vapor
Release Detection: Interstitial
Release Detection: None
Release Detection: Other
No

Release Prevention: Double Bottom No Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other No

Release Prevention: Other Note Not reported

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather Not reported Tank Roof: Dbldeck Not reported Tank Roof: Pontoon Not reported Not reported Tank Roof: Balloon Tank Roof: Lifter Not reported Tank Roof: Pan Not reported Tank Roof: Other Yes

Tank Roof: Other Note none-horizontal tank

#### Tank Material:

Tank Materials: Bare Steel No Tank Materials: Concrete No Tank Materials: Insulated Tank Jacket No Tank Materials: Unknown No Tank Materials: Other Yes

Tank Materials: Other Note bare steel welded, single wall, totally above the ground, horizontal

Tank Type Cathodic/CP: Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

#### Owner:

42777 Owner Id: Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Owner Address2: Not reported

Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: **PRIVATE** Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 42779

Owner Name: M J Colgan Associates Owner Address: 5418 Ancestry Ct Owner Address2: Not reported Gainesville, VA 20155 Owner City/State/Zip: Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Direction Distance

Elevation Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Owner Id: 48850

Owner Name: Manassas FBO LLC dba APP Jet Center Manassas

Owner Address: 9998 Wakeman Dr
Owner Address2: Not reported
Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 44504

Owner Name: Volo Holdings Manassas Limited Liability Corp

Owner Address: 9998 Wakeman Dr
Owner Address2: Not reported
Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42776

Owner Name: Dulles Aviation Incorporated Owner Address: 10501 Observation Rd

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 43640

Owner Name: Chantilly Air Incorporated Owner Address: 10761 James Payne Ct

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

 Fed Regulated:
 No

 Tank Number:
 T002

 Tank Type:
 AST

 Tank Capacity:
 20000

 Tank Contents:
 JET FUEL

 Tank Status:
 CURR IN USE

Tank Containment:

Install Date: Not reported

Containment: Curbing No
Containment: Weirs No
Containment: Sorbent No
Containment: Culvert No

Direction Distance Elevation

n Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Containment: Diversion No
Containment: Retention No
Containment: Dike Yes
Containment: Unknown No
Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water
Release Detection: Visual
Release Detection: Vapor
Release Detection: Interstitial
Release Detection: None
Release Detection: Other
No

Release Detection: Other Note Not reported

Release Prevention: Double Bottom No Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No
Release Prevention: Exc Liner No
Release Prevention: None No
Release Prevention: Unknown No
Release Prevention: Other Yes

Release Prevention: Other Note concrete containment w/oil/water sepe\\arator

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp Yes
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather

Tank Roof: Dbldeck

Tank Roof: Pontoon

Tank Roof: Balloon

Tank Roof: Lifter

Tank Roof: Pan

Tank Roof: Pan

Tank Roof: Pan

Tank Roof: Others

Tank Roof: Other Yes

Tank Roof: Other Note none-horizontal tank

#### Tank Material:

Tank Materials: Bare Steel Yes
Tank Materials: Concrete No
Tank Materials: Insulated Tank Jacket No
Tank Materials: Unknown No
Tank Materials: Other No

Tank Materials: Other Note Not reported

Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

# MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Tank Type Vertical: Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

Owner:

Owner Id: 42777 Owner Name: FlightWorks

600 Town Park Ln Ste 550 Owner Address:

Owner Address2: Not reported

Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: **PRIVATE** Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 42779

M J Colgan Associates Owner Name: 5418 Ancestry Ct Owner Address: Owner Address2: Not reported

Gainesville, VA 20155 Owner City/State/Zip:

COMMERCIAL Owner Type:

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 48850

Owner Name: Manassas FBO LLC dba APP Jet Center Manassas

Owner Address: 9998 Wakeman Dr Not reported Owner Address2:

Owner City/State/Zip: Manassas, VA 20110 COMMERCIAL Owner Type:

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id:

Owner Name: Volo Holdings Manassas Limited Liability Corp

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110 Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 42776

Owner Name: **Dulles Aviation Incorporated** Owner Address: 10501 Observation Rd

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110

Direction Distance

Elevation Site Database(s) EPA ID Number

### MANASSAS REGIONAL AIRPORT (Continued)

Owner Type:

COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 43640

Owner Name: Chantilly Air Incorporated Owner Address: 10761 James Payne Ct

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Fed Regulated: No Tank Number: T003 Tank Type: AST Tank Capacity: 15000

Tank Contents: GASOLINE: AVIATION GAS

Tank Status: CURR IN USE

Tank Containment:

Install Date: 1/1/1990 Containment: Curbing No Containment: Weirs No Containment: Sorbent No Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown No Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water
Release Detection: Visual
Release Detection: Vapor
Release Detection: Interstitial
Release Detection: None
Release Detection: Other
No

Release Prevention: Double Bottom No Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No
Release Prevention: Exc Liner No
Release Prevention: None No
Release Prevention: Unknown No
Release Prevention: Other Yes

Release Prevention: Other Note concrete containment w/ oil-water separator

Tank Foundation: Steel No Tank Foundation: Earthen No

**EDR ID Number** 

A100204553

Direction Distance Elevation

on Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

Tank Foundation: Concrete Imp Yes
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather Not reported Tank Roof: Dbldeck Not reported Tank Roof: Pontoon Not reported Tank Roof: Balloon Not reported Tank Roof: Lifter Not reported Tank Roof: Pan Not reported Not reported Tank Roof: Pan Not reported

Tank Roof: Other Yes

Tank Roof: Other Note none-horizontal tank

#### Tank Material:

Tank Materials: Bare Steel Yes
Tank Materials: Concrete No
Tank Materials: Insulated Tank Jacket No
Tank Materials: Unknown No
Tank Materials: Other No

Tank Materials: Other Note Not reported

Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

#### Owner:

Owner Id: 42777
Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Owner Address2: Not reported

Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: PRIVATE
Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42779

Owner Name: M J Colgan Associates
Owner Address: 5418 Ancestry Ct
Owner Address2: Not reported
Owner City/State/Zip: Gainesville, VA 20155

Owner Type: COMMERCIAL

Number of Active AST: 10

**EDR ID Number** 

A100204553

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Number of Active UST: Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 48850

Manassas FBO LLC dba APP Jet Center Manassas Owner Name:

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110

Owner Type: **COMMERCIAL** Number of Active AST: 10

Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 44504

Owner Name: Volo Holdings Manassas Limited Liability Corp

9998 Wakeman Dr Owner Address: Owner Address2: Not reported

Manassas, VA 20110 Owner City/State/Zip: Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 42776

Owner Name: **Dulles Aviation Incorporated** Owner Address: 10501 Observation Rd

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110 Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 43640

Owner Name: Chantilly Air Incorporated Owner Address: 10761 James Payne Ct

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110 Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Fed Regulated: No Tank Number: T005 Tank Type: **AST** Tank Capacity: 20000 Tank Contents: JET FUEL Tank Status: **CURR IN USE** 

Tank Containment:

1/28/1993 Install Date:

Direction Distance Elevation

nce EDR ID Number ttion Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Containment: Curbing No Containment: Weirs No Containment: Sorbent Yes Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown Nο Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water
Release Detection: Visual
Release Detection: Vapor
Release Detection: Interstitial
Release Detection: None
Release Detection: Other
No

Release Prevention: Double Bottom No Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other Yes

Release Prevention: Other Note concrete containment w/ oil-water separator

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather
Tank Roof: Dbldeck
Tank Roof: Pontoon
Tank Roof: Pontoon
Tank Roof: Balloon
Tank Roof: Lifter
Tank Roof: Lifter
Tank Roof: Pan
Not reported
Tank Roof: Other
Not reported
Yes

Tank Roof: Other Note None-horizontal tank

Tank Material:

Tank Materials: Bare Steel No Tank Materials: Concrete No Tank Materials: Insulated Tank Jacket No Tank Materials: Unknown No Tank Materials: Other No

Tank Materials: Other Note single wall, totally above the ground, lined interior, horizontal

Tank Type Cathodic/CP: N
Tank Type Single Wall: N
Tank Type Double Wall: N
Tank Type Lined Interior: N

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Tank Type Double Bottom: Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

Owner:

42777 Owner Id: Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Owner Address2: Not reported

Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: **PRIVATE** Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 42779

M J Colgan Associates Owner Name: 5418 Ancestry Ct Owner Address: Owner Address2: Not reported

Gainesville, VA 20155 Owner City/State/Zip: Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 48850

Manassas FBO LLC dba APP Jet Center Manassas Owner Name:

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110 Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id:

Owner Name: Volo Holdings Manassas Limited Liability Corp

9998 Wakeman Dr Owner Address: Not reported Owner Address2: Owner City/State/Zip: Manassas, VA 20110 Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 42776

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Owner Name: **Dulles Aviation Incorporated** 10501 Observation Rd Owner Address:

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110 Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 43640

Chantilly Air Incorporated Owner Name: 10761 James Payne Ct Owner Address:

Owner Address2: Not reported

Manassas, VA 20110 Owner City/State/Zip: Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 0 Number of Inactive UST:

Fed Regulated: No Tank Number: T006 Tank Type: **AST** Tank Capacity: 15000

**GASOLINE: AVIATION GAS** Tank Contents:

Tank Status: **CURR IN USE** 

Tank Containment:

1/28/1993 Install Date: Containment: Curbing No Containment: Weirs No Containment: Sorbent Yes Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown No Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water No Release Detection: Visual Yes Release Detection: Vapor No Release Detection: Interstitial No Release Detection: None No Release Detection: Other No

Release Detection: Other Note Not reported

Release Prevention: Double Bottom No

Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other Yes

Direction Distance Elevation

ion Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Release Prevention: Other Note concrete containment w/ oil-water separator

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather Not reported Tank Roof: Dbldeck Not reported Tank Roof: Pontoon Not reported Tank Roof: Balloon Not reported Tank Roof: Lifter Not reported Tank Roof: Pan Not reported Not reported Tank Roof: Pan Not reported

Tank Roof: Other Yes

Tank Roof: Other Note none-horizontal tank

### Tank Material:

Tank Materials: Bare Steel No Tank Materials: Concrete No Tank Materials: Insulated Tank Jacket No Tank Materials: Unknown No Tank Materials: Other No Tank Materials: Other Note welded Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

#### Owner:

Owner Id: 42777
Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Owner Address2: Not reported

Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: PRIVATE
Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42779

Owner Name: M J Colgan Associates
Owner Address: 5418 Ancestry Ct

Direction Distance

Elevation Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Owner Address2: Not reported

Owner City/State/Zip: Gainesville, VA 20155
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 48850

Owner Name: Manassas FBO LLC dba APP Jet Center Manassas

Owner Address: 9998 Wakeman Dr
Owner Address2: Not reported
Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 44504

Owner Name: Volo Holdings Manassas Limited Liability Corp

Owner Address: 9998 Wakeman Dr
Owner Address2: Not reported
Owner City/State/7ip: Manages VA 2011

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42776

Owner Name: Dulles Aviation Incorporated
Owner Address: 10501 Observation Rd

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 43640

Owner Name: Chantilly Air Incorporated Owner Address: 10761 James Payne Ct

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Fed Regulated: No
Tank Number: T007
Tank Type: AST
Tank Capacity: 20000
Tank Contents: JET FUEL

Direction Distance Elevation

**EDR ID Number** Site Database(s) **EPA ID Number** 

**CURR IN USE** 

3/18/2005

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Tank Status:

Install Date:

Tank Containment:

Containment: Curbing No Containment: Weirs No Containment: Sorbent Yes Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown Nο Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water No Release Detection: Visual Yes Release Detection: Vapor No Release Detection: Interstitial No Release Detection: None No Release Detection: Other No

Release Detection: Other Note Not reported

Release Prevention: Double Bottom No

Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other Yes

Release Prevention: Other Note concrete w/ coating, containment w/ oil-water separator

Tank Foundation: Steel No Tank Foundation: Earthen No Tank Foundation: Concrete Imp No Tank Foundation: Unknown No Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather Not reported Tank Roof: Dbldeck Not reported Tank Roof: Pontoon Not reported Not reported Tank Roof: Balloon Tank Roof: Lifter Not reported Tank Roof: Pan Not reported

Tank Roof: Other Yes

Tank Roof: Other Note None-horizontal tank

Tank Material:

Tank Materials: Bare Steel Yes Tank Materials: Concrete No Tank Materials: Insulated Tank Jacket Nο Tank Materials: Unknown No Tank Materials: Other No

Tank Materials: Other Note Not reported

MAP FINDINGS Map ID

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

Tank Type Cathodic/CP: Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

Owner:

42777 Owner Id: Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Owner Address2: Not reported

Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: **PRIVATE** Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 42779

Owner Name: M J Colgan Associates Owner Address: 5418 Ancestry Ct Owner Address2: Not reported

Owner City/State/Zip: Gainesville, VA 20155 Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

48850 Owner Id:

Manassas FBO LLC dba APP Jet Center Manassas Owner Name:

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110 Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 0 Number of Inactive UST:

Owner Id: 44504

Owner Name: Volo Holdings Manassas Limited Liability Corp

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Manassas, VA 20110 Owner City/State/Zip: Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0

Direction Distance Elevation

tance EDR ID Number vation Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42776

Owner Name: Dulles Aviation Incorporated
Owner Address: 10501 Observation Rd

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 43640

Owner Name: Chantilly Air Incorporated Owner Address: 10761 James Payne Ct

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Fed Regulated: No
Tank Number: T008
Tank Type: AST
Tank Capacity: 15000

Tank Contents: GASOLINE: AVIATION GAS

Tank Status: CURR IN USE

Tank Containment:

2/28/2005 Install Date: Containment: Curbing No Containment: Weirs No Containment: Sorbent Yes Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown No Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water
Release Detection: Visual
Release Detection: Vapor
Release Detection: Interstitial
Release Detection: None
Release Detection: Other
No

Release Prevention: Double Bottom No Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No

A100204553

Direction Distance Elevation

on Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Release Prevention: Exc Liner No
Release Prevention: None No
Release Prevention: Unknown No
Release Prevention: Other Yes

Release Prevention: Other Note coated concrete, oil water separator

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp No
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather Not reported Tank Roof: Dbldeck Not reported Tank Roof: Pontoon Not reported Tank Roof: Balloon Not reported Tank Roof: Lifter Not reported Tank Roof: Pan Not reported

Tank Roof: Other Yes

Tank Roof: Other Note None-horizontal tank

#### Tank Material:

Tank Materials: Bare Steel No Tank Materials: Concrete No Tank Materials: Insulated Tank Jacket No Tank Materials: Unknown No Tank Materials: Other No

Tank Materials: Other Note Not reported

Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

### Owner:

Owner Id: 42777
Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Owner Address2: Not reported
Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: PRIVATE
Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

MAP FINDINGS Map ID

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

## MANASSAS REGIONAL AIRPORT (Continued)

Owner Id:

42779

Owner Name: M J Colgan Associates Owner Address: 5418 Ancestry Ct Owner Address2: Not reported Gainesville, VA 20155 Owner City/State/Zip:

Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 48850

Manassas FBO LLC dba APP Jet Center Manassas Owner Name:

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110 Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 0 Number of Inactive AST: Number of Inactive UST: 0

Owner Id: 44504

Owner Name: Volo Holdings Manassas Limited Liability Corp

Owner Address: 9998 Wakeman Dr Not reported Owner Address2: Owner City/State/Zip: Manassas, VA 20110 Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 42776

**Dulles Aviation Incorporated** Owner Name: Owner Address: 10501 Observation Rd

Owner Address2: Not reported

Manassas, VA 20110 Owner City/State/Zip: Owner Type: **COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 43640

Chantilly Air Incorporated Owner Name: Owner Address: 10761 James Payne Ct Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110 Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0

Number of Inactive UST: 0

Fed Regulated: No Tank Number: T009 A100204553

Direction Distance Elevation

Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Tank Type: AST
Tank Capacity: 20000
Tank Contents: JET FUEL
Tank Status: CURR IN USE

#### Tank Containment:

Install Date: 2/28/2005 Containment: Curbing No Containment: Weirs No Containment: Sorbent Yes Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown No Containment: Other No

Containment: Other Note Not reported

#### Release Detection:

Release Detection: Ground Water No
Release Detection: Visual Yes
Release Detection: Vapor No
Release Detection: Interstitial No
Release Detection: None No
Release Detection: Other No

Release Detection: Other Note Not reported

Release Prevention: Double Bottom No Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other Yes

Release Prevention: Other Note coated concrete, oil/water separator

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather Not reported Tank Roof: Dbldeck Not reported Tank Roof: Pontoon Not reported Tank Roof: Balloon Not reported Tank Roof: Lifter Not reported Tank Roof: Pan Not reported Not reported Tank Roof: Pan Not reported

Tank Roof: Other Yes

Tank Roof: Other Note None-horizontal tank

## Tank Material:

Tank Materials: Bare Steel No Tank Materials: Concrete No Tank Materials: Insulated Tank Jacket No

Direction Distance

Elevation Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Tank Materials: Unknown No Tank Materials: Other No Tank Materials: Other Note welded Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

Owner:

Owner Id: 42777
Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Owner Address2: Not reported

Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: PRIVATE
Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42779

Owner Name: M J Colgan Associates
Owner Address: 5418 Ancestry Ct
Owner Address2: Not reported

Owner City/State/Zip: Gainesville, VA 20155
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 48850

Owner Name: Manassas FBO LLC dba APP Jet Center Manassas

Owner Address: 9998 Wakeman Dr
Owner Address2: Not reported
Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 44504

Owner Name: Volo Holdings Manassas Limited Liability Corp

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported Owner City/State/Zip: Manassas, VA 20110

MAP FINDINGS Map ID

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

## MANASSAS REGIONAL AIRPORT (Continued)

Owner Type:

**COMMERCIAL** 

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Owner Id: 42776

Owner Name: **Dulles Aviation Incorporated** Owner Address: 10501 Observation Rd

Owner Address2: Not reported

Manassas, VA 20110 Owner City/State/Zip: COMMERCIAL Owner Type:

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

43640 Owner Id:

Owner Name: Chantilly Air Incorporated 10761 James Payne Ct Owner Address:

Owner Address2: Not reported

Manassas, VA 20110 Owner City/State/Zip: Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 Number of Inactive UST: 0

Fed Regulated: No Tank Number: T010 Tank Type: **AST** Tank Capacity: 20000 Tank Contents: JET FUEL Tank Status: **CURR IN USE** 

Tank Containment:

Install Date: Not reported

Containment: Curbing No Containment: Weirs No Containment: Sorbent Yes Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown Nο Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water No Release Detection: Visual Yes Release Detection: Vapor No Release Detection: Interstitial No Release Detection: None No Release Detection: Other No

Release Detection: Other Note Not reported

Release Prevention: Double Bottom No A100204553

Direction
Distance
Elevation

on Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other Yes

Release Prevention: Other Note coated concrete.\\, oil/water separator

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp No
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather Not reported Tank Roof: Dbldeck Not reported Tank Roof: Pontoon Not reported Tank Roof: Balloon Not reported Tank Roof: Lifter Not reported Tank Roof: Pan Not reported Not reported Tank Roof: Pan Not reported

Tank Roof: Other Yes

Tank Roof: Other Note None-Horizontal tank

### Tank Material:

Tank Materials: Bare Steel No
Tank Materials: Concrete No
Tank Materials: Insulated Tank Jacket No
Tank Materials: Unknown No
Tank Materials: Other No

Tank Materials: Other Note Not reported

Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

### Owner:

Owner Id: 42777
Owner Name: FlightWorks

Owner Address: 600 Town Park Ln Ste 550

Owner Address2: Not reported
Owner City/State/Zip: Kennesaw, GA 30144

Owner Type: PRIVATE
Number of Active AST: 10

Direction Distance

Elevation Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42779

Owner Name: M J Colgan Associates
Owner Address: 5418 Ancestry Ct
Owner Address2: Not reported

Owner City/State/Zip: Gainesville, VA 20155 Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 48850

Owner Name: Manassas FBO LLC dba APP Jet Center Manassas

Owner Address: 9998 Wakeman Dr Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 44504

Owner Name: Volo Holdings Manassas Limited Liability Corp

Owner Address: 9998 Wakeman Dr
Owner Address2: Not reported
Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 42776

Owner Name: Dulles Aviation Incorporated Owner Address: 10501 Observation Rd

Owner Address2: Not reported

Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10
Number of Active UST: 0
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 43640

Owner Name: Chantilly Air Incorporated
Owner Address: 10761 James Payne Ct

Owner Address2: Not reported
Owner City/State/Zip: Manassas, VA 20110
Owner Type: COMMERCIAL

Number of Active AST: 10 Number of Active UST: 0 Number of Inactive AST: 0 **EDR ID Number** 

A100204553

Direction Distance Elevation

on Site Database(s) EPA ID Number

### MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Number of Inactive UST: 0

Fed Regulated:

Tank Number:

Tank Type:

Tank Capacity:

Tank Contents:

Tank Status:

No
To11

AST

1000

GASOLINE

CURR IN USE

Tank Containment:

5/5/1993 Install Date: Containment: Curbing No Containment: Weirs No Containment: Sorbent Yes Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike Yes Containment: Unknown No Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water
Release Detection: Visual
Release Detection: Vapor
Release Detection: Interstitial
Release Detection: None
Release Detection: Other
No

Release Prevention: Double Bottom No Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other Yes

Release Prevention: Other Note COncrete containment w/ OWS

Tank Foundation: Steel No
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp Yes
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather
Tank Roof: Dbldeck
Tank Roof: Dbldeck
Tank Roof: Pontoon
Tank Roof: Balloon
Tank Roof: Lifter
Tank Roof: Pan
Not reported
Not reported
Not reported
Not reported
Tank Roof: Other
Yes

Tank Roof: Other Note None-horizontal Tank

Direction Distance

Elevation Site Database(s) EPA ID Number

## MANASSAS REGIONAL AIRPORT (Continued)

A100204553

**EDR ID Number** 

Tank Material:

Tank Materials: Bare Steel Yes
Tank Materials: Concrete No
Tank Materials: Insulated Tank Jacket No
Tank Materials: Unknown No
Tank Materials: Other No

Tank Materials: Other Note Not reported

Tank Type Cathodic/CP: Ν Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

13 RCRA-CESQG 1004791712 9998 WAKEMAN DR. VAR000500199

< 1/8 MANASSAS, VA 20110 1 ft.

RCRA-CESQG:

Relative: Date form received by agency: 10/31/2000
Higher Facility name: Not reported

Facility address: 9998 WAKEMAN DR.

Actual: MANASSAS, VA 20110

 189 ft.
 EPA ID:
 VAR000500199

 Contact:
 MICHAEL WEBER

Contact address: 9998 WAKEMAN DR. MANASSAS, VA 20110

Contact country: US

Contact telephone: (703) 361-7267
Contact email: Not reported
EPA Region: Not reported
Land type: Municipal

Classification: Conditionally Exempt Small Quantity Generator

Description: Handler: generates 100 kg or less of hazardous waste per calendar

month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from

the cleanup of a spill, into or on any land or water, of acutely

hazardous waste

Direction Distance Elevation

vation Site Database(s) EPA ID Number

(Continued) 1004791712

Owner/Operator Summary:

Owner/operator name: MICHAEL WEBER
Owner/operator address: 494 OLD BRIDGE RD.

AMISSVILLE, VA 20106

Owner/operator country: Not reported Owner/operator telephone: (540) 347-9746

Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:

U.S. importer of hazardous waste: No Mixed waste (haz. and radioactive): No Recycler of hazardous waste: No Transporter of hazardous waste: No Treater, storer or disposer of HW: No Underground injection activity: No On-site burner exemption: No Furnace exemption: No Used oil fuel burner: No Used oil processor: No User oil refiner: No Used oil fuel marketer to burner: No Used oil Specification marketer: No Used oil transfer facility: No Used oil transporter: No

Waste code: D001

Waste name: IGNITABLE WASTE

. Waste code: D018
. Waste name: BENZENE

Waste code: D039

. Waste name: TETRACHLOROETHYLENE

Waste code: D040

Waste name: TRICHLORETHYLENE

Facility Has Received Notices of Violations:

Regulation violated: SR - 262.11
Area of violation: Generators - General

Date violation determined: 08/01/2003
Date achieved compliance: 10/16/2003
Violation lead agency: State

Enforcement action: INSPECTOR FACT FINDING LETTER - Warning letter

Enforcement action date: 09/04/2003
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

**EDR ID Number** 

MAP FINDINGS Map ID

Direction Distance

Elevation Site Database(s) **EPA ID Number** 

(Continued) 1004791712

**Evaluation Action Summary:** 

MANASSAS, VA 20110

Evaluation date: 08/01/2003

Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE

Area of violation: Generators - General

Date achieved compliance: 10/16/2003 Evaluation lead agency: State

14 **AURORA FLIGHT SCIENCES** VA UST U004220316 9950 WAKEMAN DR North N/A

< 1/8 0.096 mi.

506 ft.

Facility: Relative:

Higher Facility Id: 3042584 Facility Type: COMMERCIAL

Actual: CEDS Facility ID: 200000873735 191 ft.

Owner:

Owner Id: 48008

Owner Name: Aurora Flight Sciences Owner Address: 9950 Wakeman Dr Owner Address2: Not reported Manassas, VA 20110 Owner City, State, Zip: COMMERCIAL Owner Type:

Number of Active AST: 0 Number of Active UST: 0

Number of Inactive AST: 0 Number of Inactive UST: 1

UST:

Facility ID: 3042584 Federally Regulated: Yes

Tank Number: 1 Tank Capacity: 500 **USED OIL** Tank Contents: **REM FROM GRD Tank Status:** 

Tank Type: UST

Tank Material:

Install Date: 1/14/1994 Tank Materials: Bare Steel Yes Tank Materials: Cath Protect Steel No Tank Materials: Epoxy Steel No Tank Materials: Fiberglass No Tank Materials: Concrete No Tank Materials: Composite No Tank Materials: Double Walled No Tank Materials: Lined Interior No Tank Materials: Excav Liner No Tank Materials: Insulated Tank Jacket No

Tank Materials: Repaired No Tank Materials: Unknown No Tank Materials: Other No

Tank Materials: Other Note Not reported

Release Detection:

**EDR ID Number** 

MAP FINDINGS Map ID

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

## **AURORA FLIGHT SCIENCES (Continued)**

U004220316

Tank Release Detection: Leak Deferred No Tank Release Detection: Manual Gauge No Tank Release Detection: Auto Gauge No Tank Release Detection: Tank Tightness No Tank Release Detection: Vapor Monitor No Tank Release Detection: Inventory No Tank Release Detection: Stat Invent Recon No Tank Release Detection: Spill Install Nο Tank Release Detection: Overfill Install No Tank Release Detection: Groundwater No Tank Release Detection: Int Sec Containment Nο Tank Release Detection: Int Double Walled No Tank Release Detection: Other Method No

Tank Release Detection: Other Note Not reported

Pipe Release Detection: Leak Deferred No

Pipe Release Detection: Autoleak Not reported

Pipe Release Detection: Line Tightness No Pipe Release Detection: Stat Invent Recon No Pipe Release Detection: Groundwater No Pipe Release Detection: Int Sec Containment No Pipe Release Det: Interior Double Walled No Pipe Release Detection: Other Method No

Pipe Release Detection: Other Note Not reported

**GRAVITY** Pipe Type: Pipe Materials: Bare Steel No Pipe Materials: Galvanized Steel No Pipe Materials: Copper No Pipe Materials: Fiberglass No Pipe Materials: Cath Protect No Pipe Materials: Double Walled No Pipe Materials: Sec Containment No Pipe Materials: Repaired No Pipe Materials: Unknown No

Pipe Materials: Other Pipe Materials: Other Note Not reported

D15 **VA RAILWAY EXPRESS BROAD RUN MAINT FACILITY** 

U004175543 VA UST WNW **10637 PIPER LN VA Financial Assurance** N/A

No

1/8-1/4 BRISTOW, VA 20136

0.213 mi.

1122 ft. Site 1 of 2 in cluster D

Facility: Relative:

Facility Id: 3041755 Higher Facility Type: STATE

Actual: CEDS Facility ID: 200000850922 191 ft.

Owner:

Owner Id: 45319

Virginia Railway Express Owner Name: 1500 King St Ste 202 Owner Address:

Owner Address2: Not reported

Owner City, State, Zip: Alexandria, VA 22314

Owner Type: LOCAL Number of Active AST: 1 Number of Active UST: 1

Direction Distance

Elevation Site Database(s) EPA ID Number

### VA RAILWAY EXPRESS BROAD RUN MAINT FACILITY (Continued)

U004175543

**EDR ID Number** 

Number of Inactive AST: 0
Number of Inactive UST: 0

UST:

Facility ID: 3041755 Federally Regulated: Yes

 Tank Number:
 1

 Tank Capacity:
 500

 Tank Contents:
 USED OIL

 Tank Status:
 CURR IN USE

Tank Type: UST

Tank Material:

5/18/2010 Install Date: Tank Materials: Bare Steel No Tank Materials: Cath Protect Steel Nο Tank Materials: Epoxy Steel No Tank Materials: Fiberglass No Tank Materials: Concrete No Tank Materials: Composite Yes Tank Materials: Double Walled Yes Tank Materials: Lined Interior No Tank Materials: Excav Liner No Tank Materials: Insulated Tank Jacket No Tank Materials: Repaired No Tank Materials: Unknown No Tank Materials: Other No

Tank Materials: Other Note Not reported

Release Detection:

Tank Release Detection: Leak Deferred No Tank Release Detection: Manual Gauge No Tank Release Detection: Auto Gauge No Tank Release Detection:Tank Tightness No Tank Release Detection: Vapor Monitor No Tank Release Detection: Inventory No Tank Release Detection: Stat Invent Recon No Tank Release Detection: Spill Install No Tank Release Detection: Overfill Install Yes Tank Release Detection: Groundwater No Tank Release Detection: Int Sec Containment No Tank Release Detection: Int Double Walled Yes Tank Release Detection: Other Method No

Tank Release Detection: Other Note Not reported

Pipe Release Detection: Leak Deferred No

Pipe Release Detection: Autoleak Not reported

Pipe Release Detection: Line Tightness

No
Pipe Release Detection: Stat Invent Recon
Pipe Release Detection: Groundwater

No
Pipe Release Detection: Int Sec Containment
Pipe Release Det: Interior Double Walled
Pipe Release Detection: Other Method

No

Pipe Release Detection: Other Note Not reported

Pipe Type: PRESSURE

Pipe Materials: Bare Steel No

MAP FINDINGS Map ID

Direction Distance

**EDR ID Number** Elevation Site Database(s) **EPA ID Number** 

### VA RAILWAY EXPRESS BROAD RUN MAINT FACILITY (Continued)

U004175543

Pipe Materials: Galvanized Steel No Pipe Materials: Copper No Pipe Materials: Fiberglass No Pipe Materials: Cath Protect No Pipe Materials: Double Walled Yes Pipe Materials: Sec Containment Yes Pipe Materials: Repaired No Pipe Materials: Unknown No Pipe Materials: Other Yes Pipe Materials: Other Note **PVC** 

VA Financial Assurance 1:

3041755 Facility ID:

Owner Name: Virginia Railway Express

ROF Own Id: 45319 UST Tank Type: Mechanism: Not reported Gallonage: Not reported Per Occurence: Not reported Third Party: Not reported Annual Aggregate: Not reported In Compliance: Not reported

Total Capacity: 500

CEDS Facility Name: Virginia Railway Express - Broad Run Yard

Tank Status: **CURR IN USE** 

Active Federally Regualted UST: Y

D16 **VA RAILWAY EXPRESS BROAD RUN MAINT FACILITY** 

WNW **10637 PIPER LN** 1/8-1/4 BRISTOW, VA 20136

0.213 mi.

1122 ft. Site 2 of 2 in cluster D

Relative:

AST:

Higher

Facility ID: 3041755 Facility Type: STATE CEDS Facility ID: 200000850922

Actual: 191 ft.

Tank Info:

Owner:

Owner Id: 45319

Owner Name: Virginia Railway Express Owner Address: 1500 King St Ste 202

Owner Address2: Not reported

Owner City/State/Zip: Alexandria, VA 22314

Owner Type: LOCAL Number of Active AST: 1 Number of Active UST: 1 Number of Inactive AST: 0 Number of Inactive UST: 0

Fed Regulated: No Tank Number: Ast1 Tank Type: **AST** Tank Capacity: 1000 Tank Contents: **USED OIL**  VA AST

A100355367

N/A

Direction
Distance
Elevation

Site Database(s) EPA ID Number

#### VA RAILWAY EXPRESS BROAD RUN MAINT FACILITY (Continued)

A100355367

**EDR ID Number** 

Tank Status: CURR IN USE

Tank Containment:

Install Date: 7/9/2010 Containment: Curbing Containment: Weirs No Containment: Sorbent No Containment: Culvert No Containment: Diversion No Containment: Retention No Containment: Dike No Containment: Unknown Nο Containment: Other No

Containment: Other Note Not reported

Release Detection:

Release Detection: Ground Water
Release Detection: Visual
Release Detection: Vapor
Release Detection: Interstitial
Release Detection: None
Release Detection: Other
No

Release Detection: Other Note Not reported

Release Prevention: Double Bottom No

Release Prevention: Double Walled No

Release Prevention: Lined Interior Not reported

Release Prevention: Poly Jacket No Release Prevention: Exc Liner No Release Prevention: None No Release Prevention: Unknown No Release Prevention: Other No

Release Prevention: Other Note Not reported

Tank Foundation: Steel Yes
Tank Foundation: Earthen No
Tank Foundation: Concrete Imp
Tank Foundation: Unknown No
Tank Foundation: Other No

Tank Foundation: Other Note Not reported

Tank Roof: Float No Tank Roof: Cone No

Tank Roof: Breather
Tank Roof: Dbldeck
Tank Roof: Pontoon
Tank Roof: Pontoon
Tank Roof: Balloon
Tank Roof: Lifter
Tank Roof: Pan
Not reported
Not reported
Not reported
Not reported
Tank Roof: Pan
Not reported
Tank Roof: Other
Yes

Tank Roof: Other Note Horizontal

Tank Material:

Tank Materials: Bare Steel Yes
Tank Materials: Concrete No
Tank Materials: Insulated Tank Jacket
No
Tank Materials: Unknown No
Tank Materials: Other No
Tank Materials: Other Shop Fab

Direction Distance

Elevation Site Database(s) EPA ID Number

VA RAILWAY EXPRESS BROAD RUN MAINT FACILITY (Continued)

A100355367

VAR000506774

**EDR ID Number** 

Tank Type Cathodic/CP: Tank Type Single Wall: Ν Tank Type Double Wall: Ν Tank Type Lined Interior: Ν Tank Type Double Bottom: Ν Tank Type Potable/Skid: Ν Tank Type Shop Fabricated/Built: Ν Tank Type Vaulted Below Grade: Ν Tank Type Vertical: Ν Tank Type Horizontal: Ν Tank Type Unknown: Ν Tank Type Other: Ν Tank Type Other Specify: Ν

RCRA-SQG 1007210911

WNW 10599 RESIDENCY ROAD 1/8-1/4 MANASSAS, VA 20136 0.235 mi.

1240 ft.

17

Relative: RCRA-SQG:

Higher Date form received by agency: 02/04/2004

Facility name: Not reported

Actual: Facility address: 10599 RESIDENCY ROAD MANASSAS, VA 20136

EPA ID: VAR000506774

Mailing address: BOWLING GREEN DR.

VIENNA, VA 22180 NICK KOLLAS

Contact: NICK KOLLA
Contact address: Not reported
Not reported

Contact country: US

Contact telephone: (703) 698-7887
Contact email: Not reported
EPA Region: Not reported

Classification: Small Small Quantity Generator

Description: Handler: generates more than 100 and less than 1000 kg of hazardous

waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of

hazardous waste at any time

Not reported

Owner/Operator Summary:

Owner/Op end date:

Owner/operator name: NICK KOLLAS
Owner/operator address: Not reported
Not reported
Owner/operator country: US

Owner/operator telephone: Not reported Legal status: Private Owner/Operator Type: Operator Owner/Op start date: 05/10/1991

Owner/operator name: NICK KOLLAS
Owner/operator address: Not reported

Direction Distance

Elevation Site Database(s) EPA ID Number

(Continued) 1007210911

Not reported

Owner/operator country:
Owner/operator telephone:
Legal status:
Owner/Operator Type:
Owner/Op start date:
Owner/Op end date:

VIS
Not reported
Private
Owner
Owner
Owner
Owner
Not reported

Handler Activities Summary:

U.S. importer of hazardous waste: No Mixed waste (haz. and radioactive): No Recycler of hazardous waste: No Transporter of hazardous waste: No Treater, storer or disposer of HW: No Underground injection activity: No On-site burner exemption: No Furnace exemption: No Used oil fuel burner: No Used oil processor: No User oil refiner: No Used oil fuel marketer to burner: No Used oil Specification marketer: No Used oil transfer facility: No Used oil transporter: No

Waste code: D008
Waste name: LEAD

Violation Status: No violations found

18 VDOT - MANASSAS AREA HEADQUARTERS SHOP

NW 10228 RESIDENCY RD 1/4-1/2 MANASSAS, VA 22110

0.251 mi. 1325 ft.

Relative: LTANKS:

**Higher** Region: NVRO

CEDS Facility Id: 200000096828

Actual: Case Status: Closed

**209 ft.** Pollution Complaint #: 19900438 Reported: 10/16/1989

19 LONG VERA RESIDENCE VA LTANKS \$105174512 South 11726 BRISTOW RD N/A

South 11726 BRISTOW RD 1/4-1/2 BRISTOW, VA 20136

0.455 mi. 2401 ft.

Relative: LTANKS:

**Higher** Region: NVRO

CEDS Facility Id: 200000204654

Actual: Case Status: Closed

218 ft. Pollution Complaint #: 20023078

Reported: 10/12/2001

S106850459

N/A

**VA LTANKS** 

**EDR ID Number** 

Count: 6 records. ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)	
MANASSAS	S108930196	MANASSAS AIRPORT	MANASSAS AIRPORT-PIPER LANE		VA SPILLS	
MANASSAS	S106239963	MANASSAS AIRPORT	1/4 MILE OFF OBSERVATION ROAD		VA SPILLS	
MANASSAS	S106240124	MANASSAS AIRPORT PUMP STATION	OBSERVATION DRIVE		VA SPILLS	
MANASSAS	S115962702	DULLES AVIATION, INC/MANASSAS AIRP	10501 PIPER LANE		VA RGA LUST	
PRINCE WILLIAM	S104407645	COLONIAL PIPELINE - BULL RUN	ROUTE 234 & SUDLEY MANOR DRIVE	20109	VA LUST	
PRINCE WILLIAM	S103459715	AT&T INDEPENDENT HILL	ROUTE 234	20112	VA LUST	

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

**Number of Days to Update:** Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

### STANDARD ENVIRONMENTAL RECORDS

#### Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 03/07/2016 Source: EPA
Date Data Arrived at EDR: 04/05/2016 Telephone: N/A

Number of Days to Update: 10 Next Scheduled EDR Contact: 01/16/2017
Data Release Frequency: Quarterly

**NPL Site Boundaries** 

Sources

EPA's Environmental Photographic Interpretation Center (EPIC)

Telephone: 202-564-7333

EPA Region 1 EPA Region 6

Telephone 617-918-1143 Telephone: 214-655-6659

EPA Region 3 EPA Region 7

Telephone 215-814-5418 Telephone: 913-551-7247

EPA Region 4 EPA Region 8

Telephone 404-562-8033 Telephone: 303-312-6774

EPA Region 5 EPA Region 9

Telephone 312-886-6686 Telephone: 415-947-4246

EPA Region 10

Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 03/07/2016 Source: EPA
Date Data Arrived at EDR: 04/05/2016 Telephone: N/A

Number of Days to Update: 10 Next Scheduled EDR Contact: 01/16/2017
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991 Date Data Arrived at EDR: 02/02/1994 Date Made Active in Reports: 03/30/1994

Number of Days to Update: 56

Source: EPA Telephone: 202-564-4267 Last EDR Contact: 08/15/2011

Next Scheduled EDR Contact: 11/28/2011 Data Release Frequency: No Update Planned

#### Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 03/07/2016 Date Data Arrived at EDR: 04/05/2016 Date Made Active in Reports: 04/15/2016

Number of Days to Update: 10

Source: EPA Telephone: N/A

Last EDR Contact: 10/05/2016

Next Scheduled EDR Contact: 01/16/2017 Data Release Frequency: Quarterly

#### Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 09/14/2016 Date Data Arrived at EDR: 10/04/2016 Date Made Active in Reports: 10/21/2016

Number of Days to Update: 17

Source: Environmental Protection Agency

Telephone: 703-603-8704 Last EDR Contact: 10/04/2016

Next Scheduled EDR Contact: 01/16/2017 Data Release Frequency: Varies

#### SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 03/07/2016 Date Data Arrived at EDR: 04/05/2016 Date Made Active in Reports: 04/15/2016

Number of Days to Update: 10

Source: EPA

Telephone: 800-424-9346 Last EDR Contact: 10/20/2016

Next Scheduled EDR Contact: 01/30/2017 Data Release Frequency: Quarterly

## Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 03/07/2016 Date Data Arrived at EDR: 04/05/2016 Date Made Active in Reports: 04/15/2016

Number of Days to Update: 10

Source: EPA

Telephone: 800-424-9346 Last EDR Contact: 10/20/2016

Next Scheduled EDR Contact: 01/30/2017 Data Release Frequency: Quarterly

#### Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 06/27/2016 Date Data Arrived at EDR: 06/30/2016 Date Made Active in Reports: 09/02/2016

Number of Days to Update: 64

Source: EPA

Telephone: 800-424-9346 Last EDR Contact: 12/28/2016

Next Scheduled EDR Contact: 04/10/2017 Data Release Frequency: Quarterly

#### Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 06/21/2016 Date Data Arrived at EDR: 06/30/2016 Date Made Active in Reports: 09/02/2016

Number of Days to Update: 64

Source: Environmental Protection Agency

Telephone: 800-438-2474 Last EDR Contact: 12/28/2016

Next Scheduled EDR Contact: 04/10/2017 Data Release Frequency: Quarterly

### Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/21/2016 Date Data Arrived at EDR: 06/30/2016 Date Made Active in Reports: 09/02/2016

Number of Days to Update: 64

Source: Environmental Protection Agency

Telephone: 800-438-2474 Last EDR Contact: 12/28/2016

Next Scheduled EDR Contact: 04/10/2017 Data Release Frequency: Quarterly

#### RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 06/21/2016 Date Data Arrived at EDR: 06/30/2016 Date Made Active in Reports: 09/02/2016

Number of Days to Update: 64

Source: Environmental Protection Agency

Telephone: 800-438-2474 Last EDR Contact: 12/28/2016

Next Scheduled EDR Contact: 04/10/2017 Data Release Frequency: Quarterly

#### RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/21/2016 Date Data Arrived at EDR: 06/30/2016 Date Made Active in Reports: 09/02/2016

Number of Days to Update: 64

Source: Environmental Protection Agency

Telephone: 800-438-2474 Last EDR Contact: 12/28/2016

Next Scheduled EDR Contact: 04/10/2017

Data Release Frequency: Varies

#### Federal institutional controls / engineering controls registries

#### LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 05/28/2015 Date Data Arrived at EDR: 05/29/2015 Date Made Active in Reports: 06/11/2015

Number of Days to Update: 13

Source: Department of the Navy Telephone: 843-820-7326 Last EDR Contact: 11/18/2016

Next Scheduled EDR Contact: 02/27/2017 Data Release Frequency: Varies

#### US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 05/09/2016 Date Data Arrived at EDR: 06/01/2016 Date Made Active in Reports: 09/02/2016

Number of Days to Update: 93

Source: Environmental Protection Agency

Telephone: 703-603-0695 Last EDR Contact: 11/29/2016

Next Scheduled EDR Contact: 03/13/2017 Data Release Frequency: Varies

#### US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 05/09/2016 Date Data Arrived at EDR: 06/01/2016 Date Made Active in Reports: 09/02/2016

Number of Days to Update: 93

Source: Environmental Protection Agency

Telephone: 703-603-0695 Last EDR Contact: 11/29/2016

Next Scheduled EDR Contact: 03/13/2017

Data Release Frequency: Varies

#### Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 09/26/2016 Date Data Arrived at EDR: 09/29/2016 Date Made Active in Reports: 11/11/2016

Number of Days to Update: 43

Source: National Response Center, United States Coast Guard

Telephone: 202-267-2180 Last EDR Contact: 12/28/2016

Next Scheduled EDR Contact: 04/10/2017 Data Release Frequency: Annually

#### State- and tribal - equivalent CERCLIS

SHWS: This state does not maintain a SHWS list. See the Federal CERCLIS list and Federal NPL list.

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: N/A Date Data Arrived at EDR: N/A Date Made Active in Reports: N/A

Number of Days to Update: N/A

Source: Department of Environmental Quality

Telephone: 804-698-4236 Last EDR Contact: 12/19/2016

Next Scheduled EDR Contact: 04/03/2017

Data Release Frequency: N/A

#### State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Solid Waste Management Facilities

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 09/10/2015 Date Data Arrived at EDR: 09/11/2015 Date Made Active in Reports: 11/09/2015

Number of Days to Update: 59

Source: Department of Environmental Quality

Telephone: 804-698-4238 Last EDR Contact: 01/03/2017

Next Scheduled EDR Contact: 03/20/2017 Data Release Frequency: Quarterly

### State and tribal leaking storage tank lists

LUST REG WC: Leaking Underground Storage Tank List

Leaking underground storage tank site locations. Includes: counties of Alleghany, Bedford, Botetourt, Craig, Floyd, Franklin, Giles, Henry, Montgomery, Patrick, Pulaski, Roanoke; cities of Bedford, Clifton Forge, Covington, Martinsville, Radford, Roanoke, Salem,

Date of Government Version: 06/04/2015 Date Data Arrived at EDR: 06/05/2015 Date Made Active in Reports: 07/07/2015

Number of Days to Update: 32

Source: Department of Environmental Quality West Central Regional Office

Telephone: 540-562-6700 Last EDR Contact: 08/29/2016

Next Scheduled EDR Contact: 12/12/2016 Data Release Frequency: No Update Planned

LUST REG PD: Leaking Underground Storage Tank Sites

Leaking underground storage tank site locaitons. Includes: counties of Amelia, Brunswick, Charles City, Chesterfield, Dinwiddie, Essex, Gloucester, Goochland, Greensville, Hanover, Henrico, King and Queen, King William, Lancaster, Mathews, Middlesex, New Kent, Northumberland, Powhatan, Prince George, Richmond, Surry, Sussex, Westmoreland; cities of Colonial Heights, Emporia, Hopewell, Petersburg.

Date of Government Version: 12/02/2014 Date Data Arrived at EDR: 12/04/2014 Date Made Active in Reports: 01/16/2015

Number of Days to Update: 43

Source: Department of Environmental Quality Piedmont Regional Office

Telephone: 804-527-5020 Last EDR Contact: 08/29/2016

Next Scheduled EDR Contact: 12/12/2016 Data Release Frequency: Quarterly

#### LUST REG SC: Leaking Underground Storage Tanks

Leaking underground storage tank site locations. Includes: counties of Amherst, Appomattox, Buckingham, Campbell, Charlotte, Cumberland, Halifax, Lunenburg, Mecklenburg, Nottoway, Pittsylvania, Prince Deward; cities of Danville, Lynchburg.

Date of Government Version: 09/06/2013 Date Data Arrived at EDR: 09/06/2013 Date Made Active in Reports: 09/17/2013

Number of Days to Update: 11

Source: Department of Environmental Quality, South Central Region

Telephone: 434-582-5120 Last EDR Contact: 08/29/2016

Next Scheduled EDR Contact: 12/12/2016 Data Release Frequency: Semi-Annually

### LUST REG TD: Leaking Underground Storage Tank Sites

Leaking underground storage tank site locations. Includes: counties of Accomack, Isle of Wight, James City, Northampton, Southampton, York; cities of Chesapeake, Franklin, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach, Williamsburg.

Date of Government Version: 06/30/2013 Date Data Arrived at EDR: 07/05/2013 Date Made Active in Reports: 09/16/2013

Number of Days to Update: 73

Source: Department of Environmental Quality Tidewater Regional Office

Telephone: trofoia@deq.vir Last EDR Contact: 09/26/2016

Next Scheduled EDR Contact: 01/09/2017 Data Release Frequency: Quarterly

#### LUST REG VA: Leaking Underground Storage Tank List

Leaking underground storage tank site locations. Includes: counties of Albemarle, Augusta, Bath, Clarke, Fluvanna, Frederick, Greene, Highland, Nelson, Page, Rockbridge, Rockingham, Shenandoah, Warren; cities of Buena Vista, Charlottesville, Harrisonburg, Lexington, Staunton, Waynesboro, Winchester.

Date of Government Version: 12/06/2011 Date Data Arrived at EDR: 12/08/2011 Date Made Active in Reports: 01/16/2012

Number of Days to Update: 39

Source: Department of Environmental Quality Valley Regional Office

Telephone: 540-574-7800 Last EDR Contact: 08/29/2016

Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: No Update Planned

#### LUST REG NO: Leaking Underground Storage Tank Tracking Database

Leaking underground storage tank site locations. Includes: counties of Arlington, Caroline, Culpeper, Fairfax, Fauquier, King George, Loudoun, Louisa, Madison, Orange, Prince William, Rappahannock, Spotsylvania, Stafford; cities of Alexandria, Fairfax, Falls Church, Fredericksburg, Manassas, Manassas Park.

Date of Government Version: 05/18/2004 Date Data Arrived at EDR: 05/22/2004 Date Made Active in Reports: 07/09/2004

Number of Days to Update: 48

Source: Department of Environmental Quality Northern Regional Office

Telephone: 703-583-3800 Last EDR Contact: 09/06/2011

Next Scheduled EDR Contact: 12/19/2011 Data Release Frequency: No Update Planned

#### LUST REG SW: Leaking Underground Storage Tank Database

Leaking underground storage tank site locations. Includes: counties of Bland, Buchanan, Carroll, Dickenson, Grayson, Lee, Russell, Scott, Smyth, Tazewell, Washington, Wise, Wythe; cities of Bristol, Galax, Norton.

Date of Government Version: 07/15/2013 Date Data Arrived at EDR: 07/18/2013 Date Made Active in Reports: 09/16/2013

Number of Days to Update: 60

Source: Department of Environmental Quality Southwest Regional Office

Telephone: 276-676-4800 Last EDR Contact: 10/11/2016

Next Scheduled EDR Contact: 01/23/2017 Data Release Frequency: No Update Planned

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 01/07/2016 Date Data Arrived at EDR: 01/08/2016 Date Made Active in Reports: 02/18/2016

Number of Days to Update: 41

Source: EPA Region 10 Telephone: 206-553-2857 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Quarterly

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 02/25/2016 Date Data Arrived at EDR: 04/27/2016 Date Made Active in Reports: 06/03/2016

Number of Days to Update: 37

Source: Environmental Protection Agency

Telephone: 415-972-3372 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Quarterly

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 10/13/2015 Date Data Arrived at EDR: 10/23/2015 Date Made Active in Reports: 02/18/2016

Number of Days to Update: 118

Source: EPA Region 8 Telephone: 303-312-6271 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Quarterly

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 10/09/2015
Date Data Arrived at EDR: 02/12/2016
Date Made Active in Reports: 06/03/2016

Number of Days to Update: 112

Source: EPA Region 7 Telephone: 913-551-7003 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 12/11/2015 Date Data Arrived at EDR: 02/19/2016 Date Made Active in Reports: 06/03/2016

Number of Days to Update: 105

Source: EPA Region 6 Telephone: 214-665-6597 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 02/05/2016 Date Data Arrived at EDR: 04/29/2016 Date Made Active in Reports: 06/03/2016

Number of Days to Update: 35

Source: EPA Region 4 Telephone: 404-562-8677 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Semi-Annually

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 10/27/2015 Date Data Arrived at EDR: 10/29/2015 Date Made Active in Reports: 01/04/2016

Number of Days to Update: 67

Source: EPA Region 1 Telephone: 617-918-1313 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land

Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 02/17/2016 Date Data Arrived at EDR: 04/27/2016 Date Made Active in Reports: 06/03/2016

Number of Days to Update: 37

Source: EPA, Region 5 Telephone: 312-886-7439 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Varies

LTANKS: Leaking Petroleum Storage Tanks

Includes releases of petroleum from underground storage tanks and aboveground storage tanks.

Date of Government Version: 08/01/2016 Date Data Arrived at EDR: 09/01/2016 Date Made Active in Reports: 11/07/2016

Number of Days to Update: 67

Source: Department of Environmental Quality

Telephone: 804-698-4010 Last EDR Contact: 12/02/2016

Next Scheduled EDR Contact: 03/13/2017 Data Release Frequency: Quarterly

#### State and tribal registered storage tank lists

FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010 Date Data Arrived at EDR: 02/16/2010 Date Made Active in Reports: 04/12/2010

Number of Days to Update: 55

Source: FEMA

Telephone: 202-646-5797 Last EDR Contact: 10/11/2016

Next Scheduled EDR Contact: 01/23/2017 Data Release Frequency: Varies

UST: Registered Petroleum Storage Tanks

Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 08/02/2016 Date Data Arrived at EDR: 09/01/2016 Date Made Active in Reports: 11/03/2016

Number of Days to Update: 63

Source: Department of Environmental Quality

Telephone: 804-698-4010 Last EDR Contact: 12/02/2016

Next Scheduled EDR Contact: 03/13/2017 Data Release Frequency: Semi-Annually

AST: Registered Petroleum Storage Tanks Registered Aboveground Storage Tanks.

> Date of Government Version: 08/02/2016 Date Data Arrived at EDR: 09/01/2016 Date Made Active in Reports: 11/03/2016

Number of Days to Update: 63

Source: Department of Environmental Quality

Telephone: 804-698-4010 Last EDR Contact: 12/02/2016

Next Scheduled EDR Contact: 03/13/2017 Data Release Frequency: Semi-Annually

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 12/03/2015 Date Data Arrived at EDR: 02/04/2016 Date Made Active in Reports: 06/03/2016

Number of Days to Update: 120

Source: EPA Region 6 Telephone: 214-665-7591 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 11/05/2015 Date Data Arrived at EDR: 11/13/2015 Date Made Active in Reports: 01/04/2016

Number of Days to Update: 52

Source: EPA Region 5 Telephone: 312-886-6136 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 02/05/2016 Date Data Arrived at EDR: 04/29/2016 Date Made Active in Reports: 06/03/2016

Number of Days to Update: 35

Source: EPA Region 4 Telephone: 404-562-9424 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Semi-Annually

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 10/20/2015 Date Data Arrived at EDR: 10/29/2015 Date Made Active in Reports: 01/04/2016

Number of Days to Update: 67

Source: EPA, Region 1 Telephone: 617-918-1313 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 09/23/2014 Date Data Arrived at EDR: 11/25/2014 Date Made Active in Reports: 01/29/2015

Number of Days to Update: 65

Source: EPA Region 7 Telephone: 913-551-7003 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 01/07/2016 Date Data Arrived at EDR: 01/08/2016 Date Made Active in Reports: 02/18/2016

Number of Days to Update: 41

Source: EPA Region 10 Telephone: 206-553-2857 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Quarterly

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 02/25/2016 Date Data Arrived at EDR: 04/27/2016 Date Made Active in Reports: 06/03/2016

Number of Days to Update: 37

Source: EPA Region 9 Telephone: 415-972-3368 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 01/26/2016 Date Data Arrived at EDR: 02/05/2016 Date Made Active in Reports: 06/03/2016

Number of Days to Update: 119

Source: EPA Region 8 Telephone: 303-312-6137 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Quarterly

#### State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Controls Sites Listing

A listing of sites with Engineering Controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 09/27/2016 Date Data Arrived at EDR: 09/29/2016 Date Made Active in Reports: 11/03/2016

Number of Days to Update: 35

Source: Department of Environmental Quality

Telephone: 804-698-4228 Last EDR Contact: 12/22/2016

Next Scheduled EDR Contact: 04/10/2017 Data Release Frequency: Quarterly

INST CONTROL: Voluntary Remediation Program Database

Sites included in the Voluntary Remediation Program database that have deed restrictions.

Date of Government Version: 09/27/2016 Date Data Arrived at EDR: 09/29/2016 Date Made Active in Reports: 11/03/2016

Number of Days to Update: 35

Source: Department of Environmental Quality

Telephone: 804-698-4228 Last EDR Contact: 12/22/2016

Next Scheduled EDR Contact: 04/10/2017 Data Release Frequency: Quarterly

#### State and tribal voluntary cleanup sites

VRP: Voluntary Remediation Program

The Voluntary Cleanup Program encourages owners of elected contaminated sites to take the initiative and conduct voluntary cleanups that meet state environmental standards.

Date of Government Version: 09/27/2016 Date Data Arrived at EDR: 09/29/2016 Date Made Active in Reports: 11/03/2016

Number of Days to Update: 35

Source: Department of Environmental Quality

Telephone: 804-698-4228 Last EDR Contact: 12/22/2016

Next Scheduled EDR Contact: 04/10/2017 Data Release Frequency: Quarterly

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015 Date Data Arrived at EDR: 09/29/2015 Date Made Active in Reports: 02/18/2016

Number of Days to Update: 142

Source: EPA, Region 1 Telephone: 617-918-1102 Last EDR Contact: 12/27/2016

Next Scheduled EDR Contact: 04/10/2017 Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008 Date Data Arrived at EDR: 04/22/2008 Date Made Active in Reports: 05/19/2008

Number of Days to Update: 27

Source: EPA, Region 7 Telephone: 913-551-7365 Last EDR Contact: 04/20/2009

Next Scheduled EDR Contact: 07/20/2009 Data Release Frequency: Varies

#### State and tribal Brownfields sites

BROWNFIELDS: Brownfields Site Specific Assessments

To qualify for Brownfields Assessment, the site must meet the Federal definition of a Brownfields and should have contaminant issues that need to be addressed and a redevelopment plan supported by the local government and community. Virginia's Department of Environmental Quality performs brownfields assessments under a cooperative agreement with the U.S. Environmental Protection Agency at no cost to communities, property owners or, prospective purchasers. The assessment is an evaluation of environmental impacts caused by previous site uses similar to a Phase II Environmental Assessment.

Date of Government Version: 07/12/2016
Date Data Arrived at EDR: 07/29/2016
Date Made Active in Reports: 09/02/2016

Number of Days to Update: 35

Source: Department of Environmental Quality

Telephone: 804-698-4207 Last EDR Contact: 10/27/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Varies

### ADDITIONAL ENVIRONMENTAL RECORDS

#### Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 09/20/2016 Date Data Arrived at EDR: 09/21/2016 Date Made Active in Reports: 11/11/2016

Number of Days to Update: 51

Source: Environmental Protection Agency

Telephone: 202-566-2777 Last EDR Contact: 12/20/2016

Next Scheduled EDR Contact: 04/03/2017 Data Release Frequency: Semi-Annually

### Local Lists of Landfill / Solid Waste Disposal Sites

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998 Date Data Arrived at EDR: 12/03/2007 Date Made Active in Reports: 01/24/2008

Number of Days to Update: 52

Source: Environmental Protection Agency

Telephone: 703-308-8245 Last EDR Contact: 10/31/2016

Next Scheduled EDR Contact: 02/13/2017

Data Release Frequency: Varies

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009

Date Data Arrived at EDR: 05/07/2009 Date Made Active in Reports: 09/21/2009

Number of Days to Update: 137

Source: EPA, Region 9 Telephone: 415-947-4219 Last EDR Contact: 10/24/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: No Update Planned

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985 Date Data Arrived at EDR: 08/09/2004 Date Made Active in Reports: 09/17/2004

Number of Days to Update: 39

Source: Environmental Protection Agency

Telephone: 800-424-9346 Last EDR Contact: 06/09/2004 Next Scheduled EDR Contact: N/A

Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land

A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 08/06/2014
Date Made Active in Reports: 01/29/2015

Number of Days to Update: 176

Source: Department of Health & Human Serivces, Indian Health Service

Telephone: 301-443-1452 Last EDR Contact: 11/04/2016

Next Scheduled EDR Contact: 02/13/2017 Data Release Frequency: Varies

#### Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 08/31/2016 Date Data Arrived at EDR: 09/06/2016 Date Made Active in Reports: 09/23/2016

Number of Days to Update: 17

Source: Drug Enforcement Administration

Telephone: 202-307-1000 Last EDR Contact: 08/31/2016

Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: No Update Planned

#### US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 08/30/2016 Date Data Arrived at EDR: 09/06/2016 Date Made Active in Reports: 09/23/2016

Number of Days to Update: 17

Source: Drug Enforcement Administration

Telephone: 202-307-1000 Last EDR Contact: 11/29/2016

Next Scheduled EDR Contact: 03/13/2017 Data Release Frequency: Quarterly

## Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/18/2014 Date Data Arrived at EDR: 03/18/2014 Date Made Active in Reports: 04/24/2014

Number of Days to Update: 37

Source: Environmental Protection Agency

Telephone: 202-564-6023 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Varies

#### Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 06/27/2016 Date Data Arrived at EDR: 06/28/2016 Date Made Active in Reports: 09/23/2016

Number of Days to Update: 87

Source: U.S. Department of Transportation

Telephone: 202-366-4555 Last EDR Contact: 12/28/2016

Next Scheduled EDR Contact: 04/10/2017 Data Release Frequency: Annually

#### SPILLS PD: PREP Database

The Department of Environmental Quality's POLLUTION RESPONSE PROGRAM, known as PREP, provides for responses to air, water, and waste pollution incidents in order to protect human health and the environment.

Date of Government Version: 10/20/2009 Date Data Arrived at EDR: 10/29/2009 Date Made Active in Reports: 12/03/2009

Number of Days to Update: 35

Source: Department of Environmental Quality, Piedmont Region

Telephone: 804-527-5020 Last EDR Contact: 02/06/2012

Next Scheduled EDR Contact: 05/21/2012 Data Release Frequency: Quarterly

#### SPILLS BRL: Prep/Spills Database Listing

A listing of spills locations located in the Blue Ridge Regional area, Lynchburg.

Date of Government Version: 09/18/2009 Date Data Arrived at EDR: 09/18/2009 Date Made Active in Reports: 10/06/2009

Number of Days to Update: 18

Source: DEQ, Blue Ridge Regional Office

Telephone: 434-582-6218 Last EDR Contact: 11/28/2011

Next Scheduled EDR Contact: 03/12/2012 Data Release Frequency: Varies

### SPILLS NO: PREP Database

The Department of Environmental Quality's POLLUTION RESPONSE PROGRAM, known as PREP, provides for responses to air, water, and waste pollution incidents in order to protect human health and the environment.

Date of Government Version: 09/23/2009 Date Data Arrived at EDR: 09/29/2009 Date Made Active in Reports: 10/30/2009

Number of Days to Update: 31

Source: Department of Environmental Quality, Northern Region

Telephone: 703-583-3864 Last EDR Contact: 09/06/2011

Next Scheduled EDR Contact: 12/19/2011 Data Release Frequency: No Update Planned

### SPILLS PC: Pollution Complaint Database

Pollution Complaints Database. The pollution reports contained in the PC database include the initial release reporting of Leaking Underground Storage Tanks and all other releases of petroleum to the environment as well as releases to state waters. The database is current through 12/1/93. Since that time, all spill and pollution reporting information has been collected and tracked through the DEQ regional offices.

Date of Government Version: 06/01/1996 Date Data Arrived at EDR: 10/22/1996 Date Made Active in Reports: 11/21/1996

Number of Days to Update: 30

Source: Department of Environmental Quality

Telephone: 804-698-4287 Last EDR Contact: 03/08/2010

Next Scheduled EDR Contact: 06/21/2010
Data Release Frequency: No Update Planned

## SPILLS SW: Reportable Spills

The Department of Environmental Quality's POLLUTION RESPONSE PROGRAM, known as PREP, provides for responses to air, water, and waste pollution incidents in order to protect human health and the environment.

Date of Government Version: 01/21/2010 Date Data Arrived at EDR: 01/22/2010 Date Made Active in Reports: 02/16/2010

Number of Days to Update: 25

Source: Department of Environmental Quality, Southwest Region

Telephone: 276-676-4839 Last EDR Contact: 07/13/2012

Next Scheduled EDR Contact: 10/29/2012 Data Release Frequency: No Update Planned

#### SPILLS TD: PREP Database

The Department of Environmental Quality's POLLUTION RESPONSE PROGRAM, known as PREP, provides for responses to air, water, and waste pollution incidents in order to protect human health and the environment.

Date of Government Version: 09/17/2009 Date Data Arrived at EDR: 09/23/2009 Date Made Active in Reports: 10/06/2009

Number of Days to Update: 13

Source: Department of Environmental Quality, Tidewater Region

Telephone: trofoia@deq.vir Last EDR Contact: 09/06/2011

Next Scheduled EDR Contact: 12/19/2011 Data Release Frequency: Quarterly

SPILLS VA: PREP Database

The Department of Environmental Quality's POLLUTION RESPONSE PROGRAM, known as PREP, provides for responses to air, water, and waste pollution incidents in order to protect human health and the environment.

Date of Government Version: 08/08/2012 Date Data Arrived at EDR: 08/09/2012 Date Made Active in Reports: 10/05/2012

Number of Days to Update: 57

Source: Department of Environmental Quality, Valley Regional Office

Telephone: 540-574-7800 Last EDR Contact: 05/06/2013

Next Scheduled EDR Contact: 08/19/2013 Data Release Frequency: Quarterly

SPILLS WC: Prep Database

The Department of Environmental Quality's POLLUTION RESPONSE PROGRAM, known as PREP, provides for responses to air, water, and waste pollution incidents in order to protect human health and the environment.

Date of Government Version: 09/21/2009 Date Data Arrived at EDR: 09/29/2009 Date Made Active in Reports: 10/30/2009

Number of Days to Update: 31

Source: Department of Environmental Quality, West Central Region

Telephone: 540-562-6700 Last EDR Contact: 09/06/2011

Next Scheduled EDR Contact: 12/19/2011 Data Release Frequency: No Update Planned

SPILLS: Prep/Spills Database Listing

The Department of Environmental Quality's POLLUTION RESPONSE PROGRAM, known as PREP, provides for responses to air, water, and waste pollution incidents in order to protect human health and the environment. PREP staff often work to assist local emergency responders, other state agencies, federal agencies, and responsible parties, as may be needed, to manage pollution incidents. Oil spills, fish kills, and hazardous materials spills are examples of incidents that may involve the DEQ's PREP Program.

Date of Government Version: 08/02/2016 Date Data Arrived at EDR: 09/01/2016 Date Made Active in Reports: 11/07/2016

Number of Days to Update: 67

Source: Department of Environmental Quality

Telephone: 804-698-4287 Last EDR Contact: 12/02/2016

Next Scheduled EDR Contact: 03/13/2017 Data Release Frequency: Varies

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 09/01/2012 Date Data Arrived at EDR: 01/03/2013 Date Made Active in Reports: 02/15/2013

Number of Days to Update: 43

Source: FirstSearch Telephone: N/A

Last EDR Contact: 01/03/2013 Next Scheduled EDR Contact: N/A

Data Release Frequency: No Update Planned

#### Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 06/21/2016 Date Data Arrived at EDR: 06/30/2016 Date Made Active in Reports: 09/02/2016

Number of Days to Update: 64

Source: Environmental Protection Agency

Telephone: 800-438-2474 Last EDR Contact: 12/28/2016

Next Scheduled EDR Contact: 04/10/2017 Data Release Frequency: Varies

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 01/31/2015 Date Data Arrived at EDR: 07/08/2015 Date Made Active in Reports: 10/13/2015

Number of Days to Update: 97

Source: U.S. Army Corps of Engineers

Telephone: 202-528-4285 Last EDR Contact: 12/08/2016

Next Scheduled EDR Contact: 03/20/2017

Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005 Date Data Arrived at EDR: 11/10/2006 Date Made Active in Reports: 01/11/2007

Number of Days to Update: 62

Source: USGS

Telephone: 888-275-8747 Last EDR Contact: 10/14/2016

Next Scheduled EDR Contact: 01/23/2017 Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005 Date Data Arrived at EDR: 02/06/2006 Date Made Active in Reports: 01/11/2007

Number of Days to Update: 339

Source: U.S. Geological Survey Telephone: 888-275-8747 Last EDR Contact: 10/14/2016

Next Scheduled EDR Contact: 01/23/2017

Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011 Date Data Arrived at EDR: 03/09/2011 Date Made Active in Reports: 05/02/2011

Number of Days to Update: 54

Source: Environmental Protection Agency

Telephone: 615-532-8599 Last EDR Contact: 11/17/2016

Next Scheduled EDR Contact: 11/28/2016 Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 07/12/2016 Date Data Arrived at EDR: 08/17/2016 Date Made Active in Reports: 10/21/2016

Number of Days to Update: 65

Source: Environmental Protection Agency

Telephone: 202-566-1917 Last EDR Contact: 11/16/2016

Next Scheduled EDR Contact: 02/27/2017 Data Release Frequency: Quarterly

## EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013 Date Data Arrived at EDR: 03/21/2014 Date Made Active in Reports: 06/17/2014

Number of Days to Update: 88

Source: Environmental Protection Agency

Telephone: 617-520-3000 Last EDR Contact: 11/08/2016

Next Scheduled EDR Contact: 02/20/2017 Data Release Frequency: Quarterly

## 2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 04/22/2013 Date Data Arrived at EDR: 03/03/2015 Date Made Active in Reports: 03/09/2015

Number of Days to Update: 6

Source: Environmental Protection Agency

Telephone: 703-308-4044 Last EDR Contact: 11/11/2016

Next Scheduled EDR Contact: 02/20/2017 Data Release Frequency: Varies

## TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2012 Date Data Arrived at EDR: 01/15/2015 Date Made Active in Reports: 01/29/2015

Number of Days to Update: 14

Source: EPA

Telephone: 202-260-5521 Last EDR Contact: 12/23/2016

Next Scheduled EDR Contact: 04/03/2017 Data Release Frequency: Every 4 Years

## TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2014 Date Data Arrived at EDR: 11/24/2015 Date Made Active in Reports: 04/05/2016

Number of Days to Update: 133

Source: EPA

Telephone: 202-566-0250 Last EDR Contact: 11/22/2016

Next Scheduled EDR Contact: 03/06/2017 Data Release Frequency: Annually

## SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009 Date Data Arrived at EDR: 12/10/2010 Date Made Active in Reports: 02/25/2011

Number of Days to Update: 77

Source: EPA

Telephone: 202-564-4203 Last EDR Contact: 10/24/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 11/25/2013 Date Data Arrived at EDR: 12/12/2013 Date Made Active in Reports: 02/24/2014

Number of Days to Update: 74

Source: EPA

Telephone: 703-416-0223 Last EDR Contact: 12/06/2016

Next Scheduled EDR Contact: 03/20/2017 Data Release Frequency: Annually

## RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 08/01/2016 Date Data Arrived at EDR: 08/22/2016 Date Made Active in Reports: 11/11/2016

Number of Days to Update: 81

Source: Environmental Protection Agency

Telephone: 202-564-8600 Last EDR Contact: 11/18/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Varies

# RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995 Date Data Arrived at EDR: 07/03/1995 Date Made Active in Reports: 08/07/1995

Number of Days to Update: 35

Source: EPA

Telephone: 202-564-4104 Last EDR Contact: 06/02/2008

Next Scheduled EDR Contact: 09/01/2008 Data Release Frequency: No Update Planned

# PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013 Date Data Arrived at EDR: 10/17/2014 Date Made Active in Reports: 10/20/2014

Number of Days to Update: 3

Source: EPA

Telephone: 202-564-6023 Last EDR Contact: 11/07/2016

Next Scheduled EDR Contact: 02/20/2017 Data Release Frequency: Quarterly

## PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 01/20/2016 Date Data Arrived at EDR: 04/28/2016 Date Made Active in Reports: 09/02/2016

Number of Days to Update: 127

Source: EPA

Telephone: 202-566-0500 Last EDR Contact: 10/14/2016

Next Scheduled EDR Contact: 01/23/2017 Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 07/27/2016 Date Data Arrived at EDR: 08/05/2016 Date Made Active in Reports: 10/21/2016

Number of Days to Update: 77

Source: Environmental Protection Agency

Telephone: 202-564-5088 Last EDR Contact: 10/11/2016

Next Scheduled EDR Contact: 01/23/2017 Data Release Frequency: Quarterly

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009 Date Data Arrived at EDR: 04/16/2009 Date Made Active in Reports: 05/11/2009

Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances

Telephone: 202-566-1667 Last EDR Contact: 11/17/2016

Next Scheduled EDR Contact: 03/06/2017 Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009 Date Data Arrived at EDR: 04/16/2009 Date Made Active in Reports: 05/11/2009

Number of Days to Update: 25

Source: EPA Telephone: 202-566-1667 Last EDR Contact: 11/17/2016

Next Scheduled EDR Contact: 03/06/2017

Data Release Frequency: Quarterly

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 08/30/2016 Date Data Arrived at EDR: 09/08/2016 Date Made Active in Reports: 10/21/2016

Number of Days to Update: 43

Source: Nuclear Regulatory Commission

Telephone: 301-415-7169 Last EDR Contact: 11/07/2016

Next Scheduled EDR Contact: 02/20/2017 Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005 Date Data Arrived at EDR: 08/07/2009 Date Made Active in Reports: 10/22/2009

Number of Days to Update: 76

Source: Department of Energy Telephone: 202-586-8719 Last EDR Contact: 12/06/2016

Next Scheduled EDR Contact: 03/20/2017 Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014 Date Data Arrived at EDR: 09/10/2014 Date Made Active in Reports: 10/20/2014

Number of Days to Update: 40

Source: Environmental Protection Agency

Telephone: N/A

Last EDR Contact: 12/06/2016

Next Scheduled EDR Contact: 03/20/2017

Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database

The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 02/01/2011 Date Data Arrived at EDR: 10/19/2011 Date Made Active in Reports: 01/10/2012

Number of Days to Update: 83

Source: Environmental Protection Agency

Telephone: 202-566-0517 Last EDR Contact: 10/28/2016

Next Scheduled EDR Contact: 02/06/2017 Data Release Frequency: Varies

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S.

Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 10/03/2016 Date Data Arrived at EDR: 10/05/2016 Date Made Active in Reports: 10/21/2016

Number of Days to Update: 16

Source: Environmental Protection Agency

Telephone: 202-343-9775 Last EDR Contact: 10/05/2016

Next Scheduled EDR Contact: 01/16/2017 Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006 Date Data Arrived at EDR: 03/01/2007 Date Made Active in Reports: 04/10/2007

Number of Days to Update: 40

Source: Environmental Protection Agency

Telephone: 202-564-2501 Last EDR Contact: 12/17/2007

Next Scheduled EDR Contact: 03/17/2008 Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006 Date Data Arrived at EDR: 03/01/2007 Date Made Active in Reports: 04/10/2007

Number of Days to Update: 40

Source: Environmental Protection Agency

Telephone: 202-564-2501 Last EDR Contact: 12/17/2008

Next Scheduled EDR Contact: 03/17/2008 Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012 Date Data Arrived at EDR: 08/07/2012 Date Made Active in Reports: 09/18/2012

Number of Days to Update: 42

Source: Department of Transporation, Office of Pipeline Safety

Telephone: 202-366-4595 Last EDR Contact: 11/02/2016

Next Scheduled EDR Contact: 02/13/2017 Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 03/31/2016 Date Data Arrived at EDR: 08/01/2016 Date Made Active in Reports: 09/23/2016

Number of Days to Update: 53

Source: Department of Justice, Consent Decree Library

Telephone: Varies

Last EDR Contact: 12/30/2016

Next Scheduled EDR Contact: 04/10/2017 Data Release Frequency: Varies

## **BRS: Biennial Reporting System**

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 02/24/2015
Date Made Active in Reports: 09/30/2015
Number of Days to Lindots: 318

Number of Days to Update: 218

Source: EPA/NTIS Telephone: 800-424-9346 Last EDR Contact: 11/23/2016

Next Scheduled EDR Contact: 03/06/2017 Data Release Frequency: Biennially

# INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005 Date Data Arrived at EDR: 12/08/2006 Date Made Active in Reports: 01/11/2007

Number of Days to Update: 34

Source: USGS

Telephone: 202-208-3710 Last EDR Contact: 10/14/2016

Next Scheduled EDR Contact: 01/23/2017 Data Release Frequency: Semi-Annually

## FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 07/21/2016 Date Data Arrived at EDR: 07/26/2016 Date Made Active in Reports: 09/23/2016

Number of Days to Update: 59

Source: Department of Energy Telephone: 202-586-3559 Last EDR Contact: 11/08/2016

Next Scheduled EDR Contact: 02/20/2017 Data Release Frequency: Varies

## UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010 Date Data Arrived at EDR: 10/07/2011 Date Made Active in Reports: 03/01/2012

Number of Days to Update: 146

Source: Department of Energy Telephone: 505-845-0011 Last EDR Contact: 09/09/2016

Next Scheduled EDR Contact: 12/05/2016 Data Release Frequency: Varies

## LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 03/07/2016 Date Data Arrived at EDR: 04/07/2016 Date Made Active in Reports: 09/02/2016

Number of Days to Update: 148

Source: Environmental Protection Agency

Telephone: 703-603-8787 Last EDR Contact: 10/20/2016

Next Scheduled EDR Contact: 01/16/2017 Data Release Frequency: Varies

# LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001 Date Data Arrived at EDR: 10/27/2010 Date Made Active in Reports: 12/02/2010

Number of Days to Update: 36

Source: American Journal of Public Health

Telephone: 703-305-6451 Last EDR Contact: 12/02/2009 Next Scheduled EDR Contact: N/A

Data Release Frequency: No Update Planned

## US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 06/30/2016 Date Data Arrived at EDR: 07/25/2016 Date Made Active in Reports: 10/21/2016

Number of Days to Update: 88

Source: EPA

Telephone: 202-564-2496 Last EDR Contact: 12/22/2016

Next Scheduled EDR Contact: 04/10/2017 Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data A listing of minor source facilities.

Date of Government Version: 06/30/2016 Date Data Arrived at EDR: 07/25/2016 Date Made Active in Reports: 10/21/2016

Number of Days to Update: 88

Source: EPA

Telephone: 202-564-2496 Last EDR Contact: 12/22/2016

Next Scheduled EDR Contact: 04/10/2017 Data Release Frequency: Annually

## US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 08/05/2016 Date Data Arrived at EDR: 09/01/2016 Date Made Active in Reports: 09/23/2016

Number of Days to Update: 22

Source: Department of Labor, Mine Safety and Health Administration

Telephone: 303-231-5959 Last EDR Contact: 12/01/2016

Next Scheduled EDR Contact: 03/13/2017 Data Release Frequency: Semi-Annually

## US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 12/05/2005 Date Data Arrived at EDR: 02/29/2008 Date Made Active in Reports: 04/18/2008

Number of Days to Update: 49

Source: USGS

Telephone: 703-648-7709 Last EDR Contact: 12/12/2016

Next Scheduled EDR Contact: 03/13/2017 Data Release Frequency: Varies

## US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011 Date Data Arrived at EDR: 06/08/2011 Date Made Active in Reports: 09/13/2011

Number of Days to Update: 97

Source: USGS

Telephone: 703-648-7709 Last EDR Contact: 12/02/2016

Next Scheduled EDR Contact: 03/13/2017 Data Release Frequency: Varies

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 07/15/2016 Date Data Arrived at EDR: 09/07/2016 Date Made Active in Reports: 11/11/2016

Number of Days to Update: 65

Source: EPA Telephone: (215) 814-5000 Last EDR Contact: 12/06/2016

Next Scheduled EDR Contact: 03/20/2017 Data Release Frequency: Quarterly

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 06/02/2016 Date Data Arrived at EDR: 06/03/2016 Date Made Active in Reports: 09/02/2016

Number of Days to Update: 91

Source: Environmental Protection Agency

Telephone: 202-564-0527 Last EDR Contact: 11/28/2016

Next Scheduled EDR Contact: 03/13/2017 Data Release Frequency: Varies

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 10/25/2015 Date Data Arrived at EDR: 01/29/2016 Date Made Active in Reports: 04/05/2016

Number of Days to Update: 67

Source: Department of Defense Telephone: 571-373-0407 Last EDR Contact: 12/05/2016

Next Scheduled EDR Contact: 01/30/2017 Data Release Frequency: Varies

AIRS: Permitted Airs Facility List

A listing of permitted Airs facilities.

Date of Government Version: 09/12/2016 Date Data Arrived at EDR: 09/16/2016 Date Made Active in Reports: 11/03/2016

Number of Days to Update: 48

Source: Department of Environmental Quality

Telephone: 804-698-4000 Last EDR Contact: 11/28/2016

Next Scheduled EDR Contact: 03/13/2017

Data Release Frequency: Varies

CEDS: Comprehensive Environmental Data System

Virginia Water Protection Permits, Virginia Pollution Discharge System (point discharge) permits and Virginia Pollution Abatement (no point discharge) permits.

Date of Government Version: 09/07/2016 Date Data Arrived at EDR: 09/08/2016 Date Made Active in Reports: 11/10/2016

Number of Days to Update: 63

Source: Department of Environmental Quality

Telephone: 804-698-4077 Last EDR Contact: 12/05/2016

Next Scheduled EDR Contact: 03/20/2017 Data Release Frequency: Semi-Annually

COAL ASH: Coal Ash Disposal Sites

A listing of facilities with coal ash impoundments.

Date of Government Version: 07/29/2009 Date Data Arrived at EDR: 07/31/2009 Date Made Active in Reports: 08/21/2009

Number of Days to Update: 21

Source: Department of Environmental Protection

Telephone: 804-698-4285 Last EDR Contact: 12/05/2016

Next Scheduled EDR Contact: 03/20/2017

Data Release Frequency: Varies

DRYCLEANERS: Drycleaner List A listing of registered drycleaners.

> Date of Government Version: 12/31/2014 Date Data Arrived at EDR: 12/10/2015 Date Made Active in Reports: 02/04/2016

Number of Days to Update: 56

Source: Department of Environmental Quality

Telephone: 804-698-4407 Last EDR Contact: 10/11/2016

Next Scheduled EDR Contact: 01/23/2017 Data Release Frequency: Varies

**ENFORCEMENT: Enforcement Actions Data** A listing of enforcement actions.

> Date of Government Version: 09/28/2016 Date Data Arrived at EDR: 10/06/2016 Date Made Active in Reports: 11/07/2016

Number of Days to Update: 32

Source: Department of Environmental Quality

Telephone: 804-698-4031 Last EDR Contact: 12/19/2016

Next Scheduled EDR Contact: 03/20/2017 Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing

A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 08/11/2016 Date Data Arrived at EDR: 08/15/2016 Date Made Active in Reports: 11/04/2016

Number of Days to Update: 81

Source: Department of Environmental Quality

Telephone: 804-698-4205 Last EDR Contact: 10/31/2016

Next Scheduled EDR Contact: 02/13/2017

Data Release Frequency: Varies

Financial Assurance 2: Financial Assurance Information listing

Solid waste financial assurance information.

Date of Government Version: 08/26/2016 Date Data Arrived at EDR: 08/29/2016 Date Made Active in Reports: 11/10/2016

Number of Days to Update: 73

Source: Department of Environmental Quality

Telephone: 804-698-4123 Last EDR Contact: 11/14/2016

Next Scheduled EDR Contact: 02/13/2017 Data Release Frequency: Varies

TIER 2: Tier 2 Information Listing

A listing of facilities which store or manufacture hazardous materials and submit a chemical inventory report.

Date of Government Version: 12/31/2013 Date Data Arrived at EDR: 09/01/2015 Date Made Active in Reports: 11/16/2015

Number of Days to Update: 76

Source: Department of Environmental Quality

Telephone: 804-698-4159 Last EDR Contact: 01/03/2017

Next Scheduled EDR Contact: 04/03/2017 Data Release Frequency: Annually

UIC: Underground Injection Control Wells

A listing of underground injection controls wells.

Date of Government Version: 08/02/2016 Date Data Arrived at EDR: 08/03/2016 Date Made Active in Reports: 09/02/2016

Number of Days to Update: 30

Source: Department of Mines, Minerals and Energy

Telephone: 276-415-9700 Last EDR Contact: 11/02/2016

Next Scheduled EDR Contact: 02/13/2017 Data Release Frequency: Varies

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 09/18/2016 Date Data Arrived at EDR: 09/20/2016 Date Made Active in Reports: 10/21/2016

Number of Days to Update: 31

Source: Environmental Protection Agency

Telephone: 202-564-2280 Last EDR Contact: 12/20/2016

Next Scheduled EDR Contact: 04/03/2017 Data Release Frequency: Quarterly

## ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 06/09/2016 Date Data Arrived at EDR: 06/13/2016 Date Made Active in Reports: 09/02/2016

Number of Days to Update: 81

Source: Department of Interior Telephone: 202-208-2609 Last EDR Contact: 12/09/2016

Next Scheduled EDR Contact: 03/27/2017 Data Release Frequency: Quarterly

# FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 08/22/2016 Date Data Arrived at EDR: 08/23/2016 Date Made Active in Reports: 10/21/2016

Number of Days to Update: 59

Source: EPA

Telephone: 800-385-6164 Last EDR Contact: 11/22/2016

Next Scheduled EDR Contact: 03/06/2017 Data Release Frequency: Quarterly

# **EDR HIGH RISK HISTORICAL RECORDS**

# **EDR Exclusive Records**

## EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A Date Data Arrived at EDR: N/A Date Made Active in Reports: N/A

Number of Days to Update: N/A

Source: EDR, Inc. Telephone: N/A Last EDR Contact: N/A

Next Scheduled EDR Contact: N/A

Data Release Frequency: No Update Planned

## EDR Hist Auto: EDR Exclusive Historic Gas Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A Date Data Arrived at EDR: N/A Date Made Active in Reports: N/A Number of Days to Update: N/A

Source: EDR, Inc. Telephone: N/A Last EDR Contact: N/A

Next Scheduled EDR Contact: N/A Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historic Dry Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A

Number of Page 45 Hardest N/A

Number of Days to Update: N/A Next Scheduled EDR Contact: N/A Data Release Frequency: Varies

# **EDR RECOVERED GOVERNMENT ARCHIVES**

### Exclusive Recovered Govt. Archives

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environmental Quality in Virgina.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/20/2014
Number of Days to Update: 203

Telephone: N/A Last EDR Contact: 06/01/2012 Next Scheduled EDR Contact: N/A Data Release Frequency: Varies

Source: Department of Environmental Quality

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environmental Quality in Virgina and at the Regional VA Levels.

Date of Government Version: N/A Date Data Arrived at EDR: 07/01/2013 Date Made Active in Reports: 01/15/2014 Number of Days to Update: 198

Source: Department of Environmental Quality Telephone: N/A Last EDR Contact: 06/01/2012 Next Scheduled EDR Contact: N/A Data Release Frequency: Varies

# OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 07/30/2013 Date Data Arrived at EDR: 08/19/2013 Date Made Active in Reports: 10/03/2013

Number of Days to Update: 45

Source: Department of Energy & Environmental Protection

Telephone: 860-424-3375 Last EDR Contact: 11/11/2016

Next Scheduled EDR Contact: 02/27/2017 Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2015 Date Data Arrived at EDR: 09/29/2016 Date Made Active in Reports: 01/03/2017

Number of Days to Update: 96

Source: Department of Environmental Protection

Telephone: N/A

Last EDR Contact: 10/12/2016

Next Scheduled EDR Contact: 01/23/2017 Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD

facility.

Date of Government Version: 10/01/2016 Date Data Arrived at EDR: 11/02/2016 Date Made Active in Reports: 01/04/2017

Number of Days to Update: 63

Source: Department of Environmental Conservation

Telephone: 518-402-8651 Last EDR Contact: 11/02/2016

Next Scheduled EDR Contact: 02/13/2017 Data Release Frequency: Annually

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2015 Date Data Arrived at EDR: 07/22/2016 Date Made Active in Reports: 11/22/2016

Number of Days to Update: 123

Source: Department of Environmental Protection

Telephone: 717-783-8990 Last EDR Contact: 10/14/2016

Next Scheduled EDR Contact: 01/30/2017 Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2013 Date Data Arrived at EDR: 06/19/2015 Date Made Active in Reports: 07/15/2015

Number of Days to Update: 26

Source: Department of Environmental Management

Telephone: 401-222-2797 Last EDR Contact: 11/21/2016

Next Scheduled EDR Contact: 03/06/2017 Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2015 Date Data Arrived at EDR: 04/14/2016 Date Made Active in Reports: 06/03/2016

Number of Days to Update: 50

Source: Department of Natural Resources

Telephone: N/A

Last EDR Contact: 12/12/2016

Next Scheduled EDR Contact: 03/27/2017 Data Release Frequency: Annually

## Oil/Gas Pipelines

Source: PennWell Corporation

Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Electric Power Transmission Line Data

Source: PennWell Corporation

This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

## AHA Hospitals:

Source: American Hospital Association, Inc.

Telephone: 312-280-5991

The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing

Source: Centers for Medicare & Medicaid Services

Telephone: 410-786-3000

A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services,

a federal agency within the U.S. Department of Health and Human Services.

## **Nursing Homes**

Source: National Institutes of Health

Telephone: 301-594-6248

Information on Medicare and Medicaid certified nursing homes in the United States.

## **Public Schools**

Source: National Center for Education Statistics

Telephone: 202-502-7300

The National Center for Education Statistics' primary database on elementary

and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

## **Private Schools**

Source: National Center for Education Statistics

Telephone: 202-502-7300

The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Licensed Facilities Source: Department of Social Services

Telephone: 804-692-1900

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.

Source: FEMA

Telephone: 877-336-2627

Date of Government Version: 2003, 2015

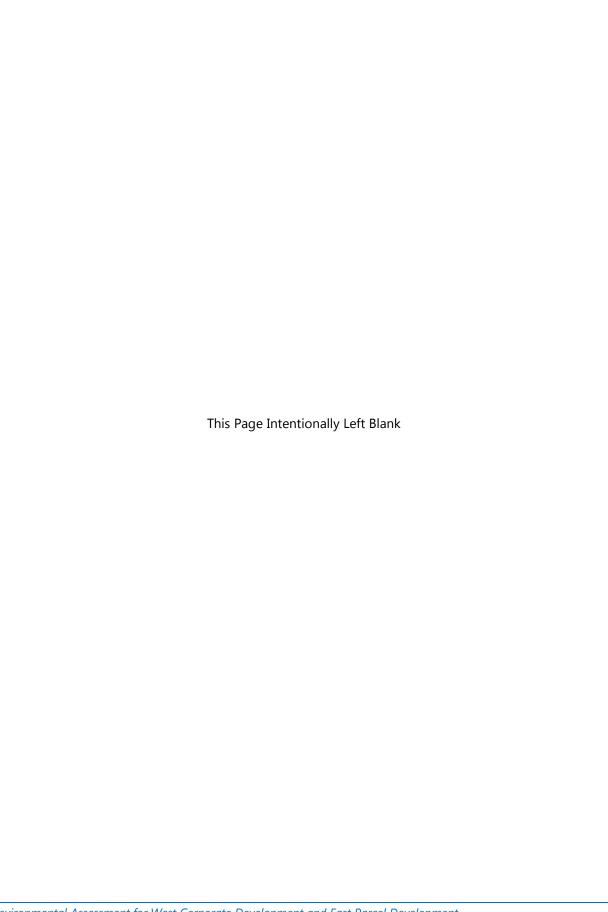
NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

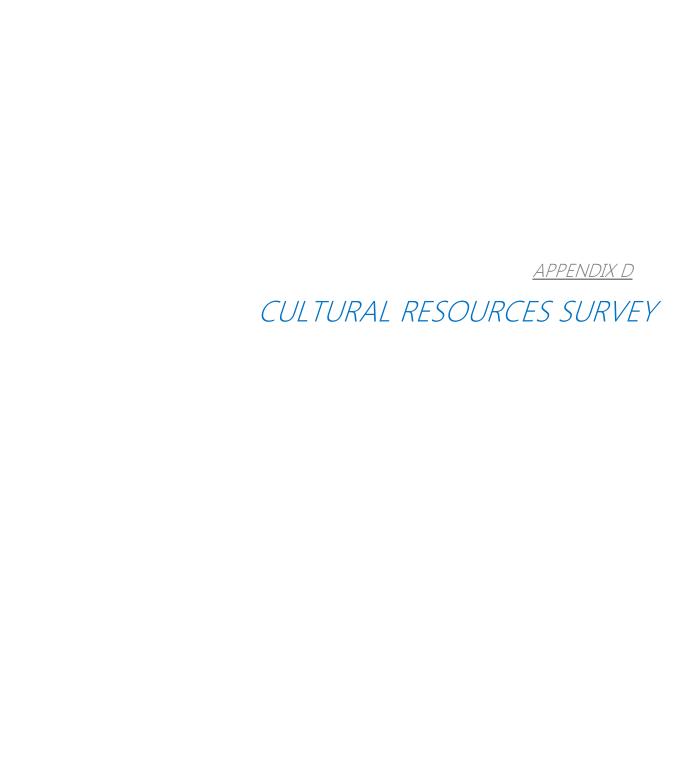
Current USGS 7.5 Minute Topographic Map Source: U.S. Geological Survey

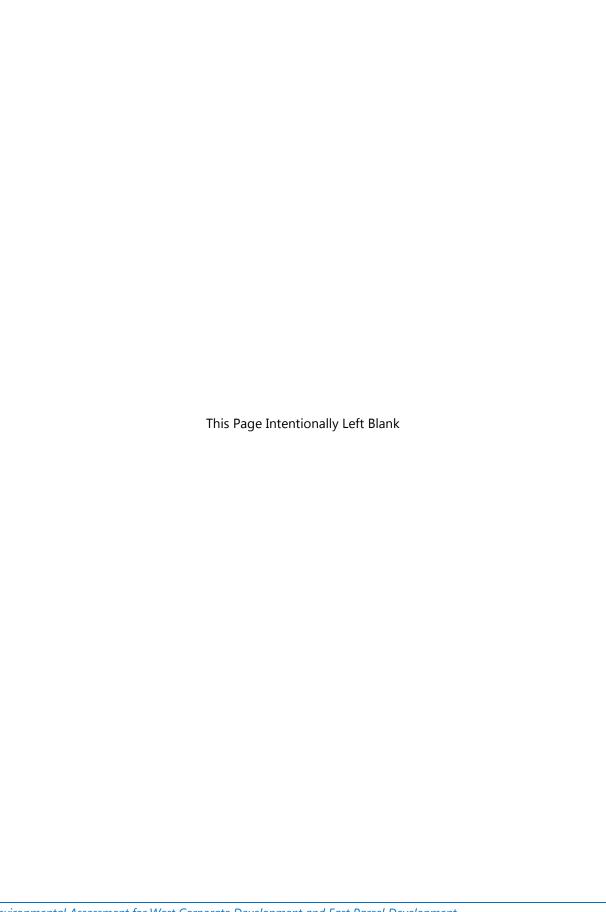
# STREET AND ADDRESS INFORMATION

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# **COMMONWEALTH of VIRGINIA**

# **Department of Historic Resources**

Molly Joseph Ward Secretary of Natural Resources 2801 Kensington Avenue, Richmond, Virginia 23221

Julie V. Langan Director

Tel: (804) 367-2323 Fax: (804) 367-2391 www.dhr.virginia.gov

June 2, 2017

Susan Stafford Federal Aviation Administration Washington Airports District Office 23723 Air Freight Lane, Suite 210 Dulles, VA 20166

Re: Manassas Regional Airport West Corporate Development and East Parcel Development

City of Manassas

DHR File No. 2017-0348

Dear Ms. Stafford,

The Virginia Department of Historic Resources (DHR) received the above referenced project for our review and comment pursuant to Section 106 (54 U.S.C. 306108) of the National Historic Preservation Act (54 U.S.C. 300101 et seq.) and it's implementing regulation, "Protection of Historic Properties" (36 CFR Part 800).

We have reviewed the report titled Phase I Archaeological Study for the Proposed West Corporate Development and East Parcel Development at Manassas Regional Airport, City of Manassas, Prince William County, Virginia prepared by Elizabeth Anderson Comer/Archaeology. It is our opinion that the fieldwork and report are consistent with applicable standards and guidelines. Much of the project area has either been previously surveyed or disturbed and the archaeological survey of roughly 18 acres of undisturbed land identified no intact sites. Based on the information provided, we find that impacts to archaeological properties are unlikely and no further archaeological survey is warranted in support of this project. We do, however, agree that protective measures should be employed during construction for adjacent site 44PW0729.

The proposed project will not be visible from most of the nine identified historic properties. Because of its scale and property type, the new development will not cause any additional

Western Region Office 962 Kime Lane Salem, VA 24153 Tel: (540) 387-5443 Fax: (540) 387-5446 Northern Region Office 5357 Main Street PO Box 519 Stephens City, VA 22655 Tel: (540) 868-7029 Fax: (540) 868-7033 Eastern Region Office 2801 Kensington Avenue Richmond, VA 23221 Tel: (804) 367-2323 Fax: (804) 367-2391 Page 2 June 2, 2017 DHR File No. 2017-0348

adverse impacts from what currently exists on the site, in areas where the development will be visible.

Based upon the sum of the review, DHR concurs with FAA that the proposed airport improvement project will have *no adverse effect on historic properties with the condition* that protective measures should be employed during construction for adjacent site 44PW0729.

If you have any questions regarding these comments or our review of this project, please do not hesitate to contact me via telephone at (804) 482-6092 or via email at <a href="mailto:adrienne.birge-wilson@dhr.virginia.gov">adrienne.birge-wilson@dhr.virginia.gov</a>.

Sincerely,

Adrienne Birge-Wilson, Architectural Historian Review and Compliance Division

Adrienne Linge-Wilson

cc: Janine Howard, DEQ



Federal Aviation Administration Beckley Airports Field Office 176 Airport Circle, Room 101 Beaver, West Virginia 25813 Telephone: (304) 252-6216 FAX: (304) 253-8028

May 5, 2017

Mr. Roger Kirchen Director, Division of Review and Compliance Virginia Department of Historic Resources 2801 Kensington Avenue Richmond, VA 23221

Re: A Request for Review and Concurrence Regarding the Area of Potential Effect and Other Section 106 Determinations for the West Corporate Development and East Parcel Development at Manassas Regional Airport

Dear Mr. Kirchen,

Per regulations implementing Section 106 of the National Historic Preservation Act (NHPA), this letter serves as a request of your review and concurrence of the Federal Aviation Administration's (FAA's) Area of Potential Effect (APE) and finding that there are no adversely effected properties on or eligible for inclusion in the National Register of Historic Places (NRHP) within the APE. A completed Project Review Application Form is provided with this letter (Enclosure).

# The Proposed Undertaking

The City of Manassas (City) proposes to redevelop the west side corporate area and develop a parcel on the east side of the Airport (Proposed Undertaking). The Proposed Undertaking includes: on-Airport roadway improvements, fixed base operator (FBO) building and parking lot reconstruction, corporate hangar/building and parking lot construction, t-hangars demolition/replacement and construction and T-hangar parking lot, west aircraft apron and taxilane tie down parking expansion, taxilane extension, maintenance and storage building construction, wash rack construction, utilities extension and stormwater drainage improvements, and security fence extension.

In order to implement the Proposed Undertaking, the City must obtain approval from the FAA to modify the existing Airport Layout Plan and to use federal funds to provide partial funding.

# The Area of Potential Effect

The Proposed Undertaking is located on the west and east side of the Airport property. The FAA has determined the APE-Direct to be the area where ground disturbing activities associated with the Proposed Undertaking could occur. The APE-Indirect was defined using a GIS based viewshed analysis (Attachment 2), incorporating all areas within line of site of the proposed new construction.

The Proposed Undertaking would not increase noise from aircraft operations because it would not change the type of aircraft currently utilizing the Airport, nor would the Proposed Undertaking increase the operational capacity/throughput for which the Airport is already designed, so these elements were not considered in the delineation of the APE-Indirect. Attachments 1 and 2 provide more detailed documentation of the delineated APEs.

Per 36 Code of Federal Regulations (CFR) 800.4(a), the FAA requests your concurrence with the extent of the APEs.

# Properties in or Eligible for Listing in the NRHP

An archives search and Phase I Archaeological Survey was completed for undisturbed portions of the APE-Direct. A copy of the Phase I Archaeological Survey is included as Attachment 1 of the Project Review Application Form. There is only one property within the APE-Direct that is listed or eligible for listing in the NRHP: the Manassas Station Operations Battlefield District, as expanded and documented in 2016. The Phase I Archaeological Survey identified no resources, including resources associated with the Manassas Station Operations Battlefield District within the APE-Direct; therefore, there is no adverse impact to archaeological resources within the APE-Direct. The Viewshed Analysis, Attachment 2 of the Project Review Application Form, determined that there are nine historic resources within the APE-Indirect which are listed in or eligible for the NRHP.

Designation	Name	Status	
076-0014	Moor Green	Listed in NRHP	
076-0024	Bristoe Station Battlefield	Eligible for NRHP	
(076-5161)	Bristoe Station Battlefield		
076-0024-		Contributes to 076-5344 NRHP	
0001 (076-	10604 Bristow Road	Eligibility	
0607)		Eligiolity	
076-0024-	New Hope Baptist Church	Contributes to 076-0024 NRHP	
0025	New Hope Baptist Church	Eligibility	
076-0024-	10741 Milford Road	Contributes to 076-0024 NRHP	
0027	10741 Williold Road	Eligibility	
076-0149	Bloom Hill Farm	Eligible for NRHP	
076-5036	Manassas Station Operations		
(0076-5168)	Battlefield (The Civil War in	Eligible for NRHP	
(0070-3100)	Virginia)		
076-5344	Village of Bristoe Historic District	Eligible for NRHP	
155-5020	The Wakeman Site / Cannon	Listed in NRHP	
	Branch Fort		

Although eligible resources were identified within the APE-Indirect, the evaluation of impact to these resources determined that in most cases existing tree lines provide screening to obstruct the line of sight between historic resources and the proposed construction, and where line of sight is not obstructed, the nature of the proposed construction does not vary substantially from the existing development already visible on the airport; therefore, the proposed construction does not represent an adverse impact to the setting and character of these resources. The FAA requests your concurrence on this finding.

# No Historic Properties Affected

Based on the information in this letter per the requirements of 36 CFR 800.11(d), the FAA has determined that the Proposed Undertaking would not adversely affect any known properties that Section 106 of the NHPA protects. The FAA respectfully requests your concurrence with this determination per 36 CFR 800(d)(1).

# Additional Information

RS&H, a consultant for the Commission, is preparing an Environmental Assessment (EA) for the Proposed Undertaking. The EA analyzes the potential environmental effects of the Proposed Undertaking compared to the No Action Alternative. As part of the EA, the FAA intends to make a *de minimis* impact determination for historic properties under Section 4(f) of the U.S. Department of Transportation Act of 1966.

Should you have any questions or require additional information to facilitate your review, please do not hesitate to contact me at <a href="mailto:susan.stafford@faa.gov">susan.stafford@faa.gov</a> or (304) 252-6216 x130.

Sincerely,

Susan Stafford

**Environmental Protection Specialist** 

**Enclosures:** 

Project Review Application Form

Attachment 1 – Phase I Archaeological Report Attachment 2 – Viewshed Study Letter Report

Cc: Juan Rivera, Airport Director

Jolene Berry, Sr. Airport Operations

David Alberts, RS&H

# Project Review Application Form

This application <u>must</u> be completed for all projects that will be federally funded, licensed, or permitted, or that are subject to state review. Please allow 30 days from receipt for the review of a project. <u>All information must be completed before review of a project can begin and incomplete forms will be returned for completion.</u>

I.

GENERAL PROJECT INFORMATION

1. Has this project	been previously reviewed	<u>—</u>	O X DHR File #		
2. Project Name	West Corporate Deve	elopment and East Parcel De	velopment at Manassas Regional Airpor		
3. Project Location			Prince William County		
	City	Town	County		
		d in project (providing fun bbreviations in the instruc			
Lead Federal Agency Federal Aviation		Administration			
Other Federal Agency Not Applicable					
State Agency	Virginia Department of Aviation				
5. Lead Agency Co	ntact Information				
<b>Contact Person</b>	Susan Stafford				
<b>Mailing Address</b>	176 Airport Circle, Rm 101, Beaver, WV 25813				
Phone Number	(304) 252-6216 x130	Fax Number			
<b>Email Address</b>	Susan.Stafford@faa.gov				
6. Applicant Conta	ct Information				
<b>Contact Person</b>	Juan Rivera, Airport Director				
<b>Mailing Address</b>	10600 Harry J. Parrish Blvd. Manassas, VA 20110				
<b>Phone Number</b>	(703) 361-1882	Fax Number			
<b>Email Address</b>	jrivera@ci.manassas.va.us				
II. PROJECT L	OCATION AND DESCR	RIPTION			
7. USGS Quadrangle Name		Nokesville			
8. Number of acres included in the project		About 60 acres (about 45 on the west and 15 on the east)			

# MAIL COMPLETED FORM AND ATTACHMENTS TO:

9. Have any architectural or archaeological surveys of the area been conducted?				
If yes, list author, title, and date of report here. Indicate if a copy is on file at DHR. See Attachment A	NO			
10. Are any structures 50 years old or older within or adjacent to the project area?	YES NO_x_			
If yes, give date(s) of construction and provide photographs.				
11. Does the project involve the rehabilitation, alteration, removal, or demolition of any structure, building, designed site (e.g. park, cemetery), or district that is 50 years or older? If <i>yes</i> , this must be explained fully in the project description.				
12. Does the project involve any ground disturbance (e.g. excavating for footings, installing sewer or water lines or utilities, grading roads, etc.)? If <i>yes</i> , this must be explained fully in the project description.				
13. DESCRIPTION: Attach a complete description of the project. Refer to the instructions required information.	for the			
To the best of my knowledge, I have accurately described the proposed project and its likely impacts	S.			
D I April 27, 2017 Signature of Applicant/Agent Date				
Signature of Applicant/Agent Date				
The following information <u>must</u> be attached to this form:				
X Completed DHR Archives search				
x USGS map with APE shown				
x Complete project description				
x Any required photographs and plans				
No historic properties affected No adverse effect Additional information is needed in order to complete our review We have previously reviewed this project. A copy of our correspondence is a Comments:	ttached.			
Signature Date				
Phone number DHR File #  This Space For Department Of Historic Resources Use Only				

# MAIL COMPLETED FORM AND ATTACHMENTS TO:

# PHASE I ARCHAEOLOGICAL STUDY FOR THE PROPOSED WEST CORPORATE DEVELOPMENT AND EAST PARCEL DEVELOPMENT AT MANASSAS REGIONAL AIRPORT, CITY OF MANASSAS, PRINCE WILLIAM COUNTY, VIRGINIA

VDHR File Number Not Yet Assigned

By Tery Harris, M.A.

Prepared for
The Federal Aviation Administration
The City of Manassas and the Manassas Regional Airport
and
R S and H, Inc.
909 N Washington St Suite 330
Alexandria, VA 22314

Prepared by
Elizabeth Anderson Comer/ Archaeology
4303 North Charles St
Baltimore, MD 21218
410-243-6767

April 2017

# **Abstract**

EAC/Archaeology, Inc. was contracted to conducted and Archaeological Identification Survey within the Area of Potential Effects-Direct (APE) of the proposed West Corporate Development and East Parcel Development within Manassas Regional Airport holdings. The proposed project represents a federal undertaking under Federal Aviation Administration review and a state undertaking under the Virginia Department of Aviation review. Initial archival research indicated that extensive previous archaeological testing had been conducted within the airport and that large portions of the project APE had been surveyed and determined to be free of potentially eligible archaeological resources. Additional areas were exempted from testing based both on the sequence of historic aerial photographs of the are available for review online or through the USGS, or based on surface evidence of soil disturbance noted during the initial field inspection for the project.

Subsequently, Phase I survey investigations were conducted within two survey area of roughly 18.4 acres aggregate area and encompassing three discontinuous testing grids. Subsurface excavations were limited to the previously untested and undisturbed portions of the western survey area, while metal detecting survey was conducted both in those portions of the western survey area, and all of the previously tested eastern survey area. Excavation testing in the western survey area found evidence of wide spread soil disturbance within the northern and central portions of that testing area, and found intact but sterile soils within the southern portion of the western survey area. Metal detector survey conducted across the eastern survey area identified primarily twentieth century material associated with past hunting on the parcel, but also recovered two horseshoe fragments whose age and cultural affiliation could not be determined. Despite the high potential for previously unidentified prehistoric resources, and a moderate potential for previously unidentified historic resources only modern materials or nondiagnostic artifacts were identified.

No archaeological resources were identified and no further work is recommended. One archaeological site, 44PW729, falls just west of the present APE, with a 20-foot buffer off all planned development. The airport will ensure protection of this site by placing temporary fencing along this buffer to ensure that construction, storage, or staging activities do not impact the site.

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# 1.1. INTRODUCTION

The City of Manassas and the Manassas Regional Airport are proposing plans to redevelop portions of the existing airport to extend commercial support facilities, and to develop presently undeveloped land along the northern boundary of the airport. The project represents an undertaking requiring approval by the Federal Aviation Administration (FAA) and a state undertaking requiring approval from the Virginia Department of Aviation (DOAV). The project comes under State Historic Preservation Office (SHPO) review under Section 106 of the National Historic Preservation Act of 1966 (as amended in 2006), and under Virginia Code Section 10.1-1118 mandating submission of environmental impact reports on major projects.

The Manassas Regional Airport is located in central Prince William County, primarily within the City of Manassas boundaries but including roughly 20 acres of property outside the current City of Manassas boundaries (Figure 1). The project falls within the Piedmont Province of Virginia, and is bound on the west and south by Broad Run, a major tributary of the Occoquan, and Cannon Branch, a major tributary of Broad Run, on the east.

This archaeological study addressed roughly 18 acres within the airport property. The Area of Potential Effects (APE) for the project represents an area encompassing all of the proposed project elements (Figures 2 and 3). Manassas Regional Airport has been the subject of a number of previous archaeological studies, and areas previously studied and found to not contain potentially eligible archaeological resources were exempted from the present study. Areas of visually obvious past disturbance or on landforms previously documented as disturbed deep fill platforms were also exempted from the present study. After all exemptions were made, two discontinuous areas totaling 4.4 acres were subject to subsurface identification survey, and three discontinuous areas totaling 18.4 acres were subject to controlled metal detection survey.

The identification survey excavation was conducted on November 15 and 16, 2016 and the metal detector survey was conducting between February 8 and February 14, 2017. Tery Harris served as Project Archaeologist for the project, designed the metal detector survey with Mr. Joseph Clemens, conducted archival research and authored the report. Dr. Robert Wanner supervised the subsurface survey and assisted with the metal detector survey. Mr. Clemens served as Crew Chief for the project and designed and supervised the metal detector survey. Paul Alberts, Sasha Sleshkupina, and Gus Kahn served as field technicians. The qualifications of primary project personnel are presented in Appendix I.

This report follows a standard format prescribed by the Virginia Department of Historic Resources (VDHR 2011). The proposed project is described in Chapter 1 along with the project setting. A general developmental context and an overview of the results of archival research are presented in Chapter 2. Chapter 3 presents the research design and methodology utilized during the study. Field survey results are presented in Chapter 4, and a study summary and recommendations concerning further treatment are presented in Chapter 5.

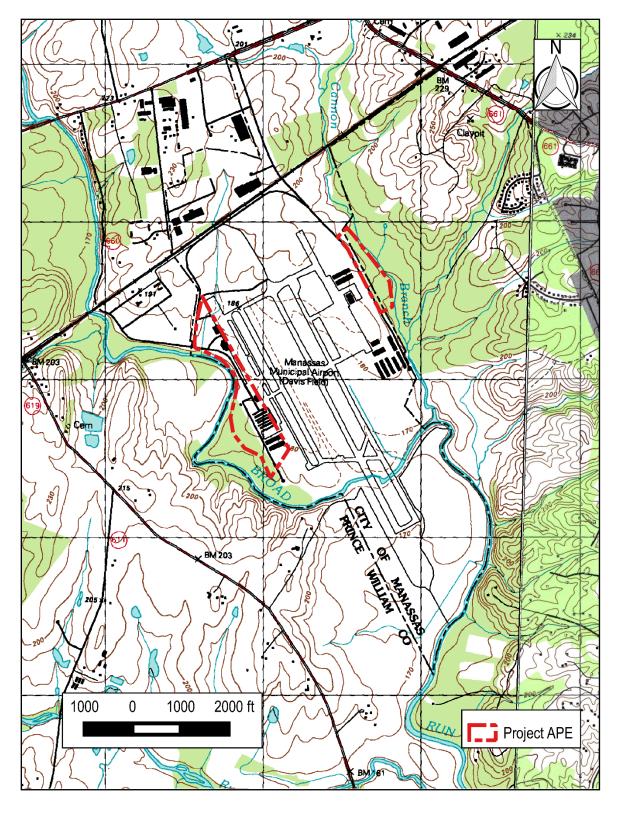


Figure 1. Project Location on the 1994 Nokesville VA and Independent Hill VA USGS 7.5 Minute Quadrangle.

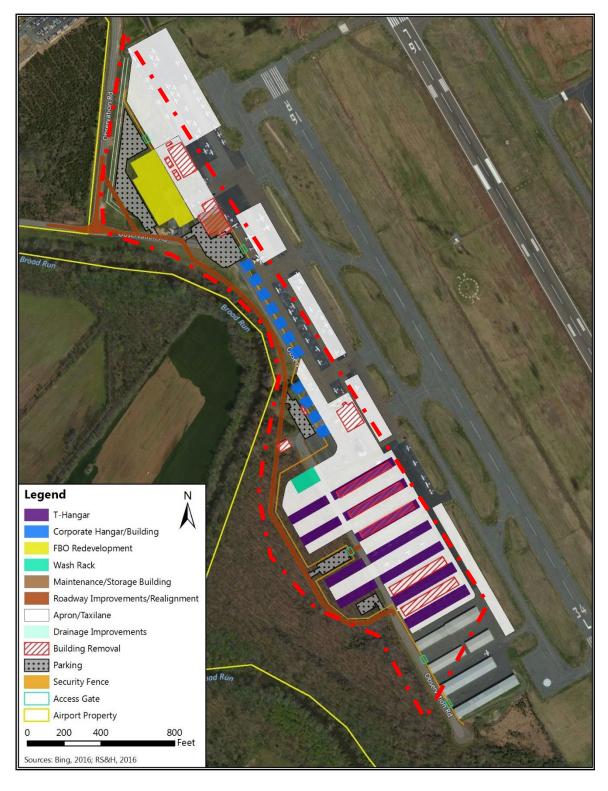


Figure 2. Project APE, western survey area and proposed project elements. (APE in red, base image courtesy of RS&H).



Figure 3. Project APE, eastern survey area and proposed project elements. (APE in red, base image courtesy of RS&H).

# 1.2 PROJECT DESCRIPTION AND SETTING

# **Project Description**

The City of Manassas and the Manassas Regional Airport are proposing plans to redevelop existing support facilities along the western edge of the airport, and to develop new support facilities along the east airport boundary (Figures 2 and 3).

The proposed project elements within the West Corporate Area include: improvements to the intersection of Observation Road and Piper Lane; realignment of Observation Road to the west; demolition of two existing FBO buildings and replacement by a 71,100 square-foot FBO building; new parking lots and expansion of the existing apron, construction of roughly 11 new 3,66 square-foot hangars and construction of adjoining parking lots, demolition and replacement of five existing T-hangars, construction of seven new T-hangars, construction of a new maintenance and storage building on the site of one demolished FBO building, extension of existing apron around the site of new T-hangar construction, construction of a wash-rack north of the T-hangars. Proposed plans also include extension of existing utilities as required to support construction, extension of the existing security fence to encompass the new facilities, and improvements to existing stormwater drainage systems to accommodate the increase in impervious surface resulting from propose construction.

Proposed development within the East Parcel Area includes realignment of Wakeman Drive, construction of new hangar and office structures, with adjoining parking lots. The existing adjacent taxilane would be extended to provide airfield access to the proposed development. Proposed plans also include extension of existing utilities as required to support construction, extension of the existing security fence to encompass the new facilities, and improvements to existing stormwater drainage systems to accommodate the increase in impervious surface resulting from propose construction.

# Description of the Area of Potential Direct Effects

The Area of Potential Direct Effects was defined to include all elements of the proposed project. Significant portions of the defined APE have been subject to or are adjacent to prior archaeological survey (Figure 4). These although two of these surveys did identify archaeological resources (McLearen 1978, Deitrick and McDaid 1994), these resources were either subsequently determined not to be eligible for listing on the National Register of Historic Places or fall outside the APE boundaries. The Mullens 2005 study and the Harris 2009 study did not identify archaeological resources. All acreage within the present APE previously studied was exempted from further consideration prior to fieldwork for this study. The APE was divided into a western survey area and an eastern survey area for purposes of this study.

# Description of the Eastern Survey Area

The eastern survey area, of roughly 14 acres within the APE, is located just east of Wakeman Drive, and north of Harry Parish Boulevard. It is primarily second growth forest, although there is some clearance as past disturbance at the southern end associated with the construction of Parish Boulevard, and a second small area of disturbance and lawn associated with a small airport signal and support facility at the northern end of the survey area. Initial pedestrian inspection of the survey area identified a cleared sewer-line corridor on the east of the study area (Figure 5),

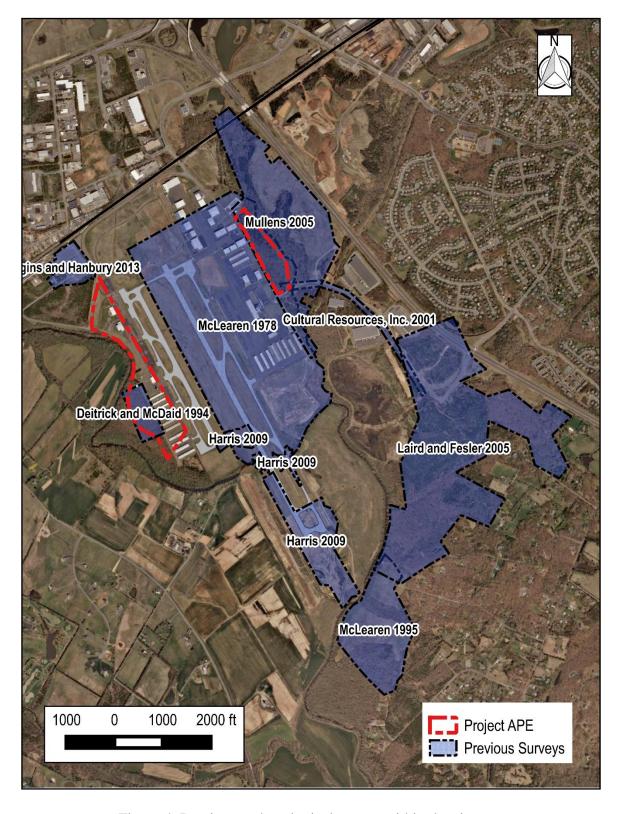


Figure 4. Previous archaeological survey within the airport.



Figure 5. View looking south down the sewer right-of-way on eastern edge of the eastern survey area.

resulting in multiple push-piles of waste soil (Figures 6 and 7) and a variety of metal debris which extended some 30 feet west into the survey area along the sewer corridor. Modern dumping was apparent both along the sewer cut and Wakeman Drive (Figure 8). The southeastern portion of the eastern survey area includes an area of low wetlands (Figure 9).

# Description of the Western Survey Area

The western survey area comprised primarily of existing airport facilities. The northern end of the survey area includes two commercial hangars, the adjacent apron, access drive, and parking facilities, as well as an area of lawn to the west, between the facilities and Observation Road (Figure 10). A large man-made drainage also runs northeast-southwest through this portion of the western survey area (Figure 11). Existing elevations and surface conditions, as well as historical aerial photographs indicates that this area has been previously disturbed during construction, prior to 1977. This portion of the western survey area was exempted due to previous disturbance.

The central portion of the western survey area includes extensive paved aprons, portions of Taxiway Alpha, the continuation of Observation Road heading south, and lawn verge west of Observation Road. At its narrowest point, this area appears to have been completely disturbed by past road and apron construction. Just north of the main western hangar area, there is small complex of administrative buildings, including the tower, a temporary trailer office, and a small structure identified as Manassas Aviation on project plans (Figure 12 and Figure 13). Subsurface testing was conducted in the lawn area west of the trailer and north of the smaller building, where no surface evidence of disturbance was present.

The southern portion of the western survey area consists of second growth forest in the west, and pavement and hangar structures to the east. The bulk of this area was surveyed in 1994 (Deitrick and McDaid 1994). Subsurface testing was conducted on the small forested area south of the area tested by Deitrick and McDaid (Figure 4). No subsurface testing was possible in the paved area around and between the existing hangar structures.



Figure 6. Soil push piles adjacent to the sewer right-of-way, in the eastern survey area. Looking west from the northeastern corner.



Figure 7. Soil push pile adjacent to the sewer right-of-way in the eastern survey area. Looking north from the southeastern corner.



Figure 8. Modern surface dumping in the northwestern corner of the eastern survey area, looking east from grid point B35.



Figure 9. View looking east from grid point D3 at the wetlands in the southeastern portion of the eastern survey area.



Figure 10. Structural complex at the northern end of the western survey area. View east from Observation Road north of its intersection with the access drive.



Figure 11. Drainage channel running through the northern portion of the western survey area. View northeast from south end of the drainage near Observation Road.



Figure 12. Main structure complex including tower, central portion of the western survey area. View looking east form the turn of the dirt road.



Figure 13. Manassas Aviation structure, central portion of the western survey area. View looking east towards Observation Road.

## Environmental Setting

The project falls within the Piedmont Province of Virginia, near the interface of the exposed metamorphic and igneous bedrock of the Piedmont and the Triassic Lowlands Basin.

The project area is bound by Broad Run on the west and Cannon Branch, a tributary of Broad Run, on the east. Broad Run is a major tributary to the Occoquan and represents part of the Potomac River Drainage. The original landform appears to represent both floodplain and low terrace. The natural topography across the airport is almost flat, apparently achieved by grading and addition of fill during the construction of the airport. The eastern survey area is the notable exception to this observation. Surface contours in the eastern survey area reflect a high knoll and descending sideslopes which appear to represent the original landform in the area.

## **Anticipated Soils**

Soils mapped in the project area include Aden silt loam, Arcola silt loam, Bermudian silt loam, Delanco fine sandy loam, Dulles silt loam, Elsinboro sandy loam, Rowland silt loam, and Urban land-Udorthents complex soils (NRCS Web Soil Survey, Elder 1989). Arcola, Delanco, Dulles Elsinboro, and Rowland soils are classified as well drained or moderately well drained. Aden and Hatboro soils are classified as poorly drained.

Aden soils are soils formed in alluvium on terraces, and is mapped only in the western survey area. They are typically deep and poorly drained. The natural profile includes a surface plowzone of 8 inches of silt loam, over a deep B Horizon (up to 58 inches) which grades from silty clay loam to clay. The substratum is a mottled silt loam, with bedrock typically encountered around 80 inches below the surface. An E Horizon may be present in some profiles. Soils color, especially in the B and C Horizons, can vary widely in value and chroma, although the hue generally ranges from 10YR to 5YR.

Arcola soils are soils formed in material weathered from siltstone, shale, and fine-grained sandstone and are found on ridgecrests and sideslopes. Arcola soils are mapped only in the eastern survey area, along the higher ridge. The plowzone is typically less than 10 inches, a silt loam which is nearly identical to the gravelly silt loam B Horizon below it. The gravel content of the subsoil matrix increases with depth, and the weathered siltstone substratum is generally encountered near a depth of two feet beneath the surface. Soil colors reflect the red siltstone and sandstones from which it developed, typically a 2.5YR to 5YR in color, but can range into the 7.5YR and 10YR range.

Bermudian soils are deep, drained soils formed in recent alluvial deposits on floodplains and are mapped only in the western survey area. The plowzone is a roughly 8 inch thick silt loam which is virtually identical to the underlying upper subsoil. The B Horizon graduates from a silt loam to a silty clay and increases in reddish hue with depth. The substratum is generally encountered below four feet, and consists of a stratified sand markedly different from the overlying B Horizon. Bedrock may be encountered as high as six feet beneath the surface.

Delanco soils are also deep soils formed in alluvium on terraces and are mapped only in the western survey area. They are moderately well drained. The plowzone is generally less than a foot deep and ranges from a fine sandy loam to a silt loam. Where present the E Horizon can be up to six

inches thick, and consists of a nearly identical fine sandy loam or silt loam. The thick B Horizon is generally encountered at roughly one foot beneath the surface, and grades from a silty clay loam to a clay loam. The substratum, at roughly 40 to 45 inches below the surface, is a mottled clay loam to sandy loam. Depth of the bedrock is typically greater than 80 inches.

Dulles soils developed in Triassic residuum along toe slopes, in saddles, and at the heads of drainage ways and are mapped only in the eastern survey area. The plowzone is typically 8 inches deep and consists of an only slightly variable dark brown or brown silt loam. The underlying B Horizon approaches three feet in thickness, and grades from silty clay loam through silty clay to clay at the base. It typically rests directly on decaying red shale of the Culpeper Basin.

Elsinboro soils formed along stream terraces out of alluvium. The soils are deep and well drained. The Ap Horizon is typically roughly 10 inches of loam which ranges in color and loam proportions. Where present the E Horizon is a similar sandy or silt loam with mica inclusions. The B Horizon approaches three feet in thickness and grades from silty clay through silty clay loam to sandy loam near the base. The B Horizon rests on a discontinuous stratified or variegated gravelly sandy loam.

Rowland soils are very deep floodplain soils formed in alluvium. They are characterized as moderately well drained to somewhat poorly drained. Rowland soils are mapped only in the southeastern portion of the eastern survey area. The plowzone is typically somewhat reddish in color, roughly 10 inches deep, and consists of a silt loam or sandy loam. The underlying B Horizon is relatively thin, including an upper transitional zone of reddish silt loam that lightens in color with depth. The substratum is generally encountered just below two feet beneath the surface, and consists of an upper layer of silty clay loam and a lower zone of stratified sand and gravel, which extends to depths below five feet.

Urban land-Odorthents complex soils are defined as areas where 85% or more of the surface is covered by asphalt, concrete or other impervious surfaces and area where the soils have been altered during excavation or covered by fill materials. This complex is mapped primarily along the aprons and taxiway of the western survey area.

### Current Land Use

The project APE is in use as an active regional airport serving small aircraft and helicopters. The western survey area includes a number of structures, hangars, aprons, access roads, and part of the western taxiway for this airport. The eastern survey area is outside the current active airport and represents second growth forest which appears to date to the mid-twentieth century.

# 2. ARCHIVAL RESEARCH AND DEVELOPMENT CONTEXT

Developmental Context

The Paleoindian Periods (Before 10,000 B.P.)

Although still debated, dated Paleoindian components from recent studies have pushed back the span of recorded history along the eastern seaboard. This earliest prehistoric period predates the classic Paleoindian Period of past development models and has been designated as Proto-Clovis. Known sites representing this period include Saltville (44SM37), Cactus Hill (44SX202), and possibly Brook Run (44CU122). Based on the Cactus Hill Pre-Clovis component, tool assemblages include prismatic blades and blade cores made from local fine grained lithic materials

(McAvoy and McAvoy 1997, Johnson 1997). Boyd cites immunological evidence of utilization of musk ox, bison, deer, elk, and small mammals such as rabbits (Boyd 2003: 68).

The Paleoindian culture is often thought of as based on big game hunting, particularly of now extinct species, although no Paleoindian artifacts associated with extinct species have been found in eastern North America. Settlement and subsistence models postulate a mosaic environment and a subsistence system focused on the hunting of large game, such as elk, caribou, and deer, with foraging of other resources as available, with a settlement system organized around the location of high quality cryptocrystalline lithic sources (Custer 1984, Gardner 1989). Archaeological excavations, such as those at the Shawnee Minisink site in the Upper Delaware Valley of Pennsylvania, have recovered evidence that eastern Paleoindians utilized many of the plant foods later important in prehistoric economies, and may have begun to utilize fish as a resource (Dent 1985, McNett 1985). These early hunter-gatherers probably traveled long distances to obtain food and the raw material for tool production, as has been shown by studies of lithic procurement systems centered on the Thunderbird site in Virginia and other Middle Atlantic sites (Gardner 1977; Custer 1984).

Site types from this period include a variety of base camps, hunting sites, and quarry-related locations. Upland swamps and headwater zones are known to have been exploited during this era. Artifact assemblages associated with the Paleoindian I Period include fluted points (most notably the Clovis type) and a variety of non-diagnostic unifacial and bifacial stone tools (Dent 1995:170). Based on sites previously reported, Paleoindian base camps have a strong riverine focus, preferring river terraces and "well watered swampy areas" (Petraglia *et al.* 1993: 18). Faunal and botanical procurement areas typically favor floodplains and uplands near these riverine foci. Some adaption of older patterns has been noted in the Early Archaic, where sites have also been reported along low-order streams and upland stream-heads.

Paleoindian diagnostics include characteristic fluted points generally manufactured from high quality cryptocrystalline lithic resources. Three identified Paleoindian components have been identified in Prince William County. The Featherstone Site (44PW0003) is coastal site identified in marshlands along the Occoquan Bay shoreline, primarily known through private collections. Two upland sites, 44PW1371 and 44PW1373, have been identified upstream along Broad Run, one through the recovery of a Hardaway-Dalton point (44PW1371) and the second through the recovery of a rhyolite Clovis or Dalton point base (44PW1373). These later two sites are located roughly 6.5 miles northwest of the present project area, situated on a ridge top, and lower ridge toeslope overlooking Broad Run, respectively.

# The Archaic (10,000 B.P. to 3,000 B.P.)

Established regional models had linked the shift from Paleoindian patterns into Early Archaic patterns with environmental changes during the Pleistocene to Holocene transition. Changes in technology and subsistence patterns are seen as directly reflecting the adaptation of newly developing resources. As the climate warmed and became moister, the Piedmont forests of oak and hickory developed; by 3,200 B.C. modern vegetative conditions essentially had stabilized (Wesler *et al.* 1981). Alternating dry and moist periods have been identified in regional pollen profiles (Brush 1986:150). The distribution and abundance of food resources would have varied in different locales during these alternating periods. Settlements expanded into more diverse

environments, apparently utilizing a wider variety of fish, game, and other plant food resources, such as nuts, berries, and roots (Johnson 1983, Custer 1990, Petraglia *et al.* 1993, Dent 1995:165-166).

By 10,000 B.P., there was a change in tool varieties, with stemmed and side-notched projectile points replacing the earlier fluted varieties. The preferred lithic materials were still imported from outside the study area. Virginia deer were the primary large game animal hunted, although bones of a number of other smaller animals recovered archaeologically show that a wide variety of species were successfully hunted. The appearance of mortars and pestles suggests that vegetable foods assumed greater importance. These changes have been interpreted as a shift in subsistence strategies towards a broad-spectrum adaptation, utilizing a number of species of animals and plants, rather than focusing primarily on large animals. This can be related to the changing environment as rapidly rising sea levels submerged the lower Susquehanna River and began forming the Chesapeake Bay (Kraft 1976). Large estuarine marshes that offered an increased quantity and variety of food resources became established in the Chesapeake Bay and its main tributaries. As temperatures increased during this period, birch and oak began to replace spruce (Brush 1986:149; Leedecker and Holt 1991:72). New evidence from Paleoindian and Early Archaic sites suggests that the transition from the Paleoindian way of life in the east was not a sharp break, but rather a gradual transition. Diagnostic artifacts for the period include Palmer, Kirk, Kirk Stemmed, and Bifurcate points.

The Middle and into the Late Archaic Periods are marked by a fully developed Holocene environment, one that was generally warm and moist (Gardner 1989). Plant gathering and processing, and fishing appear to have played increasingly important roles in subsistence systems throughout the period. This is reflected in an expansion of tool forms to include grinding stones, net-sinkers, axes, and adzes.

Wider ranging changes in subsistence and settlement patterns have been suggested for the Middle Archaic, as prehistoric populations adopted strategies which allowed them to utilize new ecological communities evolving in the Holocene. Middle Archaic populations are believed to have utilized a broader range of resources, many of which were only seasonally available. Settlement patterns reflect seasonal movement and possible reoccupation of settings with access to a variety of resources, such as low terraces, floodplains, and wetland environments. The proposed settlement system model includes large base camps located along major drainage systems. Groups would join during periods of maximum resource availability, possibly to cooperatively exploit dense but labor intensive resources such as seasonal fish runs, and then disperse to smaller groups during periods of scarce resources. Small procurement camps were typically situated in upland areas, possibly indicating the presence of social fusion/fission mechanisms, with small kin groups leaving larger base camps for seasonal exploitation of resources in other environmental niches (Gardner 1978; Custer 1984:67). In regional models the Halifax phase has been described as having a riverine oriented upland focus (Mouer 1991), although it exhibited less intensive riverine focus than the following periods of prehistory.

Artifact assemblages from this period are diverse. In this area, they may include projectile points of the following types: Stanley, Neville, Morrow Mountain, Guilford, and Halifax points. Regional Middle Archaic models also assign the Archaic triangles to this period (Custer 2000; Katz 2000).

A variety of non-diagnostic unifacial and bifacial stone tools were also produced during this period. Ground stone tools, including mortars and pestles, became common during this period (Dent 1995:170).

By the end of the Archaic Period, there were increased shallow estuarine areas in the Tidewater, and the oyster began to be intensively exploited (Dent 1995:212). Fish were also intensively harvested during this period, facilitated by the use of fish weirs. Large base camps were established at the fall lines of major freshwater streams where fish-spawning runs were most productive and at saltwater estuaries for collecting oysters (Dent 1995:212). These camps represent seasonal fusion locations. Winter fission produced a pattern of "upland hollow" hunting and foraging camps located in the Piedmont interior (Johnson 1991, Johnson 2001:82).

The Late Archaic-Transitional Period is marked by a settlement pattern focused more along interior drainages of first-order streams, with larger social groupings and increased sedentism (Mouer 1991, Steponaitis 1980). At least one researcher has suggested that the inherently linear nature of resource zones in such a system would motivate greater social interaction between groups (Mouer 1991:14).

Steatite bowls are added to the subsistence toolkit in this period. The use of the heavy steatite bowls suggests increased sedentism even in the early portions of the period (Dent 1995:213). Other diagnostic artifacts include Savannah River, Brewerton (several sub-types), Bare Island, Holmes, Perkiomen, Susquehanna Broadspears (and other broadspear types), and Vernon points. The typical toolkit included small bifaces, drills, scrapers, and utilized flakes.

In the Mid-Atlantic, Archaic sites are much more numerous, larger, and richer in artifacts than the earlier Paleoindian sites. Prince William County has 19 Early Archaic sites reported, including 44PW0432 in the project vicinity. The Middle Archaic is the best represented of the Archaic subdivisions, with 65 sites reported in the county with Middle Archaic components, including 44PW0013, 44PW0600 (although the site form has not yet been updated to reflect the reported component), and 44PW0729 adjacent to present LOD, and 44PW0249 and 44PW1110 in the project vicinity. Late Archaic components are reported at 52 Prince William County sites, including 44PW0014, 44PW0015, and 44PW0600 either on or adjacent to the airport property, and 44PW1623 and 44PW1624 in the project vicinity.

## The Woodland Period (3,000 B.P. to 1600 A.D.)

The introduction of pottery into the artifact assemblage around 3,000 B.P. marks the beginning of the Woodland period. Potters' innovations, as reflected in ceramic types, have become a significant basis for dating deposits within the Woodland period. At the end of the Woodland period, the geographic distribution of ceramic types within the Middle Atlantic corresponded with ethnohistoric cultural/linguistic boundaries. Comparable boundaries extend back to at least 200 AD (Stewart 1987:118). In the Chesapeake Bay area, ceramic distributions tended to conform to physiographic provinces, with a zone of interaction along the Fall Line (Egloff 1985).

By the Woodland Period, site patterns show a distinct movement from interior areas to major rivers valleys and estuarine settings along the coast. Settlement patterns reflected multi-seasonal, repetitive occupation of base camps along rivers, and procurement of game and mass resources

conducted by small special purpose forays in to the adjacent the uplands. This pattern appears to have been most intensified during the Late Woodland, with semi-permanent villages along major floodplains. Horticulture of adopted cultigens (the classic beans, corn, and squash) provided a slightly more controllable resource base, but reflected only part of a subsistence base which included game (such as deer, waterfowl, and fish) as well as gathered nuts, berries, and tubers. Soil exhaustion in agricultural fields motivated periodic movement of the village sites within the available floodplain environment.

It was previously thought that the break between the Archaic and Woodland periods, around 3,000 B.P., represented the introduction of horticulture. Although cultivated plants were used by Early Woodland groups in the upper South and Midwest, there is presently no evidence that cultivated foods played a role in the diet of Early Woodland people in the Chesapeake Bay area. Very efficient hunting and gathering systems (Caldwell 1958), including riverine and marine species, may have made the acceptance of cultigens slow at first. Only after A.D. 700, when varieties of tropical cultigens adapted to local conditions arrived in the Mid-Atlantic area, did agriculture begin to assume the important role that it had at the time of the arrival of the first Europeans.

# Early Woodland Period

The period from 3,000 B.P. to 2,400 B.P. is marked by experimentation with ceramic technology. Early ceramics were tempered with crushed steatite and included vessel forms similar to the Terminal Late Archaic steatite vessels, and included Marcey Creek and Seldon Island wares. After about 1,200 B.P. sand and crushed quartz tempered Accokeek ceramics were common.

Gardner proposed that the settlement-subsistence system of this period focused on a series of base camps where the populations aggregated to exploit seasonal resources (Gardner 1982:60). These base camps focused on harvesting anadromous fish in the spring and early summer, then exploiting estuarine resources in the fall and early winter. Summer and late winter were periods of group fission, with small group settlements away from major rivers.

Thirty-eight Early Woodland components have been reported in Prince William County, including 44PW0015 within the airport and 44PW0600 adjacent to the airport. 44PW1643 in the project vicinity also has a reported Early Woodland component.

# Middle Woodland Period

During the period from 2,400 B.P. to A.D. 900, the Eastern Piedmont appears to have been used only for scattered hunting sites (Curry and Kavanagh 1991:15). At this time, the adjacent Western Shore Coastal Plain of the Chesapeake Bay area was occupied by a large population that utilized a wide spectrum of wild, seasonal resources through a settlement system focused on central base camps with storage facilities and widespread procurement sites (Curry and Kavanagh 1991:16-24). The Eastern Piedmont was not intensively occupied, although they created campsites and lithic processing stations as they crossed the Piedmont on trips for direct procurement of rhyolite from quarries in the Catoctin and Blue Ridge mountains to the west (Ballweber 1990, 1991).

Diagnostics from the period include Accokeek, Popes Creek, and Mockley ceramic wares, and various forms of triangular points.

The Middle Woodland is the least represented Woodland subperiod in Prince William County, with only 14 Middle Woodland components reported. No Middle Woodland component has been reported within the vicinity of the APE.

#### Late Woodland Period

The period includes significant cultural changes, including changes in settlement patterns, growing social inequality, and changes in mortuary patterns (Barfield and Barber 1992, Boyd and Boyd 1992). Regional Mid-Atlantic models of settlement patterns for the Late Woodland Period postulate a shift to include permanent villages and hamlets (including fortification) as part of the subsistence and settlement system. Floodplain locales were the favored locations for settlements, likely based on the availability of fertile bottomland soils. Smaller base camps and procurement sites were located in diverse settings and tended to have periods of multiple re-use (Custer 1986). Subsistence practices included the cultivation of foodstuffs, especially corn, beans, and squash. Diverse wild food sources were also utilized, including nuts, starchy tubers, amaranth, goosefoot, shellfish, fish, elk, bear, turkey, squirrel, duck, bobcat, raccoon, rabbit, skunk and wolf. Researchers have noted regional differences between major drainages within the Piedmont (Hantman and Klien 1992), and difference between the Piedmont with its greater reliance on terrestrial fauna and the riverine and estuarine focused Coastal Plain (Barfield and Barber 1992).

The Eastern Piedmont was again intensively occupied after A.D. 900, when large village sites appear along the Potomac River and in the Western Piedmont Lowlands along the Monocacy River. These people produced Shepard ceramics. Their archaeological remains have been classified as the Montgomery Complex (Schmitt 1952; Kavanagh 1982; Slattery and Woodward 1992). Shepard ceramic vessels have rounded or semi-conoidal bases, slightly constricted necks, cord-marked surfaces, primarily corded-stick decoration with some incising (and punctuations, rarely), collars produced by adding a rim strip, and are tempered with crushed rock (quartz or granite). Living in large villages on or near rich floodplain soils, these people were dependent to some extent on corn and other cultivated crops. There is also some evidence of smaller occupations along major rivers (Curry and Kavanagh 1991:16; Dent and Jirikowic 1990:26; Slattery and Woodward 1992:158) and smaller tributaries (Fischler 1984; Hopkins and Fischler 1992; Robinson et al 2003).

Montgomery complex sites appear to have been occupied as late as A.D. 1300-1400, which may overlap in time with the Keyser complex along the Potomac in the Eastern Piedmont (Dent and Jirikowic 1990). The Keyser complex is identified by shell-tempered, cord-marked ceramics and riverside village sites.

Diagnostic artifacts include small triangular points indicative of the adoption of bow and arrow technology, and Keyser, Shepard, Rappahannock, and Potomac Creek ceramics. Toolkits include a variety of generalized bifaces, awls, drills, ground stone woodworking tools, net sinkers, mortars, pestles, manos and metates. Other artifacts typically found in the region are ground-slate pendants, gorgets, bone awls, agricultural tools manufactured from bone and antler, and projectile points manufactured from bone, antler, turkey spurs, stingray barbs, and shark's teeth (Dent 1995:228-229).

Thirty-five Late Woodland components have been reported in Prince William County, including 44PW0600 adjacent to the airport property.

## **European Interaction (Contact Period)**

The first documented European contact in the region was the exploration of the Potomac River by Captain John Smith in 1608. He reportedly explored the Potomac as far upstream as Little Falls. His voyage marked the beginning of English trading with indigenous peoples in the area, and his maps provide an essential picture of indigenous settlement at the time of European contact (Smith 1612).

Numerous villages were noted by Captain John Smith along the Potomac (Smith 1612). The more important villages in the region included Nacotchanck, Moyaons, and Tauxenent. The village of Tauxenent, situated on the Virginia side of the Potomac near the mouth of the Occoquan River was the only one of these to fall within the present boundaries of Prince William County. The inhabitants of Tauxenent were reportedly known also as 'Taux', 'Toag', and 'Doag', and are generally believed to be part of the Powhatan chiefdom (Cissna 1990: 28). The Maryland based Piscatway were generally closely allied with the Powhatan Confederacy, sharing a common language stock (Algonquian). Some scholars dispute this interpretation, suggesting that the groups between the Rappahannock and Potomac rivers were instead relatively independent (Potter 1983:18-19). One historian, Harrison, asserts that the native groups of the Piedmont portions of the county were "Manahoac" Siouan derivatives (Harrison 1987: 24).

Regardless of cultural attribution, it seems that the native populations during the late 17<sup>th</sup> and early 18<sup>th</sup> century were a sufficient deterrent to European settlers the keep the county interior only lightly settled into the 18<sup>th</sup> century. The early seventeenth century was marked by a series of conflicts between English settlers and the Powhatan Confederacy, with conflicts in 1609, and periodically from 1622 through 1632 (Cissna 1990: 30). Indian-European hostilities generally subsided in the middle of the 17<sup>th</sup> century when Indian treaties and reservations were offered, and European settlement spread. In contrast, conflict with the Susquehannocs of the northern Bay and between the Powhatan and Monacan confederacies dated to periods before permanent English settlement and continued through the later seventeenth century.

European settlement primarily focused on the major river valleys and coastal areas, representing a significant competition to native groups whose Late Woodland patterns also placed a strong emphasis on these settings. Competition for resources and European diseases may have both operated to reduce the native population throughout the contact period, as well as a probably significant out-migration. Most indigenous groups had migrated out the Prince William County area by the early eighteenth century (Mooney 1889, Harrison 1987: 24). Harrison attributes this to conflict with the Iroquois over the control of the fur trade. In 1722 the colony of Virginia sealed a treaty with the Iroquois, and the native groups agreed to remain west of the Blue Ridge Mountains, opening up the interior for more sustained settlement (Harrison 1987: 29).

#### Settlement to Society Period (1607-1750)

Initial settlement in northern Virginia was largely restricted to the lower Potomac Valley and coastal area. Sustained settlement of the Piedmont interior was not undertaken until the early 18<sup>th</sup> century, after the 1722 treaty. Thus early settlement consisted of a string of independent plantations located along the coast and shores of major rivers. These scattered plantations were held together by a transportation system comprised primarily of navigable waterways and a few

interior "rolling roads" constructed to transport cash crops to collection centers. The area which would become Prince William County was initially settled along the Potomac and Occoquan Rivers. By 1648 patents granted for lands along the Potomac shore from the south border to the north border of county, and in along the lower Occoquan River (WPA Writers Program 1988:15). Grants in the interior were delayed several decades, and even then were generally not taken up (actually surveyed and occupied) until into the early 18<sup>th</sup> century.

The early plantation system revolved around tobacco. Once patented, the larger land grants would be subdivided into small holdings, and worked by tenant farmers. Puglisi notes that early 18<sup>th</sup> century farmers in the region generally worked holdings of less than 500 acres, despite the enormous land grants typical of the time (Puglisi 1989: 4487). It was these tenant farmers who would clear the land and begin farming. But tobacco proved to be an unstable economic basis; tobacco was a labor-intensive crop which quickly depleted soil nutrients. Farmers found that they were forced to acquire new land and additional labor at rates which frequently outpaced the profits of a tobacco crop which proved subject to widely fluctuating prices. Some settlers chose to relocate to new lands not yet depleted; others chose to adopt alternative crops such as grains.

By 1731 population in the region had grown sufficient to justify the formation of a new county, and establishment of a new county seat nearer to the centers of population at Occoquan Creek (Woodbridge) (Deitrick and McDaid 1994: 10, McLearen *et al.* 1995: 9). In 1742 the county seat was moved towards the interior to Cedar Run (McLearen *et al.* 1995: 9). The population of the interior continued to grow as populations both took up new tobacco lands or adopted mixed farming techniques. An increase in grain agriculture in turn motivated changes in settlement and transportation systems, as mill seats were sought out and mills constructed, subsequently developing their own road connections.

An example of this process is one of the earliest patents in the project vicinity; the 30,000 acre Brent Town grant patented in 1686/7 to George Brent, Richard Foote, Nicholas Haywood, and Robert Bristow (Hunter 2004). Although a Brent Town was established on paper in 1688, the settlement was never successful and the grant remained largely undeveloped until 1737. At that date the grant was subdivided between the surviving heirs for individual development (Hunter 2004). Subsequent court records and rent rolls indicate that the lots were envisioned as 100 or 150 acre lots, but were generally taken up as two or three lots combined (Hunter 2004). The 1737 Brent Town survey indicates that the farm of John or Jonathan Adams was located in the vicinity of the present project area.

#### Colony to Nation Period (1750-1789)

As population increased in northern Virginia, both through natural increase and immigration, lands in the region were resurveyed and large holdings were divided into smaller parcels. Unfortunately, as soils were exhausted tobacco farming began to fail in the region, and new fertile land became difficult to acquire (Catlin 1988). Wheat began to replace tobacco as the primary crop in northern Virginia starting circa 1760 (Cissna 1990:37).

There is little evidence of continued development within the immediate project vicinity during this period. The Bristow portion of the Brent Town grant (west and south of the present APE) was subject to significant legal encumbrances during the end of the period, with attempted land sales

blocked in 1780 and the properties transferred to the State in 1781 (Hunter 2004). The courts then blocked state sale of the land in 1783 under a suit brought by the Bristow tenants. Robert Bristow the son was briefly awarded the land in the late 1790s, but the State appealed and the tract was finally awarded to the State in 1806 (Hunter 2004). Throughout the whole period of legal proceedings it appears that the same tenants continued to hold the land, alternately paying rent to Bristow or the State.

## Early National Period (1789-1830)

Transportation improvements were a noteworthy development in the late 18<sup>th</sup> century and the early 19<sup>th</sup> century. Although the internal road system was developing more rapidly in the nineteenth century, water routes were still important transportation routes, especially for heavy or bulky raw commodities. While water transportation continued to represent an economical mode of cargo transportation, most personal transportation and an increasing amount of cargo transportation required the use of inland road systems. This was especially true as soil exhaustion, parcel subdivision, population pressure, and mill and mining development moved populations west into the Piedmont. Private corporations were organized that would build turnpikes to link towns in Virginia and nearby states throughout the early nineteenth century (Durrenberger 1968). Bristow Road and Route 28 both seem to have been well established by the end of this period (O'Neill 2007).

Once the question of the land ownership was settled in 1806, settlement in the previous Bristow Tract seems to have increased. By 1823 roughly 4,800 acres of the 7,000 acre tract was under lease, and the town of Brentsville had been laid out within the southern portion of the tract (Hunter 2004, Harrison 1987: 668). By 1820 the county seat was moved again, to Brentsville, in response to the interior movement of population in Prince William County (Ratcliffe 1978: 73). Harrison notes "[the] country on either side of Broad Run, above the confluence with Cedar, had now become the most populous part of the county, and included the land owners of the largest political influence (Harrison 1987: 317)."

## Antebellum Period (1830-1860)

During the early nineteenth century, weakened by soil exhaustion, parcel subdivision, and fluctuating staples prices, the older plantation based economy of northern Virginia began to wear down. Previously established populations were shifting westward seeking fertile land, with a resulting depopulation in the coastal areas of northern Virginia. The settlement pattern continue to adapt, as populations migrated to new soils in the interior, and adapted to the new importance of grains in the agricultural economy. The number of mills along interior streams increased rapidly in the first half of the nineteenth century, and the internal road system shifted to include these important processing centers. Crossroads communities began to develop throughout northern Virginia, as commercial and service enterprises developed at prominent road junctions. Churches often were situated at road junctions as well. As the majority of personal travel shifted from water to roads, crossroads were becoming community centers.

Brentsville, which remained the county seat until 1893, represents one of these crossroad communities. Writing in 1835, Joseph Martin described the town ... "[t]he Court House, clerk's office, and jail are handsomely situated on the main street, in a public square of three acres. Besides them, the village contains 19 dwelling houses, 3 miscellaneous stores, 2 handsome taverns,

built of brick and stuccoed, 1 house of entertainment, 1 house of public worship, free for all denominations, a bible society, a Sunday school, a temperance and a tract society...There is in the vicinity a common school in which the rudiments of English education are taught...Population 130 persons, of whom 3 are attorneys and 3 regular physicians..." (quoted in Ratcliffe 1978: 73).

Additional transportation improvements in the form of railroads marked the onset of a second shift of both settlement and subsistence patterns near the end of the period. The Orange and Alexandria Railroad and the Manassas Gap Railroad were both completed in the early 1850s, and an 1854 map of the Orange and Alexandria suggests that by that time a small community was established at the Broad Run crossing on that line, just south of a small community called Milford (Faul 1854, Figure 14). This small unnamed community appears to be the backbone of what would be the Bristoe Station settlement, including the Stewart farm which appears to have been just off the northwest corner of the project APE. The development of these two rail lines in the region would have profound effects on both the surrounding agricultural systems, and the surrounding communities during the Civil War.

## Civil War (1861-1865)

Manassas and Bristow Station both became major focal points during the Civil War, with major effects on the communities and economy of Prince William County. The Manassas Gap Railroad provided a direct link to the Shenandoah Valley grain producers, and the Orange and Alexandria Railroad presented a route directly into the Federal Capital. Manassas Junction, the location of the exchange between these lines, quickly became an important strategic target. The following summary of military engagements in the project vicinity depends heavily on information and reconstructions provided in the *Bristoe Station and Kettle Run Battlefields Preservation Study* (Jacobs *et al.* 2016).

The first military engagement in the project region was Confederates occupation of the Manassas Junction area early in 1861, and shortly thereafter they were faced with a Federal force during the First Battle of Manassas, July 21, 1861. By the fall and winter of 1861, the Confederates had established troop encampments in the Manassas Junction region, including Camp Jones established in the Bristoe Area (Jacobs *et al* 2016).

The first documented military engagement of August of 1862 lasted a brief two days, when Jackson moved his troops through arriving on the 26th. The Confederate forces sabotages segments of the rail near the Broad Run crossing, resulting in derailment of two trains late on the 26<sup>th</sup>. Ewell's Division was subsequently left at Bristoe to guard Jackson's rear as his main force moved onto Manassas Junction to the east. Responding Union forces set up and defined at the bridge crossing over Kettle Run to the west, where they held position until Confederate forces pushed west on the morning of the 27<sup>th</sup>. Reinforcements reached the withdrawn Union troops in early afternoon, and the Federals pushed back east. After several hours of bloody engagement, the Confederate forces called an orderly retreat, and moved east to join Jackson's main force. These engagements comprise the lead up to the Second Battle of Bull Run.

Confederate and Union forces clashed at the rail station again on October 14<sup>th</sup>, 1863. Union and Confederate forces arrived at Bristoe Station the afternoon of October 14<sup>th</sup>. The federal forces gained the upper hand when they established strong defensive positions along the railbed, and were

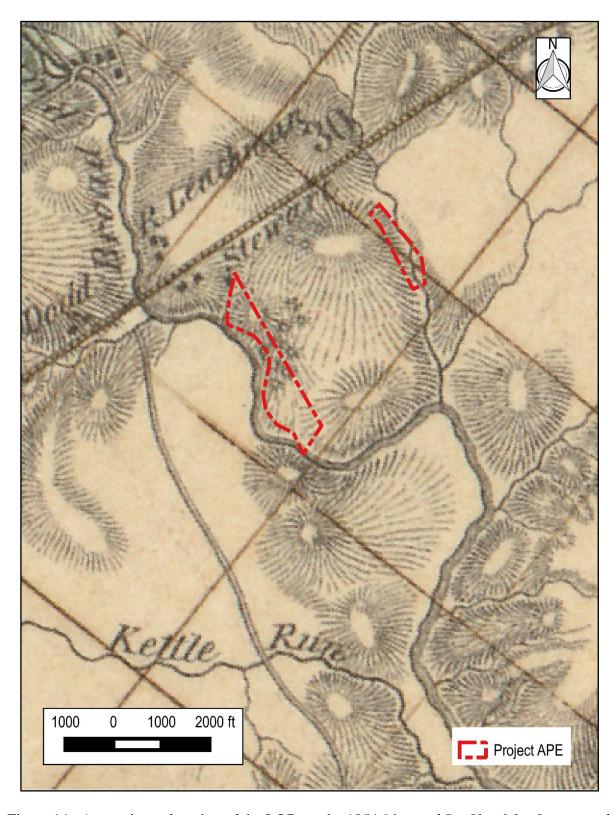


Figure 14. Approximate location of the LOD on the 1854 Map and Profile of the Orange and Alexandria Rail Road.

were able to resist the Confederate push to take the position until night fell. During the night the Union troops, out-numbered roughly 5 to 1 by Lee's Army of the Northern Virginia, withdrew from the position and moved on towards Manassas Junction. Subsequent movements saw the confederates advance to Manassas only to redraw and move back west.

The effects of the Civil War transcended simple property damage. Communities found themselves dealing with dead on the battlefield and wounded within their homes. In addition to stock and supplies requisitioned by both Confederate and Federal forces, farmers found themselves dealing with a profound shortage of labor, and land prices were depressed (McLearen *et al* 1995: 12).

#### Reconstruction and Growth (1865-1914)

Most of northern Virginia found itself economically depressed for decades following the Civil War, as the residents reclaimed their lands and rebuilt their lives and livelihoods. The population in the region continued to shift during this period, with additional families from the North moving into the area, while long time county residents moved further west (Ratcliffe 1978).

In the interior, small towns along transportation routes and surrounded by farms characterized this period. Excellent farmland and close proximity to urban areas helped the area prosper as an agricultural center. Farm practices were diverse, with some dairy production, cattle and poultry farming, fruit, vegetable and flower growing, and grain production. Established rail lines provided economical and reliable freightage into the urban markets to the east, a vital support to the rapidly developing dairy industry. By the beginning of the 20<sup>th</sup> century, the same rail lines provided commuter transportation into the federal centers at Washington and adjacent suburbs. Both Manassas and Bristow Station represent towns grown up around transportation routes, although Manassas was by far the more successful of the two.

### World War I to Present

During most of the early twentieth century, Prince William County remained a primarily rural setting dependent on an agricultural economy. Industrial development was largely constrained to the major transportation hubs, and Federal involvement restricted to the eastern portion of the County. The Marine Base at Quantico was established in 1917, and expanded again during World War II.

By the second half of the 20<sup>th</sup> century, national trends in transportation improvement and settlement organization started to change the character of Prince William County. Although most of the county remained rural and agricultural into the 3<sup>rd</sup> quarter of the 20<sup>th</sup> century, improvement in the highway system worked to change Manassas and Woodbridge into commuter settlements focused on the Metropolitan D.C. area.

The project area appears to have remained agricultural until 1963. The first Manassas City Airport, a small airport closer to Manassas, was established in 1932 (Connell 1992). The airport was expanded at the location twice, and subsequent increase in the traffic motivated a proposal to relocate the airport in 1961. The present site, the former Ralph McDonald farm, was purchased in 1963. Harry P. Davis Field, consisting of a single 3700' paved runway, a maintenance hangar with limited office space, 30 "T-hangars", and a sewage treatment plant, opened in 1964.

Multiple improvements have been necessary since that time. A parallel 3700' taxiway was added in 1967, and measures to "strengthen the support" of both runway and taxiway were implemented in 1972. In 1973 an additional 276 acres (noted as the balance of the McDonald farm) was purchased for airport expansion. The eastern parallel runway and taxiway were begun in 1975 and completed in 1979, then extended in 1985. In 1980 the Manassas City Limits were expanded to include the airport. More property was acquired during the 1990s, and the airport continued to expand facilities through the 1980s and 1990s.

## Results of Records Search

EAC/A conducted a search of both the physical site files and the VDHR DSS database to identify sites previously reported within the APE or within a two-mile radius (Table 1). This review identified 70 sites within the two-mile search radius, 14 of which are within or adjacent to the airport property. One site, 44PW729 falls just west of the present APE, which was adjusted early in the project planning process to insure a 20-foot buffer off the boundaries of the site. Subsequent development plans will ensure protection by placing temporary fencing along this buffer to ensure that construction, storage, or staging activities do not impact the site.

Sites previously reported in the vicinity are predominately historic, with 30 sites reported as solely historic components and an additional 16 sites reported with both prehistoric and historic components. Twenty-five solely prehistoric sites have been previously reported in the vicinity. Prehistoric occupation ranges from the Early, Middle, and Late Archaic, and the Early and possibly Middle Woodland, however most prehistoric sites reported are chronologically indeterminate. Functionally, most prehistoric sites have been classified as small temporary or ephemeral campsites, although 44PW0249 is specifically named as a seasonal base camp, and six other prehistoric sites are interpreted as smaller campsites, generally satellite procurement camps or possibly seasonal micro-fission camps. Based on chronologically classifiable sites, the Late Archaic Period appears to represent the period of most intense prehistoric utilization along Broad Run and its vicinity.

Prehistoric sites interpreted as larger camps are roughly evenly distributed between terrace or interior flat settings and ridge top settings. The one known base camp, and several of the larger campsites are located at confluences of major streams in drainage system, including confluences of Broad Run and its tributaries.

Historic sites span the 18<sup>th</sup> to 20<sup>th</sup> centuries. The most common period is the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, although this may be biased by relatively intensive survey within the mid-to-late 19<sup>th</sup> century Bristoe Station settlement and battlefield just north of the APE.

Table 1. Archaeological resources within a two-mile radius of the APE.

Site Name	Historic or	Description	Location	Comments
<u>&amp;/or</u> Number	Prehistoric			
44PW0011	Prehistoric	Indeterminate Prehistoric	Interior flat	Interpreted as a small campsite or specialized tool production site. Assemblage reported as 10 quartz and quartzite flakes and one flake of an unidentified coarse grained igneous material.
44PW0012	Prehistoric and Historic	Archaic Woodland 18th Century 19th Century	Interior flat	Prehistoric component interpreted as a campsite. Prehistoric assemblage includes 2 Savannah River points, 2 generic side-notched points, 1 generic stemmed point, 1 broad bladed side- notched point, 1 quarry blank, 1 cord-marked sherd of shell tempered aboriginal ceramic, 1 knife or preform of chert, and quartz, quartzite and minimal chert debitage. The historic assemblage includes generic stoneware, and single examples of Buckley, tin-glazed earthenware, and pearlware. Specifically identified stonewares include a sherd of Rhennish and 4 Albany slip decorated sherds.
44PW0013	Prehistoric	Archaic- Middle	Interior flat	Interpreted as a small campsite. Assemblage reported as quartz and quartzite. 1 Halifax point, 1 generic side-notched point, 1 rough biface, and 8 flakes.
44PW0014	Prehistoric	Archaic- Late	Interior flat	Interpreted as a campsite. Assemblage reported includes 4 Savannah River and 1 Savannah River variant, 1 Kirk stemmed point, and 5 unidentified points and point fragments. Additional material included several knives and preforms, 5 cores and core fragments, 2 large core tools, 1 hammerstone, 1 FCR, and debitage of quartz, quartzite, felsite, and siltstone.
44PW0015	Prehistoric	Archaic- Late Woodland- Early	Interior flat	Interpreted as a campsite. Reported assemblage includes 1 Savannah River and 1 Piscataway point, 1 bifacial chopper, several bifaces, 2 unidentified points, and debitage of quartz, quartzite, chert, and rhyolite.
44PW0016	Prehistoric	Archaic Woodland	Interior flat at confluence of Kettle and Broad Runs	Large site, primarily surface collected. Assemblage includes knives, a steatite shard, blanks, cores, and presumably debitage. Diagnostic points include Stanly, Halifax, Savannah River, Piscataway, and Clarksville points.
44PW0027- Wakeman Site Cannon Branch Fort	Historic	19th Century- 3rd Quarter	Low terrace/hillslope	Earthenwork parapet with associated ditches, presumed Civil War.
44PW0249	Prehistoric	Middle Archaic	Ridge overlooking confluence of Cedar and Broad Run	Base Camp. Surface collection only. Assemblage includes quartz flakes, a rhyolite flake, a quartz flake tool, quartz debitage, and a quartz Halifax point.
44PW0431	Prehistoric and Historic	Indeterminate Prehistoric 19th Century 20th Century	Ridge	Prehistoric assemblage includes quartz and quartzite shatter, quartz and quartzite flakes, and one stemmed quartz projectile point. Historic assemblage includes cut nails, domestic glass, and several creamware sherds.
44PW0432	Prehistoric	Archaic- Early	Ridge	Assemblage is small, but includes both a quartz uniface and a fragment of a gray chert projectile point believed to be a Kirk-type point.

Site Name &/or Number	Historic or Prehistoric	<u>Description</u>	<b>Location</b>	Comments
44PW0433	Prehistoric	Indeterminate Prehistoric	Ridge	Assemblage is restricted to non-diagnostic quartz and quartzite debitage.
44PW0434	Prehistoric	Indeterminate Prehistoric	Ridge	Assemblage is restricted to non-diagnostic quartz debitage.
44PW0435	Prehistoric and Historic	Indeterminate Prehistoric Indeterminate Historic	Ridge	Prehistoric assemblage includes quartz debitage and one corner-notched quartz projectile point. Historic assemblage includes domestic glass and creamware.
44PW0436	Prehistoric	Indeterminate Prehistoric	Ridge	Two quartz flakes.
44PW0486	Historic	20th Century	Upland flat	Surface features include a stone cellar and a stone lined well. Artifact material is a light scatter only.
44PW0487	Historic	19th Century 20th Century	Upland flat	Site consists of ice house remains associated with a surviving late 18th/early 19th century farmhouse.
44PW0509	Prehistoric	Indeterminate Prehistoric	Ridge	Assemblage includes quartz and quartzite debitage, one quartz general biface, and one piece of FCR.
44PW0510	Prehistoric and Historic	Woodland 19th Century- 4th Quarter 20th Century- 1st Half	Interior flat	Ephemeral Camp. Prehistoric assemblage includes one quartz Yadkin triangle point, a basalt flake, a possible quartzite core, and a quartzite tested cobble. The historic assemblage includes domestic glass, machine made brick, lead, and two unidentified ceramic sherds.
44PW0511	Historic	19th Century- 2nd Half 20th Century- 1st Half	Interior flat	Historic farm complex and associated artifact scatter.
44PW0600	Prehistoric and Historic	Archaic- Late Woodland- Early 18th Century- 2nd Half 19th Century- 1st Half	Low terrace on Broad Run	Prehistoric component interpreted as a multi component campsite, the historic component as domestic remains. Prehistoric assemblage includes a partial hafted Middle Woodland biface, FCR, a steatite bowl fragment, a sherd of shell tempered aboriginal ceramic, and debitage of quartz, quartzite, chert, and jasper. The historic assemblage includes hand made nails, hand made brick, cut nails, creamware, and painted pearlware.
44PW0601	Prehistoric	Indeterminate Prehistoric	Low terrace on Broad Run	Interpreted as an ephemeral camp. Assemblage includes a partial hafted biface and debitage of quartz, quartzite, and "metavolcanic" material.
44PW0602	Prehistoric	Indeterminate Prehistoric	Ridge	Ephemeral camp. Assemblage restricted to non-diagnostic quartz and quartzite debitage.
44PW0603	Prehistoric	Indeterminate Prehistoric	Low terrace on Broad Run	Interpreted as an ephemeral camp. Assemblage includes FCR and debitage of quartz, chalcedony, and "metavolcanic" material.
44PW0604	Prehistoric	Indeterminate Prehistoric	Low terrace on Broad Run	Interpreted as an ephemeral camp. Assemblage includes 3 pieces of quartz and metavolcanic debitage.
44PW0729	Prehistoric	Archaic- Middle Woodland	Low terrace on Broad Run	Interpreted as campsite, explicitly noted as retaining subsurface integrity. Assemblage includes a possible Rossville or Morrow Mountain hafted biface, 1 cord-marked shell-tempered aboriginal sherd, 1 shell-tempered sherd, 1 sand and grit tempered sherd, 7 FCR, and debitage of quartz, quartzite, and metavolcanic material.

Site Name &/or Number	Historic or Prehistoric	<u>Description</u>	<u>Location</u>	Comments
44PW0866	Prehistoric	Indeterminate Prehistoric	High terrace/toe slope	Assemblage restricted to non-diagnostic quartz debitage.
44PW0867	Prehistoric	Indeterminate Prehistoric	Low terrace on Broad Run	Tentatively identified as a campsite. Assemblage includes rhyolite and quartz debitage, a possible cobble tool or FCR, and FCR.
44PW0868	Prehistoric	Indeterminate Prehistoric	Toe slope	Prehistoric assemblage recovered from seven positive test locations, primarily non-diagnostic quartz debitage, and one biface base.
44PW0869	Prehistoric	Indeterminate Prehistoric	Low terrace on Broad Run	1 quartz flake and several pieces of FCR.
44PW0870	Prehistoric	Indeterminate Prehistoric	Low terrace on Broad Run	Artifacts noted as recovered from the interface of "recent flood deposits and a truncated B Horizon". Assemblage includes a large quartzite core utilized as a scraping tool, a quartzite core, and quartz and quartzite debitage.
44PW0971	Prehistoric and Historic	Archaic 19th Century-2nd Half	Ridge	No description of prehistoric assemblage. Historic component is major component, representing five clusters believed to be associated with a Civil War encampment.
44PW0977	Prehistoric	Indeterminate Prehistoric	Ridge	Ephemeral Camp. Total of four quartz flakes.
44PW0978	Prehistoric and Historic	Indeterminate Prehistoric 19th Century	Ridge	Prehistoric assemblage included 22 flakes, primarily quartz (also quartzite and chert), and a possible Halifax projectile point fragment.  Historic component may be associated with Civil War period, includes both architectural and domestic materials.
44PW0979	Prehistoric and Historic	Indeterminate Prehistoric 19th Century	Toe slope	Prehistoric assemblage consists of five flakes. Historic assemblage dates primarily to the first half of the 19th century, including both domestic and architectural materials.
44PW0980	Prehistoric and Historic	Indeterminate Prehistoric 19th Century	Hillslope	Densest portion of the historic scatter may represent an early to mid-19th century tenant farm.
44PW1107	Historic	19th Century- 4th Quarter 20th Century- 1st Quarter	Ridge	Yard deposits associated with a surviving turn of the century residence. Located within the Bristow Battlefield and the recovered assemblage included Civil War era glass and grape shot.
44PW1110	Prehistoric and Historic	Archaic- Middle 19th Century- 3rd Quarter	Hillslope	Prehistoric component described as a camp, with "later domestic stuff". Located within the Bristow Battlefield.
44PW1111	Historic	19th Century- 4th Quarter	Hillslope	Identified on the basis of a surviving hand pump.
44PW1112	Historic	20th Century- 1st Quarter	Hillslope	Robertson Cemetery.
44PW1113	Historic	19th Century- 2nd Half 20th Century- 1st Quarter	Hillslope	Artifact scatter surrounding the Robertson Cemetery. A "wide scatter of 19th century artifacts with a few Civil War period artifacts.
44PW1114	Historic	19th Century- 2nd Half 20th Century- 1st Quarter	Upland flat	Trash scatter.

Site Name &/or Number	Historic or Prehistoric	<u>Description</u>	Location	Comments
44PW1115	Prehistoric and Historic	Indeterminate Prehistoric 19th Century- 4th Quarter 20th Century- 1st Quarter	Knoll	Trash scatter adjacent to existing structure.
44PW1116	Historic	19th Century- 3rd Quarter	Hillslope	Military camp, no further information provided.
44PW1117	Historic	19th Century- 3rd Quarter	Interior flat	Military camp, no further information provided.
44PW1118	Historic	19th Century- 2nd Half	Interior flat	Trash scatter.
44PW1119	Historic	19th Century- 4th Quarter 20th Century- 1st Quarter	Hillslope	Trash scatter.
44PW1120	Historic	19th Century- 3rd Quarter	Low terrace/interior flat	Reputed Civil War cemetery. Currently only two markers and many unmarked sinks, local history reports more markers present prior to the 1980s.
44PW1234- Bristow Battlefield Cemetery 2	Historic	19th Century- 3rd Quarter	Low terrace/interior flat	Located using a combination of infrared thermal imaging and metal rod probing.
44PW1246- Brentville Historic Center	Prehistoric and Historic	Indeterminate Prehistoric 19th Century	Upland flat	Early 19th century to early 20th century settlement with intact stratified deposits.
44PW1247- Brentville Historic Center 2	Historic	19th Century 20th Century	Ridge	Includes trench features which may be either Civil War entrenchments or mining pits.
44PW1336- Lucaville 1	Historic	19th Century-2nd Half 20th Century-1st Half	Interior flat	Site appears to represent a small field scatter, with two whiteware sherds and two late 19th-early 20th century bottle glass sherds.
44PW1337- Lucaville 2	Prehistoric	Indeterminate Prehistoric	Interior flat	Site represents one positive STP producing 4 quartz flakes.
44PW1338- Lucaville 3	Historic	20th Century	Interior flat	Yard deposits adjacent to a 20th century structure.
44PW1339- Lucaville 4	Historic	20th Century	Upland flat	Yard deposits adjacent to a 20th century structure. Several structures were relocated to this location in the 1930s.
44PW1340- Lucaville 5	Historic	19th Century	Upland flat	Site represents one positive STP producing 2 dark green bottle sherds, one nail fragment, and 4 clinker.
44PW1393	Historic	19th Century 20th Century	Low terrace/toe slope overlooking Broad Run	Site includes a concrete structure pad over possible older structure remains. An early county survey also noted the presence of the Lipscomb family cemetery. The recovered assemblage includes both architectural and domestic materials recovered in disturbed contexts.
44PW1623	Prehistoric and Historic	Archaic- Late 19th Century- 2nd Half	Ridge	Prehistoric component is a light scatter of debitage but also includes steatite bowl fragments. Historic component is a possible Union Battery emplacement and camp.
44PW1624	Prehistoric and Historic	Archaic- Late 19th Century- 2nd Half	Hillslope	Prehistoric component is probably from ephemeral campsite, historic component appears to be a residential concentration.

Site Name &/or Number	Historic or Prehistoric	<u>Description</u>	Location	Comments
44PW1625	Prehistoric and Historic	Archaic 18th Century- 4th Quarter 19th Century- 1st Half	Ridge	Prehistoric component is an ephemeral camp, historic component is a trash scatter dating from several periods in the 19th century.
44PW1626	Historic	20th Century	Interior flat	Trash scatter associated with a standing structure.
44PW1627	Historic	20th Century- 1st Half	Hillslope	Trash scatter.
44PW1629	Prehistoric	Indeterminate Prehistoric	Low terrace/toe slope	Ephemeral Camp. One jasper flake and five quartz (secondary) flakes.
44PW1630	Historic	19th Century- 2nd Half	Low terrace/toe slope	Trash scatter, possibly associated with Union occupation during the Battles of Bristoe Station.
44PW1631	Historic	19th Century- 4th Quarter 20th Century- 1st Quarter	Hillslope	Trash scatter, primarily architectural.
44PW1632	Historic	19th Century	Hillslope	Trash scatter of cut nails.
44PW1633	Historic	19th Century- 1st Half	Knoll	Residential concentration including bottle glass and architectural debris.
44PW1634	Historic	19th Century- 4th Quarter	Hillslope	Trash scatter, possibly associated with Union occupation during the Battles of Bristoe Station. Also yielded a stemmed quartz projectile point.
44PW1635	Historic	19th Century- 4th Quarter 20th Century- 1st Quarter	Hillslope	Trash scatter.
44PW1643	Prehistoric	Woodland- Early	Ridge overlooking Broad Run	Ephemeral camp, revisited. Assemblage includes quartzite flakes, quartzite debitage, quartz flakes, and a Bare Island point.
44PW1644	Historic	20th Century- 2nd Quarter 20th Century- 2nd Half	Ridge	Artifact scatter associated with circa 1930s to 198-s farmstead.

A review of VDHR historic resources files identified 51 resources within a two-mile radius of the APE (Table 2). Only one of these resources, The Manassas Station Operations Battlefield District (076-5036), actually extends to within the project APE. Twenty-four of these resources have already been determined not eligible for listing on the National Register. Only one reported resource predates the nineteenth century (076-0149). Four resources date to the early nineteenth century (076-0014, 076-0148, 076-5399, and 155-5024), including the former Orange and Alexandria Railway, now part of the Norfolk Southern rail system. Twelve reported resources date to the mid and late nineteenth century, although this number includes two overlapping Civil War battlefield listings (076-0024 and 076-5036) and the multiple resource Village of Bristow Historic District (076-5344). Thirty resource date from the twentieth century, with half of those constructed after 1940.

The majority of reported resources are residential structures or surviving farm complexes. Two are associated with the railroad, and a third is related to mid-twentieth century communication development. One church is represented. Several family cemeteries are reported with their associated farmsteads.

Overall, this represents the development of the project vicinity primarily after the arrival of the Orange and Alexandria Railway in 1851. The railway provided transportation for agricultural goods east towards Washington, and eventually provided commuter transportation from Washington to the minor residential development which centered around Bristoe Station on the line.

A review of previous surveys on file at the VDHR archives identified seven previous cultural resources studies conducted on airport property (McLearen 1978, Smith 1978, Thomas 1981, Deitrick and McDaid 1994, McLearen et al. 1995, Cultural Resources, Inc. 2001, and Harris 2009). The Prince William County Archaeologist identified two additional studies conducted at the county level (Mullens 2005 and Laird and Fesler 2005) (See Figure 4). The two 1978 studies represent a Phase I survey and the subsequent Phase II investigation by Southside Historical Sites, Inc., covering those portions of the airport north of the bend in Broad Run (McLearen 1978, Smith 1978). The survey phase consisted primarily of walk-over and surface collection in well-plowed fields, although subsurface excavation was carried out once artifact concentrations were defined by surface collection. Six such artifact concentrations were initially identified, but only five were considered worthy of further investigations (Area 6 consisted of an isolated Vernon point with a single flake). The other five concentrations represent sites 44PW0011 through 44PW0015, a small tool-production camp, a multi-component possible residential campsite and 18th and 19th century historic site, a small Middle Archaic campsite, a Late Archaic possible residential campsite, and a Late Archaic and Early Woodland campsite, respectively. The subsequent Phase II evaluation study (Smith 1978) examined the five sites and determined that further study would not be likely to yield significant new information. This survey included the eastern survey area, although no physical testing appears to have been conducted at that time, in the area described as the wooded fringe along the creek.

Table 2. Historic resources within a two-mile radius of the APE. (National Register Listed resources in bold typeface) (Resources within Districts not listed separately).

VDHR	Resource Name	Date	Туре	Comments
number				
076-0013	Bristow Manor/ Wellfly	1900	Farm complex	
076-0014	Moor Green	c.1800	Residence	Brick on stone farmhouse with barn and smoke house.
076-0024	Bristoe Battlefield	1861- 1863	Military	Expanded boundaries include the northern portion of the Manassas Regional Airport. 1,162 acres representing the location of the August 17, 1862 engagement between Hooker and Jackson, and the October 14, 1863 Battle of Bristoe. There are 54 non-contributing late 19th through 20th century structures within the boundaries, four within the review radius which have individual VDHR listings. There are also two cemeteries. Files list its status as "VLR listing removed", now listed under 076-5344.
076-0148	Boardman/Fostern	c.1825	Residence	Surviving resources include a slave cemetery.
076-0149	Bloom Hill Farm	c.1780	Residence	Recommended eligible for listing on the NRHP. Also appears under 44PW487.
076-0245	Davis-Beard House	1870	Residence	Part of the Bristoe Battlefield district under 076-0024-0004, also under 076-5344
076-0285	W.J. Thomasson House and Barn	c. 1900, 1929	Farm complex	Determined eligible.
076-0294	Carr Family Cemetery	1908, c.1920	Cemetery	Associated farm complex in ruins. Also known as 076-0024-0031 and 44PW981.
076-0584	10815 Milford Road	1900, c.1940, c.1980	Residence	Also known under 076-0024-0013 and 076-5344.
076-0598	10708 Bristow Road	1940, c.1980	Farm complex	Also known under 076-0024-0001 and 076-5344.
076-0599				
<u> </u>	10710 Bristow Road	1890	Farm complex	Also known under 076-0024-0001 and 076-5344
076-0601		1890 1870, c. 1940	Farm complex Farm complex	Also known under 076-0024-0001
076-0601 076-0604	Road 10721 Milford	1870, c.	-	Also known under 076-0024-0001 and 076-5344
	Road 10721 Milford Road 10823 Bristow	1870, c. 1940	Farm complex	Also known under 076-0024-0001 and 076-5344 Also know under 076-0024-0012

Number   10204 Piper Lane   1900   Residence   Found not eligible   Road   1712 Nokesville   Road   1940   Farm complex   Found not eligible   Road   Farm complex   Found not eligible   Road   Farm complex   Found not eligible   Road   Farm complex   Found not eligible   Found not eligible   Road   Farm complex   Found not eligible   Farm in ruins   Farm   Found not eligible   Farm   Found not eligible   Farm   Found not eligible   Found not eligibl	VDHR	Resource Name	Date	Туре	Comments
1076-0612		Tresource Traine	Dute	1,700	Commence
Road	076-0611	10204 Piper Lane	1900	Residence	
Road	076-0612		1900	Residence	Found not eligible
Road	076-0614		1940	Farm complex	Found not eligible
Road	076-0615	Road	1945	Residence	Found not eligible
Road		Road	1940	commercial	
Operations   Battlefield (Bristos Station   Battlefield, Bull   Run Bridge, Kettle Run   Battlefield, Union   Mills)   Farm complex   Found not eligible.	076-0658		1940-	Residential	
076-5043         9550 Godwin Drive         1925         Residence         Found not eligible           076-5044         Hersch Farm         1900         Farm complex         Found not eligible           076-5073         Robertson Cemetery         1878         Cemetery         Also known as 076-0024-0029 and 076-5344, 44PW1112.           076-5099         Kline House         c.1860         Farm complex         Found not eligible.           076-5100         WKDV Transmitter Site         1965         Technology Communications         Found not eligible.           076-5146         11009 Bristow Road         1880, c. 19801         Farm complex         Farm in ruins. Also known as 076-0024-0011.           076-5288         de Gastyne House         1907         Residence         Residence           076-5344         Village of Bristow Historic District         Historic District         Railroad/crossroad community dating to the late 19th century.           076-5395         Blue Grass Acres Farm         1940         Farm complex Farm complex Found not eligible.           076-5397         Hersch House         1915         Residence         Includes former kennel and workshop. Found not eligible.           076-5398         Outbuilding, 9850 Chevalle Road         1863         Railroad         This section evaluated and found not eligible           155	076-5036	Operations Battlefield (Bristoe Station Battlefield, Bull Run Bridge, Kettle Run Battlefield,Union Mills)	1862	Military	
Drive   1900   Farm complex   Found not eligible	076-5042	Conner Farm	1904	Farm complex	Found not eligible.
1878   Cemetery   Cemetery   Cemetery   O76-5073   Robertson   Cemetery   Cemetery   O76-5099   Kline House   C.1860   Farm complex   Found not eligible.	076-5043		1925	Residence	Found not eligible
Cemetery C.1860 Farm complex Found not eligible.  076-5100 WKDV Transmitter Site 1880, c. Road 19801 Residence 1906, c. Farm complex Farm ruins. Also known as 076-0024-0011.  076-5288 de Gastyne House 1907 Residence 1906, c. Farm complex Farm 1940 Pristoric District 1940 Pristoric District 1940 Pristoric District 1940 Pristoric District 195-5398 Outbuilding, 9850 Chevalle Road 076-5399 Orange and Alexandria Railway 1863 Military Military Also known as 076-5168, 44PW0227. Civil War earthworks.	076-5044	Hersch Farm	1900	Farm complex	Found not eligible
076-5100 WKDV Transmitter Site  076-5146 11009 Bristow Road  076-5288 de Gastyne House  076-5344 Village of Bristow Historic District  076-5395 Blue Grass Acres Farm  076-5397 Hersch House  076-5398 Outbuilding, 9850 Chevalle Road  076-5399 Orange and Alexandria Railway  155-5020 Camnon Branch Fort/ The Wakeman Site  1965 Technology. Communications  Technology. Communications  Found not eligible.  Farm complex Farm omplex  Farm complex  Farm comp	076-5073		1878	Cemetery	
Transmitter Site  O76-5146  O76-5146  O76-5288  O76-5288  O76-5288  O76-5344  Village of Bristow Historic District  O76-5395  O76-5397  O76-5398  O76-5399  O76-5399  O76-5399  O76-5399  O76-5399  O76-5390	076-5099	Kline House	c.1860	Farm complex	Found not eligible.
Road   19801   0024-0011.     O76-5288   de Gastyne House   1907   Residence     O76-5344   Village of Bristow Historic District   Historic District   Railroad/crossroad community dating to the late 19 <sup>th</sup> century.     O76-5395   Blue Grass Acres Farm   1906, c. 1940   Farm complex     O76-5397   Hersch House   1915   Residence   Includes former kennel and workshop. Found not eligible.     O76-5398   Outbuilding, 9850 Chevalle Road   1851   Railroad   This section evaluated and found not eligible     O76-5399   Orange and Alexandria Railway   Railway   Also known as 076-5168, 44PW0227. Civil War earthworks.	076-5100		1965		_
076-5394 Village of Bristow Historic District Parm Complex Farm 1940 Parm Complex  076-5395 Blue Grass Acres Farm 1940  076-5397 Hersch House 1915 Residence Includes former kennel and workshop. Found not eligible.  076-5398 Outbuilding, 9850 Chevalle Road 1851 Railroad This section evaluated and found not eligible  076-5399 Cannon Branch Fort/ The Wakeman Site Military Also known as 076-5168, 44PW0227. Civil War earthworks.	076-5146	Road	,	-	
Historic District  076-5395 Blue Grass Acres Farm  1906, c. 1940  076-5397 Hersch House  076-5398 Outbuilding, 9850 Chevalle Road  076-5399 Orange and Alexandria Railway  155-5020 Cannon Branch Fort/ The Wakeman Site  Historic District  to the late 19 <sup>th</sup> century.  to the late 19 <sup>th</sup> century.  Includes former kennel and workshop. Found not eligible.  Found not eligible.  Found not eligible.  This section evaluated and found not eligible  Also known as 076-5168,  44PW0227. Civil War earthworks.	076-5288	de Gastyne House	1907	Residence	
Farm 1940  076-5397 Hersch House 1915 Residence Includes former kennel and workshop. Found not eligible.  076-5398 Outbuilding, 9850 Chevalle Road 1851 Railroad This section evaluated and found not eligible Railway 155-5020 Cannon Branch Fort/ The Wakeman Site Also known as 076-5168, 44PW0227. Civil War earthworks.		Historic District		Historic District	
Found not eligible.  O76-5398 Outbuilding, 9850 1900 Domestic Found not eligible.  O76-5399 Orange and Alexandria Railway  155-5020 Cannon Branch Fort/ The Wakeman Site  Found not eligible.  Also known as 076-5168,  44PW0227. Civil War earthworks.		Farm	1940	-	
Chevalle Road  O76-5399 Orange and Alexandria Railway  155-5020 Cannon Branch Fort/ The Wakeman Site  Chevalle Road  Railroad This section evaluated and found not eligible  Also known as 076-5168,  44PW0227. Civil War earthworks.					Found not eligible.
Alexandria Railway  155-5020 Cannon Branch Fort/ The Wakeman Site  Also known as 076-5168, 44PW0227. Civil War earthworks.			1900		_
Fort/ The Wakeman Site 44PW0227. Civil War earthworks.		Alexandria Railway			eligible
	155-5020	Fort/ The	1863	Military	
	155-5022		1890	Residence	Found not eligible

VDHR	Resource Name	Date	Туре	Comments
number	G	1050		
155-5024	Cemetery Foster	1850	Cemetery	Found not eligible.
	Drive			
155-5025	Cannon Branch	1896	Cemetery	Found not eligible
	Cemetery			
155-5026	Railroad Utility	1950	Railroad	Found not eligible
	Building Godwin			
	Drive			
155-5027	10017 Nokesville	1945	Residence	Found not eligible
	Road			
155-5028	10021 Nokesville	1945	Residence	Found not eligible
	Road			
155-5030	Oakwood	1960	Residence	Found not eligible
155 5021	10000 1000	10.50	- · · ·	
155-5031	10033-10035	1952	Residence	Found not eligible
	Nokesville Road			
155-5032	The Manassas	1950,	Religious	Found not eligible.
	Church of the	1960s,		
	Brethren	1980s		
	(Current)			
155-5033	10053 Nokesville	1960	Residence	Found not eligible
	Road			
155-5034	Prince William	1950	Residential	Converted to commercial. Found not
	Animal Hospital			eligible.

MAAR's 1981 study consisted of a limited Phase I survey of a small area along Little Bull Run roughly 7 miles north of the airport property, intended as the installation location of an Outer Marker locator for the airport (Thomas 1981). No archaeological resources were identified.

Phase I survey was conducted in 1994 prior to proposed improvements at the airport to add helicopter facilities (Deitrick and McDaid 1994). The Deitrick and McDaid survey falls within the western survey area in the APE. This study incorporated surface inspection and subsurface testing of a roughly 10 acre portion of the western airport property, and identified one site: 44PW0729. This site was interpreted as a revisited ephemeral campsite utilized from the Middle Archaic to the Late Woodland, and considered potentially eligible for listing on the NRHP. The past project was redesigned to avoid the site, and no further work was conducted at this location. The present project has also been redesigned to avoid this site.

The 1995 Phase I survey by the Archaeological Research Center of Virginia Commonwealth University covered a large parcel south of the present project APE, in Prince William County (McLearen *et al.* 1995). The survey identified five archaeological sites: 44PW0866 to 44PW0870. All appear to represent small transient campsites, from indeterminate prehistoric occupations. None of the sites were considered potentially significant, and no further work was recommended.

Additional Phase I study was conducted for the airport in advance of proposed connector road northeast of the airport proper (Cultural Resources, Inc. 2001). This survey consisted of surface reconnaissance, and subsurface testing of a 2,900' portion of the proposed alignment. No archaeological resources were identified.

The final survey conducted within the airport consisted of work conducted by EAC/Archaeology in 2008 in advance of the proposed extension of Runway 16L/34R and Taxiway B. This study examine 53 acres of the airport along the proposed extension and including proposed drainage improvements and signaling changes. The study identified three isolated finds: one isolated quartz flake, two out of context rhyolite flakes, and one undecorated whiteware sherd, and several instances of modern material. It also documented large amounts of soil disturbance and twentieth century fill around and under the existing runway and its drainage system

One County level compliance study was conducted within the present APE (Mullens 2005). This survey was conducted by Thunderbird Associates, Inc. in 2005 in advance of proposed development of the Glen-Gery Brick property, a 120-acre tract which included the eastern survey area. Archival research conducted for the study determined that significant portions of the project tract had been historically used for clay mining and retained no potential for intact archaeological resources, therefore physical testing was restricted to the undisturbed portions of the low rise and terrace west of Cannon Branch (including the present eastern survey area. The 22 test location excavated during the survey recovered one quartzite flake and one hornfels flake, but identified no archaeological sites.

Three additional cultural resources studies were conducted in the immediate project vicinity as part of extensive study associated with the Route 234 Bypass Project: Phase II and Phase III studies at the Moor Hoff Farm (44PW0600) a multi-component prehistoric and historic site (Higgins and Downing 1996, Pullins and Downing 1998) and a Phase I supplementary study (Rinehart 1999).

Work at the Moor Hoff site focused on both the prehistoric (Middle Archaic through Late Woodland) and the historic component (late 18<sup>th</sup> to mid-19<sup>th</sup> centuries). Site 44PW0600 was considered pertinent to the present study not only due to proximity, but also because its low terrace setting along Broad Run is similar to the much of the present project area. Phase II determined that the site retained subsurface deposits and at least one major historic subsurface feature (Higgins and Downing 1996). Phase III study determined that the prehistoric component rested within a deflated soil context with Middle Archaic and Late Woodland materials carried within a 15 cm stratigraphic zone (Pullins and Downing 1998). However, the historic component proved quite fruitful, retaining features and deposits associated not only with the main Foster residence, but also a blacksmith shop, a detached kitchen, a combined slaves quarter and workshop, and a cemetery.

The smaller supplemental Phase I of a proposed Route 234 access road was conducted just northeast of the present project area, and in part reinvestigated site 44PW0602. The survey consisted of surface inspection and subsurface testing (Rinehart 1999). Rinehart's study of 44PW0602 confirmed the site as a low density lithic scatter, which he dated to the Early Archaic and Early Woodland. As all cultural material was recovered from mixed plowzone context, the site was determined not eligible for listing on the NRHP, and no further work has been conducted at this location.

In 2005 the James River Institute for Archaeology, Inc. conducted a Phase I survey of 150 acres of the 183-acre Airport Gateway tract (Laird and Fesler 2005). This study consisted of subsurface survey and identified one small prehistoric lithic scatter and a small twentieth century artifact scatter, as well as 13 "archaeological locations" consistent of single or double artifacts finds below

the threshold of site density in under VDHR guidelines. Most, but not all, of these isolated finds consisted of prehistoric debitage. Where isolated historic artifacts were recovered the material was nondiagnostic material consistent with field scatter. Both archaeological sites identified were sparse and restricted to the plowzone, and neither was considered eligible for listing on the National Register. No further work was recommended for either site.

The most recent archaeological survey in the project vicinity was the 2013 William and Mary Center for Archaeological Research (WMCAR) survey for the proposed Virginia Rail Express Broad Run Parking Expansion (Higgins and Hanbury 2013). This survey examined roughly 4 acres of the larger 13-acre APE, the majority of which was covered by existing paving. The survey included both subsurface testing and metal detector survey. WMCAR identified four archaeological locations, no archaeological sites, and extensive disturbance of the survey area associated with the 1991 construction of the existing facilities. No further archaeological study was recommended.

## 3. RESEARCH DESIGN AND METHODOLOGY

## **Objectives**

This investigation sought to determine the presence or absence of previously unrecorded archaeological resources within the survey area. These objectives are consistent with state and federal guidelines pertaining to identification (Phase I) surveys.

## Archival and Background Research

Cartographic and archival research was conducted as part of these investigations. Research was conducted at the National Archives in College Park, Maryland; the Library of Congress; the Fairfax County Public Library; the Bull Run Regional Library and its Ruth E. Lloyd Information Center, and the Central Branch of the Prince William County Public Libraries; and the archive and DSS server of the Virginia Department of Historic Resources. Additional information concerning county level survey work was supplied by the office of the Prince William County Archaeologist.

The general history of the region was reviewed to determine historical trends and influences upon the project area. The impact of local, state, regional and national events and trends on the project area was considered. Previous archaeological research conducted in the project vicinity was reviewed and evaluated. Information was reviewed pertinent to sites within a two-mile radius of the project area.

#### Field Methods

As previously discussed, subsurface testing was restricted to apparently undisturbed portions of the western survey area not subject to previous archaeological survey. To determine the presence or absence of archaeological deposits, field investigations in this area consisted of the systematic excavation of shovel test pits (STPs). STPs were placed along transects established using an optical sight compass and a fiberglass tape, based on datum points established and measured in using a Leica DTM-520 Total Station. Testing was conducted at a 15-meter (50-foot) test interval. Tests containing modern material, while considered positive, were not surrounded by additional testing.

Due to presence of a substantial area previously tested by Deitrick and McDaid in 1994, field testing was conducted as two discontinuous clusters of test, utilizing two grids. The northern grid included the apparently undisturbed area in the central portion of the western survey area, north and west of the administrative building complex. The datum for this grid (N0E0) was located off the northwestern corner of the Manassas Aviation structure.

The southern grid was restricted to the forested area south of the Deitrick and McDaid survey boundaries. The datum for this grid was established at the west edge of Observation Road at the north end of the current cul de sac, and the grid carried 30-meters north and 45-meters west to bring it into the survey area.

A total of 54 test locations were excavated during the field survey. All testing conducted is discussed and illustrated in Chapter 4 of this report. STPs measured approximately 40 centimeters (cm) in diameter and extended approximately 10 cm into sterile subsoil where not prevented by a high water table or compact gravel matrix.

All excavated soil was screened through 1/4-inch hardware cloth for artifact recovery. Each shovel test was recorded on a standardized recording form, which included provenience, setting, soil texture and color. Recovered artifacts were placed in bags labeled with provenience information, although some modern materials were discarded in the field.

After subsurface survey was completed within the western survey area, a metal detector survey was completed within undisturbed portions of the western survey area and the eastern survey area. The metal detector survey in the western survey area utilized the already existing transects marked for the subsurface survey, and worked at 25-foot intervals within this grid. A second 50-foot grid was established in the eastern survey area, aligned to Wakeman Drive on the western boundary, and again worked at 25-foot intervals. Areas of modern dumping with multiple metallic items present, primarily adjacent to the sewer right-of-way and at the northern end of the eastern survey, where excluded as this material would mask readings and removal of the material was not within the scope of this study.

Initial metal detecting was done east-west starting in the south and working north. Once this was completed the survey was repeated moving north-south beginning in the south, providing intensive coverage on the 25-foot grid. In the relatively undisturbed eastern survey area, areas that would be more suitable to military camp or emplacement use were tested for a third time; these area included the spring, the top of the rise, and the area around the recovered horseshoe.

Positive readings were flagged, and a second crew member excavated and proofed positive signal finds. Metal detector finds were mapped initially using the 25-foot grid as a data backup and so that artifact "hotspots" could be identified in the event something of substance was found. All finds were subsequently remarked using a handheld Trimble GPS unit to record accurate Universal Transverse Mercator (UTM) coordinates for each find. Reported accuracy varied between 15 and 30 inches depending on signal reception.

## Laboratory Methods

Artifacts collected during the Phase I investigation were washed and catalogued in accordance with the current state guidelines (VDHR 2011). As only three pieces of modern material and four pieces of nondiagnostic coal were recovered, it is anticipated that the small collection recovered during this project will not be retained for conservation at any facility. The full artifact catalog is presented as Appendix II. Artifact catalogs were compiled using the SHARD (Sonoma Historic Artifact Research Database) developed by the Anthropological Studies Center at Sonoma State University and the Society for Historical Archaeology.

## Expected Results

Given the large number of previously registered prehistoric sites previously noted in the project vicinity, including 44PW729 adjacent to the APE, it was anticipated that a number of small lithic scatters or short term camps sites may have existed in the APE. However, extensive previous disturbance in the western survey area reduced the potential for surviving archaeological resource. It was anticipated that the primary potential for prehistoric resource consisted of additional materials associated with 44PW729 might be found in the northern grid.

Archival research identified limited early historic development north of study area, mid-nineteenth century development of rural farmsteads to the northwest, and with the Civil War engagement at Bristow Station west of the project area. It was anticipated that there was a moderate potential for historic resources associated with these developments within the survey area. Based on troop movement reconstructions and field of fire analysis presented in Jacobs *et al.* 2016, it is anticipated that the greatest potential for historic resources within the project APE is associated with the 1863 Battle of Bristoe Station, and would be restricted to the northern portion of the airport. Specifically, the analysis in Jacob *et al.* suggests that potential shelling debris from the Confederate A.P.Hill, McIntosh and Graham emplacements, and firing debris and personal items from Poague's forward movement (Confederate), and from the position and movement of the Federal 2<sup>nd</sup> Corps may be expected in at least the northern portion of the western survey area. One map available for review but not reproduction indicated that a Union battery manned by Ricketts' troops may have been adjacent or extended into the eastern survey area (Cope 1863), and a moderate potential for associated material was anticipated there as well.

#### 4.0 FIELD RESULTS

As noted before, the project APE consists of multiple discontinuous areas of proposed impact. The western survey area includes large areas with clearly observable signs of disturbance and large areas of paving which precluded testing, as well as the area of the previous Deitrick and McDaid archaeological survey (1994). Survey testing in the western survey area included both subsurface excavation and metal detector survey. The eastern survey area was included in both the 1978 McLearen study and the 2005 Mullens study, although only the later conducted subsurface excavation testing. Only metal detector survey was conducted within the eastern survey area.

#### The Western Survey Area

Subsurface testing in the western survey area utilized one grid oriented true north, with two testing areas distinguished by the reference datum used to measure displacement (Figure 15). Test location in the northern grid were designated by displacement north and east from a datum just off the northwest corner of the Manassas Aviation building (Figure 16). Test locations in the southern

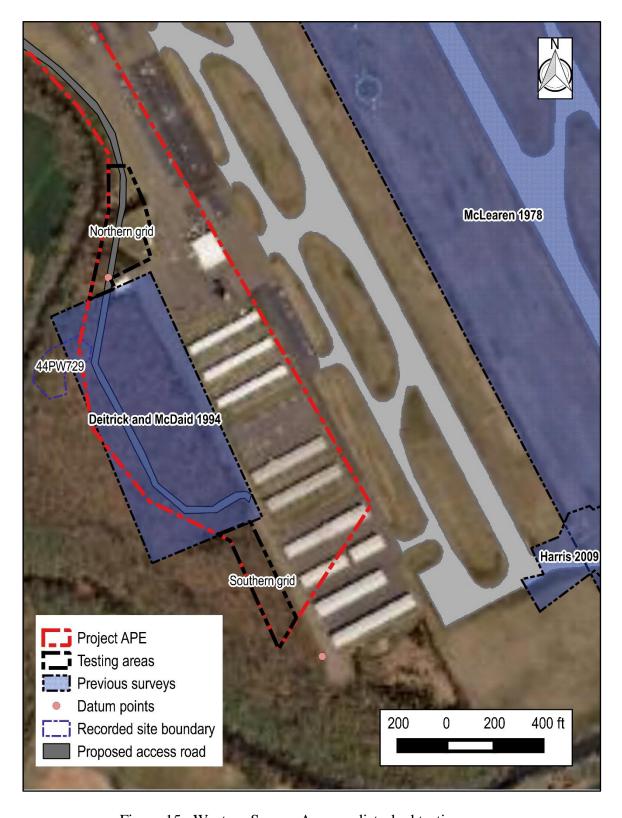


Figure 15. Western Survey Area, undisturbed testing areas.

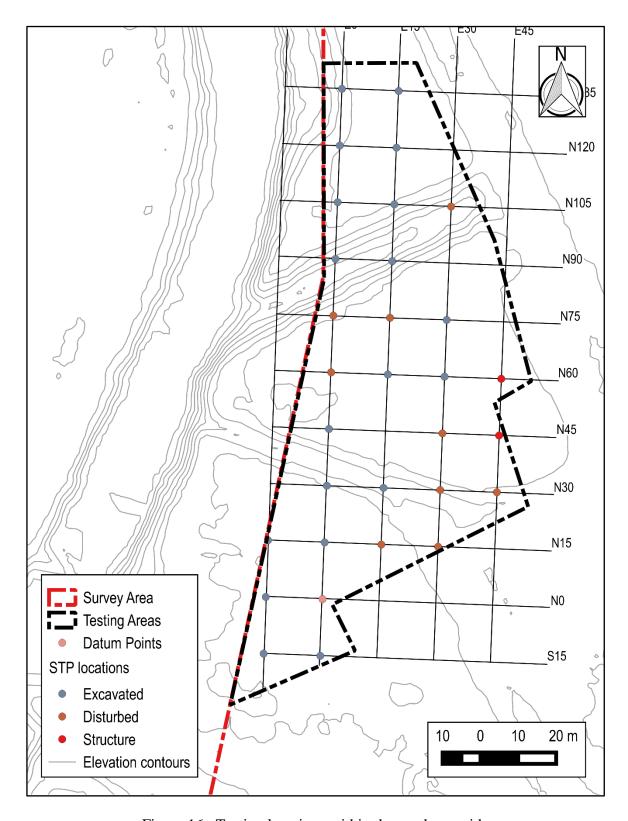


Figure 16. Testing locations within the northern grid.

grid were designated by displacement north and west from a datum on the west side of Observation Road at the north edge of the existing cul de sac (Figure 17).

Testing on the northern grid included 30 proposed test locations, 11 of which were not excavated either because of surface evidence of disturbance (including utilities marking) or where located under existing pavement or structures (Figure 16). Of the 19 test locations excavated, nine more showed clear evidence of disturbance in the excavated soil profile, indicated by soil mixing in lower subsoil layers or substratum found directly below the surface layer (Figure 18 A). Past soil disturbance is primarily concentrated along the W15 and E0 transects, especially in the north of the grid. As historic maps depicting topographic relief within the APE (Faul 1854, USGS 1944) indicate that the northwestern portion of the APE encompassed a small knoll (Faul 1854) or a low rise (USGS 1944) which is no longer present, it is anticipated that significant erosion or twentieth century grading has resulted in truncated soil profiles in this area.

Typical undisturbed soil profiles reflect a thin surface plowzone directly over subsoils (Figure 18 B). The Layer I plowzone was typically a brown to yellowish brown silt loam or loamy clay which ranged from 4 to 9 centimeters in depth. Layer II was a silty clay or clay light yellowish brown or pale brown in color, or occasionally a reddish brown. Where subsoil was not present, the surface Layer I plowzone appears to rest on deeper subsoil or substratum matrix, which highly mottled soils of gray and yellowish brown or brownish yellow clays.

Four test locations produced cultural material from test excavations within the northern grid. N30E0 and N45E0 each produced a single fragment of a pink glazed floor or wall tile, S15W15 produced a single piece of clear container glass from it disturbed second excavation level, and N0W15 produced four coal fragments from its disturbed second excavation level.

The metal detector survey conducted within the northern grid identified nothing but modern materials including foil wrappers, bottle caps, beverage cans and pull tabs, and a small collection of coins ranging from 1967 to 1986. These materials were primarily found in the exposed lawn areas rather than the woodland (Figure 19).

Testing within the southern grid of the western survey area consisted of 22 test excavation locations, one of which was not excavated due to surface evidence of disturbance (Figure 17). Soil profiles within the southern grid exhibited little evidence of past soil disturbance beyond some possible erosion (Figure 20). The typical soil profile was a surface plowzone of brown to dark yellowish brown silt loam ranging from 4 to 14 centimeters in depth. Layer II was a upper subsoil, either a yellowish brown to brownish yellow silt loam, and was not present in all test excavation suggesting that past plowing has completely incorporated the upper subsoils in some area, probably due to past erosion. Layer III was a lower subsoil zone of strong brown to yellowish red silty clay or clay loam. or mottled gray and yellowish brown silty clay to clay. The southern grid within the western survey area produced no cultural material, either from test excavations or the metal detector survey.

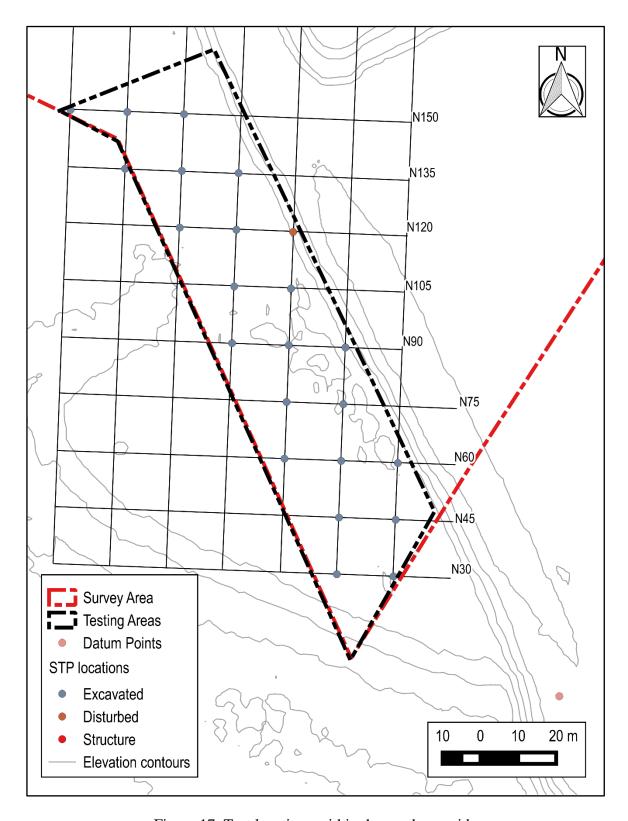


Figure 17. Test locations within the southern grid.

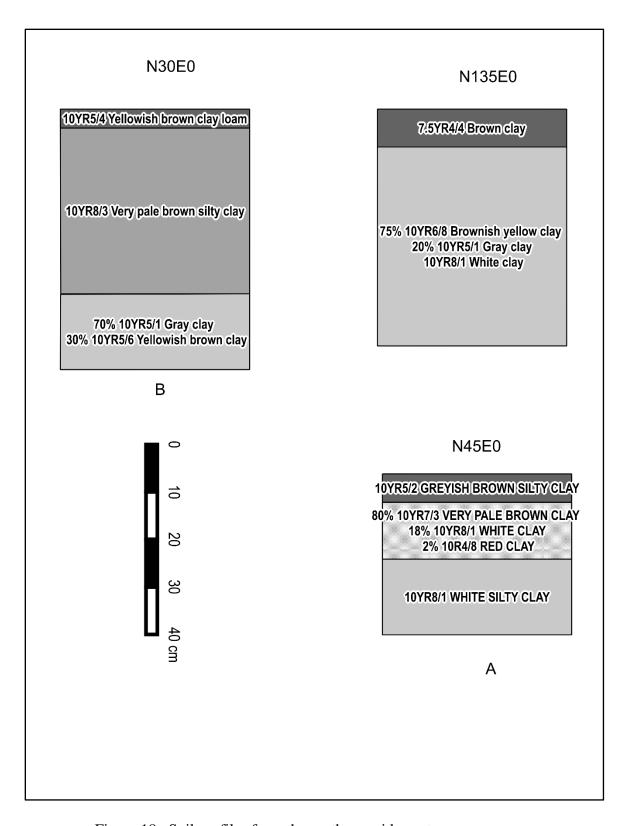


Figure 18. Soil profiles from the northern grid, western survey area.

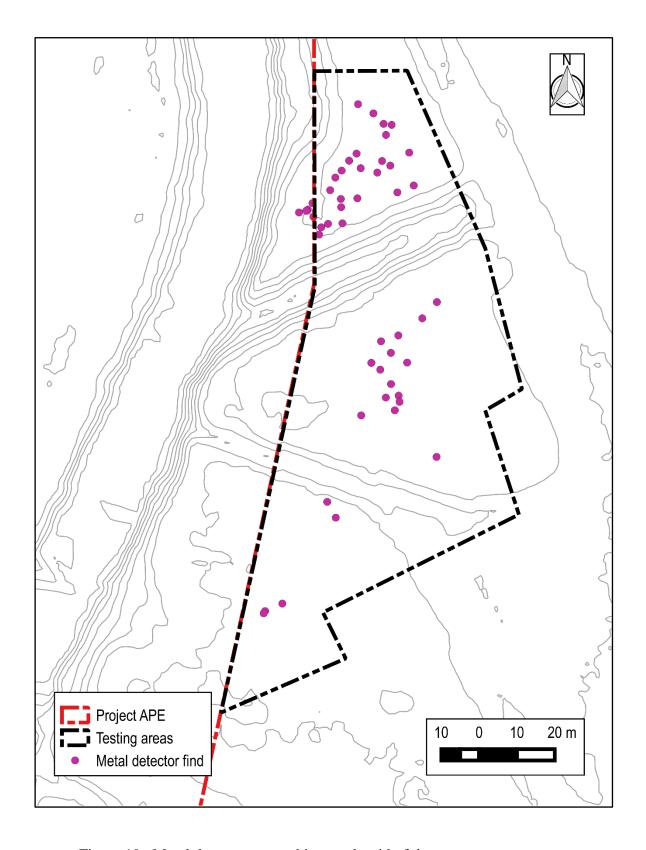


Figure 19. Metal detector survey hits, north grid of the western survey area.

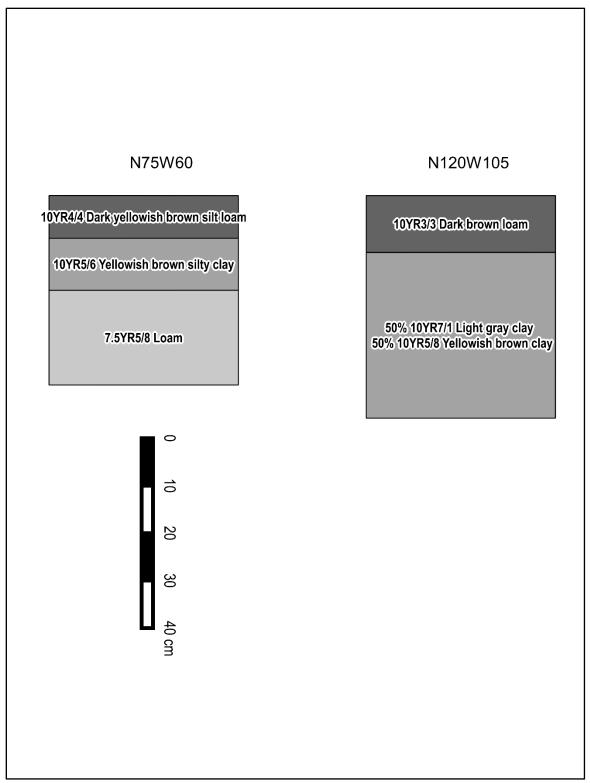


Figure 20. Soil profiles from the southern grid, western survey area.

#### The Eastern Survey Area

As the eastern survey area had been subject to adequate subsurface testing during the 2005 Thunderbird Associates study, the current investigation in this area consisted solely of the metal detector survey. The roughly 14 acre survey area produced only 24 finds (excluding metallic items from modern dumping), all but three of which represent twentieth century material. This included 13 brass bases from twentieth century shotgun shells, two twentieth century bullet casings, a wire nail, a jar lid, a pull tab, a can lid, and a piston. Three artifacts could not be definitively dated, including a corroded ferrous disk and two corroded partial horseshoes. All material recovered was relatively dispersed, and distribution is largely parallel to Wakeman Drive (Figure 21). None of the material recovered appears to be clearly associated with either Confederate or Union troops, or rises to the level of an archaeological site.

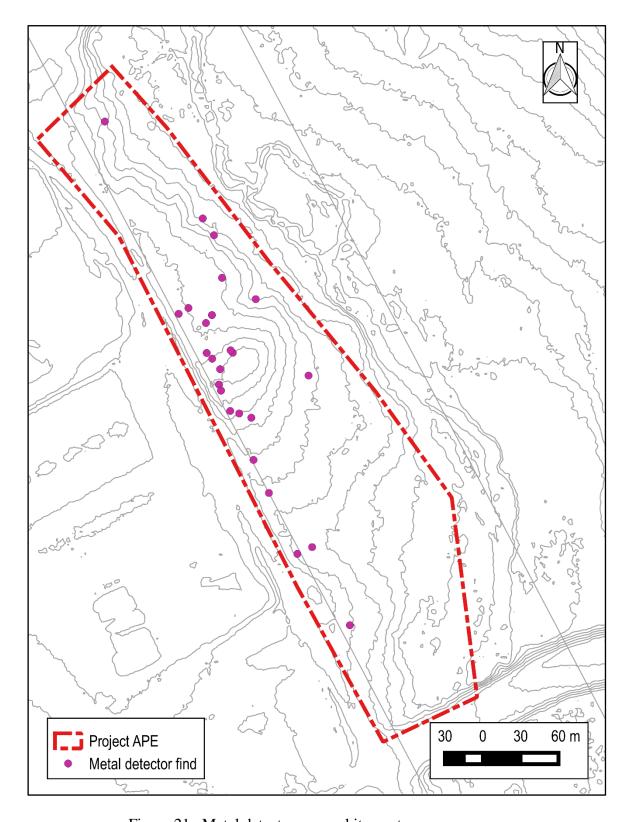


Figure 21. Metal detector survey hits, eastern survey area.

#### 5. SUMMARY AND RECOMMENDATIONS

EAC/Archaeology, Inc. was contracted to conduct an Archaeological Identification Survey within portions of the proposed West Corporate Development and East Parcel Development Area of Potential Effects-Direct within Manassas Regional Airport land holdings. Initial archival research indicated that extensive previous archaeological testing had been conducted within the airport and that large portions of the project LOD had been surveyed and determined to be free of potentially eligible archaeological resources. Additional areas were exempted from testing based both a the sequence of historic aerial photographs of the are available for review online or through the USGS, or based on surface evidence of soil disturbance noted during the initial field inspection for the project.

Subsequently, Phase I survey investigations were conducted within two survey area of roughly 18.4 acres aggregate area and encompassing three discontinuous testing grids. Subsurface excavations were limited to the previously untested and undisturbed portions of the western survey area, while metal detecting survey was conducted both in those portions of the western survey area, and all of the previously tested eastern survey area. Excavation testing in the western survey area found evidence of wide spread soil disturbance within the northern and central portions of that testing area, and found intact but sterile soils within the southern portion of the western survey area. Metal detector survey conducted across the eastern survey area identified primarily twentieth century material associated with past hunting on the parcel, but also recovered two horseshoe fragments whose age and cultural affiliation could not be determined. Despite the high potential for previously unidentified prehistoric resources, and a moderate potential for previously unidentified historic resources only modern materials or nondiagnostic artifacts were identified.

No archaeological resources were identified and no further work is recommended. One archaeological site, 44PW729, falls just west of the present APE, with a 20-foot buffer off all planned development. The airport will ensure protection by placing temporary fencing along this buffer to ensure that construction, storage, or staging activities do not impact the site.

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- 1991 "Deep Time in the Potomac River Valley Thoughts on Paleoindian Lifeways and Revisionist Archeology" *Archaeology of Eastern North America* (19):23-41.
- 1995 Chesapeake Prehistory: Old Traditions, New Directions. Plenum Press, New York. 147

#### Dent, Richard J., and Christine A. Jirikowic

1990 Preliminary Report of Investigations at the Hughes Site (18MO1). Report on file at the Maryland Historical Trust.

#### Durrenburger, Joseph Austin

1968 *Turnpikes: A Study of Toll Road Movement in Middle Atlantic States and Maryland.* Ph.D. dissertation, Department of History, Columbia University.

# Eggloff, K.

"Spheres of Cultural Interaction across the Coastal Plain of Virginia in the Woodland Period." *Structure and Process in Southeastern Archaeology*. R. Dickens and H. Ward eds., University of Alabama Press.

#### Elder, John Jr.

1989 *Soil Survey of Prince William County, Virginia.* United States Department of Agriculture.

#### Faul, August

1854 Map and profile of the Orange and Alexandria Rail Road. Orange and Alexandria Railroad Company, New York. Available in the collection of the Library of Congress Map and Geography Reading Room or online at <a href="https://www.loc.gov/item/98688754/">https://www.loc.gov/item/98688754/</a>.

# Fischler, Benjamin R.

1984 Late Woodland Use of the Potomac Piedmont Uplands. Paper presented at the annual meeting of the Eastern States Archeological Federation, Annapolis, Maryland

#### Gardner, William B.

- 1978 "Comparison of Ridge and Valley, Blue Ridge, Piedmont, and Coastal Plain Archaic Period Site Distributions: An Idealized Transect" Paper presented at the Annual Meeting of the American Anthropological Association, Washington, D.C.
- 1977 Flint Run Paleo-Indian complex and its implications for eastern North American prehistory. *Annals of the New York Academy of Sciences* 288:257-263.
- "Early and Middle Woodland in the Middle Atlantic: An Overview" in Practicing Environmental Archaeology: Methods and Interpretations, Roger Moeller, ed. Pp 53-85. American Indian Archaeological Institute, Occasional Paper 3. Washington, CN
- "An Examination of Cultural Change in the Late Pleistocene and Early Holocene (Circa 9200-6800 B.C.)". In J. M. Wittofski & T. R. Reinhart (Eds.), Paleoindian Research in Virginia: A Synthesis. Pp. 5-51. Richmond, VA: Archaeological Society of Virginia.

#### Hantman, Jeffery L. and Michael J. Klein

1992 "Middle and Late Woodland Archaeology in Piedmont Virginia". In *Middle and Late Woodland Research in Virginia: A Synthesis*, edited by T.R. Reinhardt and M.E. Hodges. Archaeological Society of Virginia, Richmond, VA.

# Harris, Tery

2009 Phase I Archaeological Survey for The Proposed Extension of Runway 16l/34r and Taxiway B, Manasass Regional Airport, City of Manassas, Prince William County, Virginia. EAC/Archaeology, Inc. Baltimore, MD. Prepared for HNTB Corporation, Arlington, VA.

#### Harrison, Fairfax

1987 *Landmarks of Old Prince William*. Reprinted by Gateway Press, Inc. Baltimore, MD. Copyright the Prince William County Historical Commission.

#### Higgins, Thomas III and Charles Downing

1996 Phase II Archaeological Evaluation of Site 44PW600, Proposed Route 234/Wetlands Mitigation Project, Prince William County, Virginia. Prepared by the William and Mary Center for Archaeological Research, Williamsburg, VA.

# Higgins, Thomas III and Mary Ruffin Hanbury

2013 A Cultural resources survey of the proposed Virginia Rail Express Broad Run Parking Expansion Project, Prince William County, Virginia. William and Mary Center for Archaeological Research, Williamsburg, Virginia. Prepared for Dewberry, Fairfax Virginia.

# Hopkins, Joseph W., III, and Benjamin R. Fischler

1992 *Phase II Archeological Investigations of Site 18HO36, Howard County, Maryland.*Report prepared for Potomac Electric Power Company by Greenhorne and O'Mara, Inc

#### Hunter, Darlene L.

2004 "The Bristoe Tract- Rent Rolls, Map and History" *Prince William Reliquary* 2004 Vol. 3 (4): 81-88.

#### Jacobs, Jane, Jo Balicki, Laura Knott, and Christina Osborn

2016 Bristoe Station and Kettle Run Battlefields Preservation Study. Commonwealth Heritage Group, Inc., Charlottesville, Virginia. Prepared for Prince William County, Virginia, and The American Battlefield Protection Program, National Park Service, Washington, District of Columbia.

#### Johnson, Michael F.

- 1983a "The Evolution of the Bifurcate Hunting System in the Interior Piedmont of Fairfax County, Virginia" In *Piedmont Archaeology: Recent Research and Results*, J. Mark Wittkofski and Lyle E. Browning editors. Archaeological Society of Virginia Special Publication No. 10, Richmond VA.
- 1991 "Middle and Late Woodland Settlement Systems in the Interior Fall Zone of the Potomac Valley: Not a Live Oyster in Sight" *North American Archaeologist* 12(1):29-60.
- 1997 "Cactus Hill '96: Preliminary Block 'A' Results Support McAvoy's Paleoindian and Pre-Fluted Point Sequence" Paper presented at the 1997 Middle Atlantic Archeological Conference. Ocean City, DE.
- 2001 "Gulf Branch (44AR5): Prehistoric Interaction at the Potomac River Fall Line" *Quarterly Bulletin of the Archeological Society of Virginia* 56(3):77-114.

# Katz, Gregory M.

2000 Archaic Period Triangular Bifaces in the Middle Atlantic Region: Technological and Functional Considerations. M.A. Thesis, Department of Anthropology, Temple University, Philadelphia, PA.

#### Kavanaugh, Maureen

1983 "Prehistoric Occupation of the Monocacy River Region". In *Piedmont Archaeology:* Recent Research and Results, J. Mark Wittkofski and Lyle E. Browning editors. Archaeological Society of Virginia Special Publication No. 10, Richmond VA..

#### Kraft, John C.

1976 Geological Reconstructions of Ancient Coastal Environments in the Vicinity of the Island Field Archaeological Site, Kent County, Delaware. In *Transactions of the Delaware Academy of Science 5*, edited by John C. Kraft, pp. 83-118. The Delaware Academy of Science, Newark.

#### Laird, Matthew and Garrett Fesler

2005 Phase I cultural resources survey of approximately 183 acres at the Airport Gateway Property, Prince William County, Virginia. James River Institute for Archaeology, Inc., Williamsburg, Virginia. Prepared for A.J. Dwoskin and Associates, Inc. Fairfax, Virginia.

# Leedecker, Charles H., and Cheryl A. Holt

1991 Archaic Occupations at the Indian Creek V Site (18PR94), Prince George's County, Maryland. *Journal of Middle Atlantic Archaeology* 7:67-90

#### McAvoy, Joseph M. and L.D. McAvoy

1997 Archeological Investigations of Site 44SX202, Cactus Hill, Sussex County, Virginia. Survey and Planning Report Series No. 8. Virginia Department of Historic Resources, Richmond, VA.

#### McLearen, Douglas C.

1978 Archaeological Reconnaissance of the Manassas Municipal Airport, Prince William County, Virginia. Prepared by Southside Historical Sites, Inc., Williamsburg, Virginia.

#### McLearen, Douglas, Christopher Egghart, and Mary Bushey

1995 Phase I Archaeological Survey of A Proposed Runway Protection Zone, Manassas Regional Airport, Prince William County, Virginia. Prepared by Virginia Commonwealth University Archaeological Research Center, Richmond Virginia.

#### Mc Nett, Charles W. (editor)

1985 Shawnee-Minisink: A Paleo-Indian to Early Archaic Stratified Site in the Upper Delaware Valley. Academic Press, New York.

#### Mouer, Daniel

1991 "The Formative Transition in Virginia". In *Late Archaic and Early Woodland Research in Virginia: A Synthesis*, edited by T.R. Reinhardt and M.E. Hodges. Archaeological Society of Virginia, Richmond, VA.

#### Mullens, John

2005 Phase I Archaeological Investigations of the circa 120 acre Glen Gery Property, Prince William County, Virginia. Thunderbird Archeology, Chantilly, Virginia. Prepared for Geln Gery Corporation, Wyomissing, Pennsylvania.

#### NRCS (Natural Resource Conservation Service

Web Soil Survey. Available at <a href="http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx">http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx</a> . Accessed July 7, 2015.

#### O'Neill, Patrick

2007 "Two Extraordinary Surveys: The 1737 Brent Town and 1824 Bristow Tract Maps" *Prince William Reliquary* 2007 Vol. 6 (2): 27-37.

#### Petraglia, Michael, Dennis Knepper, and Peter Glumac

1993 Prehistoric Occupations in the Piedmont: Archaeological Excavation in Faquier, Prince William, and Loudoun Counties, Virginia. Engineering-Science, Inc. On file at the archives of the VDHR, Richmond, VA.

# Potter, Stephen

1993 Commoners, Tribute, and Chiefs: the Development of Algonquian Culture in the Potomac Valley. University Press of Virginia, Charlottesville, VA.

#### Puglisi, Michael

"Settlement Patterns in the Northern Neck of Virginia, 1700-1730". *Northern Neck of Virginia Historical Magazine* XXXIX: 4487-4503.

#### Pullins, Stevan C. and Charles M. Downing

1998 The Moore Hoff Farm: Life and Landscape on a Northern Virginia Farmstead at the Turn of the Nineteenth Century Archaeological Data Recovery at Site 44 PW600, Associated with the Route 234 Wetlands Mitigation Project, Prince William County, Virginia. Prepared by the William and Mary Center for Archaeological Research, Williamsburg, VA.

#### Ratcliffe, R. Jackson

1978 *This Was Prince William*. Private publication, Second Printing by REF Typesetting & Publishing, Manassas, Va.

#### Rinehart, Charles

1999 Archaeological Investigation of Proposed Route 234 Access Road, VDOT Project No. 6234-076-125, C501; VDHR File No. 90-0911; PPMS No. 3790. Prepared by the Cultural Resources Group Louis Berger & Associates, Inc., Richmond, Virginia.

#### Schmitt, Karl, Jr.

1952 Archaeological Chronology of the Middle Atlantic States. In *Archaeology of the Eastern United States*, edited by James B. Griffin, pp. 59-70. University of Chicago Press.

#### Slattery, Richard G., and Douglas R. Woodward

1992 *The Montgomery Focus: A Late Woodland Potomac River Culture*. Bulletin Number 2 of the Archeological Society of Maryland, Inc.

#### Smith, Captain John

Map of Virginia. Facsimile of an Engraving in the Collections of the Library of Congress. Copy on file at Fairfax City Public Library, Fairfax, Virginia.

#### Smith, James

1978 Phase II Archaeological Survey of the Manassas Municipal Airport, Prince William County, Virginia. Prepared by Southside Historical Sites, Inc., Williamsburg, Virginia.

#### Steponaitis, Laurie C.

1980 A Survey of Artifact Collections from the Patuxent River Drainage, Maryland. Maryland Historical Trust Monograph Series No. 1. Maryland Historical Trust, Crownsville, Maryland.

#### Stewart, R. Michael

1987 "Catharsis: Comments on Thurman's Coastal Plain Synthesis." *Journal of Middle Atlantic Archaeology* 3:111-124.

1990 The Middle to Late Woodland Transition in the Lower/Middle Delaware Valley, in *North American Archaeologist*, 11(3): 231-254.

#### Thomas, Ronald

1981 Phase I Archaeological Survey, Manassas Municipal Airport, Runway 16L Outer Marker Navigational Aid, Manassas, Virginia. Prepared by Mid-Atlantic Archaeological Research, Inc., Newark, Delaware.

#### Virginia Department of Historic Resources (VDHR)

2011 Guidelines for Archaeological Investigations in Virginia. VDHR, Richmond, VA.

# United State Geological Survey

1944 Nokesville, VA 7.5 minute Quadrangle

1994 Independent Hill, VA 7.5 minute Quadrangle

1994 Nokesville, VA 7.5 minute Quadrangle

#### United States War Department (ed.)

1895 Atlas to accompany the official records of the Union and Confederate armies. Government Printing Office, Washington, District of Columbia.

Wesler, K.D., and D. Pogue, A, Button, R. Hurry, G. Fine, P. Sternheimer, and G. Furguson
1981 *The M/DOT Archaeological Resources Survey*. Prepared by the Maryland Historical
Trust, for the Maryland Department of Transportation and the Maryland Board of Public Works.

# WPA Writers Program

1988 *Prince William: The Story of Its People and Its Places*. Originally compiled in 1941 by Worker of the Writers Program of the Work Projects Administration in the State of Virginia. Reprint sponsored by the Bethlehem Club, Manassas Virginia

# APPENDIX I QUALIFICATION OF INVESTIGATORS

#### ELIZABETH ANDERSON COMER

EAC/Archaeology, Inc. 4303 North Charles Street Baltimore, Maryland 21218-1054 phone 410-243-6767 fax 410-243-8383 ecomer@eacarchaeology.com

AREAS OF

SPECIALIZATION Historical Archaeology, Prehistoric Archaeology, Architectural History, Public

Archaeology, Interpretation of Archaeological Data for the Public, Heritage Tourism Research and Development, Historic Preservation, Archival Research, Museum

Management.

EDUCATION B.A. in History and Political Science, Hood College, Frederick, Maryland 1977

University of London, Richmond College, London, England 1975-1976 M.A. in Anthropology, University of Kansas, Lawrence, Kansas 1981 Ph.D (in progress), University of Maryland, College Park, Maryland

PROFESSIONAL EXPERIENCE

1983 - Present Project Manager and Principal Investigator, EAC/Archaeology, Inc.

Personally managed and completed more than 250 projects over 31 years. Studies have included the Annapolis Historic District, Fort McHenry National Monument and Historic Shrine, Riversdale Mansion National Historic Landmark, and Londontown House and

Gardens National Historic Landmark.

1998 - Present Chief Technical Advisor - Public Archaeology Project

UNESCO Regional Office for Culture in Asia and the Pacific, Bangkok, Thailand.

Developing public archaeology initiative for UNESCO with pilot project planned in

India.

1983-1987 City Archeologist and Director of The Baltimore Center for Urban Archeology, City of

Baltimore

Established and directed Baltimore's public archeology program including selection of excavation sites and development of research designs. Additional activities included: fostering legislation to protect finite archeological resources; educating the public through continual speaking engagements and presentations; production of exhibits for

private developers, public groups and the archeology museum.

1981-1983 Area Vice-President, Soil Systems, Inc. (SSI)

Served as Principal Investigator and/or Project Manager on all projects. Managed a large staff of archeologists, historians, architectural historians and other professional personnel.

1975-1981 Archeologist

Worked as an archeologist excavating numerous sites in Kansas, Missouri and Maryland for universities and federal agencies as well as analyzing and preparing displays and

exhibits of prehistoric and historic materials recovered from sites.

TEACHING Adjunct Professor, University of Maryland College Park, **POSITIONS** 

Historic Preservation Program, 1996 - present

Courses Taught: "Management of Cultural Heritage Sites: Tourism, Archaeology &

Preservation in the Postmodern World"

Adjunct Professor, University of Maryland Baltimore County,

(UMBC), 1987

#### SELECT PUBLICATIONS

12/1983 The Great Baltimore Brewery Dig: Excavations at an Eighteenth-Nineteenth Century Baltimore Industry. . .

2/1985 Rediscovering Mrs. Carroll's Orangery. Prepared for the National Society of Colonial Dames of America in the State of Maryland.

1990 "Mount Clare: An Interdisciplinary Approach to the Restoration of a Georgian Landscape," in William M. Kelso and Rachel Most, eds., Earth Patterns: Essays in Landscape Archaeology (Charlottesville, 1990): 135-152.

Mount Clare: Introducing Baltimore to 18th Century Splendor," in Barbara J. Little and Richard J. Dent, eds., New Perspectives on Maryland Historical Archaeology (Archeological Society of Maryland, Inc. for Maryland Archaeology): 86-94).

5/1994 Phase I (Archaeological Survey) and Phase II (Archaeological Evaluation) Investigation at the Drug Enforcement Administration Justice Training Center, Quantico Marine Corps Reservation, Stafford County, Virginia. Prepared for Ellerbe Becket under contract to the Drug Enforcement Administration.

10/1997 Phase I Archaeological Survey at the National Institutes of Health, Bethesda, Campus Clinical Center Development Areas (18MO462, 18MO463, 18MO464, 18MO465), Montgomery County Maryland. Prepared for the National Institutes of Health.through Oudens + Knoop Architects, PC.

2/2001 Archaeological Monitoring Plan, Stabilization and Repair of Northwest Demi-Bastion Wall, Fort Washington (FOWA), National Capital Parks-East, Prince George's County, Maryland. Prepared for United States National Park Service, National Capital Region through architrave p.c., architects.

5/2001 Historic Resource Evaluation Services of 95 properties for the City of Baltimore East-West Transit Connector, Project # 766 (People Mover), Baltimore City, Maryland. Prepared for City of Baltimore Department of Public Works.

12/2001 Phase II and III Archaeological Investigations: Ulster Bridge, Bradford County, Pennsylvania. Prepared for Pennsylvania Department of Transportation.

4/2005 Phase II Archaeological Investigations at Route 40, Corrie House, New Castle County, Delaware. Prepared for Delaware Department of Transportation.

8/2006 Phase I Archeological Survey of The Proposed Mount Vernon Trail Extension, George Washington Memorial Parkway, Fairfax County Line to I495 Interchange, Fairfax County, Virginia. Prepared for US Dept of the Interior, National Park Service, Denver Service Center through Greenhorne & O'Mara, Inc.

2/2008 <u>Historic Context for Evaluating Post-Bellum Archeological Resources</u>. Prepared for Maryland-National Capital Park and Planning Commission through Greenhorne & O'Mara, Inc.

2/2009 Phase I Archaeological Investigation for the Proposed Extension of Runway 25, Newport News/Williamsburg International Airport, York County, Virginia. Prepared for Peninsula Airport Commission through HNTB Corporation.

12/2010 Phase I And II Investigations at the Haslup/Burns House Site (18HO266) Outside Savage, Howard County, Maryland. Prepared for Howard County, Maryland through Edmeades and Stromdahl, Ltd.

# ROBERT WAYNE WANNER, Ph.D.

EAC/Archaeology, Inc. Laboratory – 2113 St. Paul St. Baltimore, MD 21218

Cell Number: 765-404-3939 Email: rwanner@eacarchaeology.com

Daytime Number: 410-244-6321

**EDUCATION** 

October 2006 -April 2010 Ph.D. in Archaeology, University of Leicester August 2004-May 2006 M.A. in Classical Archaeology, Tufts University

B.A. in Classical Archaeology, History, University of Evansville August 1998-May 2002

PROFESSIONAL EXPERIENCE

Archaeologist/GIS Specialist, EAC/Archaeology, Baltimore, MD November 2011-present

> Provides archaeological services, including project management, execution of archival research, archaeological fieldwork, monitoring, artifact analysis, and

technical report preparation.

August 2010-August 2011 Museum Assistant, County Museum of History and Art, Zalău, Romania

> Conducted post-excavation work on the American-Romanian Porolissum Forum Project, assisting with rescue excavations throughout Sălaj County, and

participating in museum outreach activities.

August 2008 **Archaeologist**, University of Leicester, Hallaton, Leicestershire, U.K.

Used a Barrington fluxgate gradiometer to conduct geophysical survey at an

Iron Age settlement.

October 2007-April 2010 Teaching Assistant, University of Leicester, Leicester, U.K.

> Taught on the following courses: Language Tools for Ancient History: Latin; Introduction to Roman History Seminar; Language Tools for Ancient History: Greek; Introduction to Greek History Seminar; Late Antique North Africa.

June-July 2006/2007/2008/

2009/2010/2011

Associate Field Director, Porolissum Forum Project, Moigrad, Romania

Each season, contributed to planning excavations each season, supervised students and workers during the six-week excavations, mapped site with Total

Station and AutoCAD, and conducted post-excavation work.

January 2006-May 2006 Teaching Assistant, Tufts University, Medford, MA

Co-taught History of Rome course.

# RECENT ARCHAEOLOGICAL / HISTORIC PRESERVATION INVESTIGATIONS

February-June 2016 Phase II Archaeological Survey of the Western Lands Area of IAD under the MWAA

> Archaeological/Architectural Historic Preservation Services contract, Arlington, Fairfax and Loudoun Counties, Virginia. Prepared for the Metropolitan Washington Airports

Authority.

Phase I Newark Regional Transportation Center. Prepared for the Delaware Department August 2015

of Transportation.

July-December

Phase I Archaeological Survey of the Western Lands Area of IAD under the MWAA 2015

Archaeological/Architectural Historic Preservation Services contract, Arlington, Fairfax and Loudoun Counties, Virginia. Prepared for the Metropolitan Washington Airports

Authority.

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August 2015	Arlington National Cemetery Southern Expansion Site – Viewshed Study, Arlington County, Virginia. Prepared for the U.S. Army Corps of Engineers, Norfolk District (NAVFAC).
February 2015	Phase I Archeological Survey For MD 355 At West Old Baltimore Road, and Phase II Archaeological Testing At The Neelsville Blacksmith Residence/Shop (18MO734), Montgomery County, Maryland. Prepared for the Maryland State Highway Association.
February 2015	Stage 1 - Phase IB Archeology Interim Report, Baltimore Red Line Light Rail Project, City Of Baltimore and Baltimore County, Maryland. Completed for the Maryland Transit Administration.
November 2014	Land Use Study For Downtown Tunnel Segment. Completed for the Baltimore Light Rail Red Line Project.
July 2014	Land Use Study For Cooks Lane Tunnel Segment. Completed for the Baltimore Light Rail Red Line Project.
July 2014	Catoctin Furnace Stone House 1, Thurmont, Maryland: A Phase I Archaeological Identification. Prepared for the Catoctin Furnace Historical Society.
June 2014	Phase I Archeology Technical Report For C18: Powder Mill Run Restoration Site. Completed for the Maryland Transit Administration.
June 2014	Phase I Archeology Technical Report For Cimaglia Park Reforestation Site, Baltimore City, Maryland. Completed for the Maryland Transit Administration.
June 2014	Crittenton Place, Hampden, Baltimore City, Maryland: A Phase II Archaeological Evaluation. Prepared for Crittenton Hill LLC and the Maryland Historical Trust.
May 2014	Curation and Storage of BCUA Artifacts from Shot Tower Metro Display. Completed for MTA through Southern Improvement Company, Inc.
May 2014	Phase I Archaeological Investigations for MD 231 at MD 765A, Prince Frederick, Calvert County, Maryland. Prepared for Maryland SHA through Skelly & Loy, Inc.
April 2014	Phase IB Archaeological Survey for the SR 1002, Section 651, Skinners Falls Bridge Rehabilitation, Milanville, Damascus Township, Wayne County, Pennsylvania. Prepared
April 2014	for Pennsylvania Department of Transportation Stage 2 Phase 2 Archeology Technical Report For Ward Farmstead (Site 18BA582). Completed for the Maryland Historical Trust

#### PEER-REVIEWED PUBLICATIONS

- Wanner, R. Forthcoming (accepted 1 March 2011). Forests and Forts. Socioeconomic change on the Meses frontier and beyond. In: *Proceedings from Defensive system, military infrastructure and the daily life on the borders of the Roman Empire, Târgu Mureş, Romania.*
- Wanner, R. 2010. Animals and Grain on the Frontier: Some considerations of Roman land-use in the Meseş Gate of Roman Dacia. In: Pop, H. (ed.), *Identități culturale locale și regionale în context european. Studii de arheologie și antropologie istorică. In memoriam Alexandri V. Matei* [Local and regional cultural identity in the European context. Studies of archaeology and historical anthropology. In memoriam of Alexandru V. Matei.]. Cluj-Napoca: Mega.
- Wanner, R. and De Sena, E. 2010. Three Dying Towns: Reflections on the immediate Post-Roman phase of Napoca, Potaissa and Porolissum. In: Sami, D. and Speed, G. (eds.), *Debating Urbanism: beyond the walls*. Leicester: Leicester University Press.
- Wanner, R. 2008. The Natural Will: Community in Roman archaeology. In: Driessen, M., Heeren, S., Hendriks, J., Kemmers, F., and Visser, R. (eds.), TRAC 2008. Proceedings of the Eighteenth Annual Theoretical Roman Archaeology Conference, Amsterdam 2008, 157-172. Oxford: Oxbow.

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#### RECENT PRESENTATIONS

- 26 March 2016 Heritage From the Ground Up: Using Technology to Study Enslaved and Free Workers in an Iron-making Community (co-authored with Elizabeth Comer and Jane Seiter). MHT and ASM Workshop in Archaeology, Crownsville, MD.
- 8 January 2016. Forest for the Trees: Remote Sensing Applications and Historic Production at Cunningham Falls State Park (co-authored with Bryce Davenport). Society for Historical Archaeology Annual Meeting, Washington, DC.
- 7 January 2016. Excavations at Historic Neelsville: Life as a Tenant Blacksmith (co-authored with Jane Seiter). Society for Historical Archaeology Annual Meeting, Washington DC.
- 1 November 2014. Mapping the Edges. Ground-penetrating radar survey at the Catoctin African American cemetery. *ESAF Annual Meeting*. Solomons, MD.
- 27 October 2011. Landscape of Decimation? The impact of Roman colonization on Northwest Transylvania. *Purdue University Brown Bag Lecture*. West Lafayette, IN.

#### **CONFERENCE ACTIVITY**

- 2012. Session organizer for colloquium entitled "Roman Dacia and Moesia: archaeology and heritage preservation in Romania" at Archaeological Institute of America Annual Meeting in Philadelphia, PA.
- 2008. Co-organized session entitled "Dealing with dichotomies in Roman archaeology" at Theoretical Roman Archaeology Conference/ Roman Archaeology Conference: Amsterdam, Netherlands.

# **PROFESSIONAL TRAINING**

• Aerial Archaeology Training School, run by the Aerial Archaeology Research Group (AARG), Barth, Mecklenburg-Vorpommern, Germany, April 2007

Robert W. Wanner Page 3 of 3

#### Teresa (Tery) Harris

EAC/Archaeology, Inc. 4303 North Charles Street Baltimore, Maryland 21218-1054 tharris@eacarchaeology.com

#### Education

1992 M.A., Anthropology, Brandeis University 1988 B.A., Anthropology, University of Maryland

#### **Experience**

Ms. Harris has almost 30 years experience working in all phases of archaeological investigations in the Mid-Atlantic region. Her work experience includes all levels of expertise from field crew to Principal Investigator. Her responsibilities have included field and laboratory work and supervision, artifact analysis, archival research, report writing, and public education and interpretation.

#### **Employment History**

Employment Hi	istory
2005-present	Project Archaeologist, EAC/Archaeology, Inc., Baltimore, MD. Responsibilities include archival research, design and implementation of archeological investigations, field supervision, laboratory supervision, artifact analysis, some preparation of CAD graphics and report preparation. Duties also include proposal preparation work.
2003-2005	Principal Investigator, ARCH <sup>2</sup> , Inc., Metuchen, NJ. Responsibilities include archival research, design and implementation of archeological investigations, field supervision, laboratory supervision, artifact analysis, some preparation of CAD graphics and report preparation. Duties also include proposal preparation work.
1996-2002	Project Archeologist, Joseph Hopkins Associates, Inc. Baltimore, MD. Job duties included archival research, design and implementation of archeological investigations, field supervision, laboratory supervision, artifact analysis, some preparation of CAD graphics, report preparation, and office management. Duties also included some proposal preparation work.
1995	Archeologist, Baltimore Center for Urban Archeology, Baltimore, MD. Job duties included management and preparation of an archival archeological assessment (Phase Ia), and subsequent design and implementation of a Phase II evaluation study utilizing both hand and mechanical excavation, artifact analysis, and report preparation.
1994-1995	Field Director, Kemron Environmental Sciences, Inc., McLean, VA. Job duties included archival research, management of field excavation, laboratory management, and partial drafting of reports.

#### **Selected Project Experience with EAC/Archaeology, Inc.**

8/2006 Phase I Archeological Survey of The Proposed Mount Vernon Trail Extension, George Washington Memorial Parkway, Fairfax County Line to I495 Interchange, Fairfax County, Virginia. Prepared for US Dept of the Interior, National Park Service, Denver Service Center through Greenhorne & O'Mara, Inc.

4/2007 Phase I Archaeological Identification Survey – District of Columbia Department of Youth Rehabilitation, Oak Hill Youth Center, Laurel, Anne Arundel County, Maryland. Prepared District of Columbia Government through Bell Architects, P.C.

12/2007 Archeological Monitoring of Streetscape Improvements; MD Route 19 Within the Church Hill Historic District, Town of Church Hill, Queen Anne's County, Maryland. Prepared for Maryland State Highway Administration Project Planning Division through John Milner Associates, Inc.

8/2008 Gettysburg Station – Phase I and II Archeological Investigations of Straban Township Parcels 123, 123A, And 124 Part of the Former Site of Camp Letterman, Gettysburg, Pennsylvania, The Union General Hospital with August 2008 Addendum. Prepared for Landmark Commercial Realty, Inc.

10/2008 Phase II Archaeological Evaluation Investigations at Sites 44FX3180 and 44FX3181, Fairfax County Parkway Widening from Route 50 to Dulles Toll Road, Chantilly, Fairfax County, Virginia. Prepared for Fairfax County Department of Public Works and Environmental Services.

7/2010 Phase I and Phase II Archaeological Investigations for the Propsed 11th Street Bridges Improvement Project, Washington, District of Columbia. Prepared for District of Columbia Department of Transportation Infrastructure Project Management Administration through HNTB Corporation.

12/2010 Phase I And II Investigations at the Haslup/Burns House Site (18HO266) Outside Savage, Howard County, Maryland. Prepared for Howard County, Maryland through Edmeades and Stromdahl, Ltd.

Ground Penetrating Radar (GPR) and Phase I Archaeological Survey for Rose Hill, the Samuel Glass Farm, Frederick County, Virginia. Prepared for the Museum of the Shenandoah Valley.

8/2012 Phase I Archaeological Survey at MD 7 over James Run, Harford County, Maryland. Prepared for the Maryland State Highway Administration, as subcontractor for Skelly and Loy, Inc..

2014-2015 Archaeological Services for the Proposed Granite Line Phase II Gas Line Relocation Project, Franklintown Vicinity, Baltimore City, Maryland. Conducted for Baltimore Gas and Electric through Exploration Research, Inc.

2014-2015 Cultural Resources Services for the Proposed Phase I Improvements, Martin State Airport, Middle River, Baltimore County, Maryland. Conducted for the Maryland Aviation Administration through HNTB Corporation.

8/2015 Phase I Archaeological Investigations for the Proposed Improvements to the I-70/MD 144 Interchange, Frederick County, Maryland. Prepared for the Wilson T. Ballard Company.

11/2015 Phase I Archaeological Survey to Relocate the Mount St. Mary Site (18FR379) Prior to Improvements to US Route 15, Frederick County, Maryland. Conducted for the Maryland State Highways Administration through the Wilson T. Ballard Company.

1/2016 Phase IA Archaeological Reconnaissance of the Proposed Westside Regional Park, City of Frederick, Frederick County, Maryland. Prepared for Grace Fielder and Associates. and the City of Frederick.

#### **Other Project Experience**

- Project Archeologist, Phase I, Phase II, and Phase III investigations of the site of proposed BWI Facilities expansion near Hanover, Maryland. (Joseph Hopkins Associates, Inc. for the Maryland Aviation Administration).
- Project Archaeologist, Phase II investigations, Choptank Route 404 Project, Caroline County, Maryland. (Joseph Hopkins Associates, Inc. for SHA).
- Project Archeologist, Phase I and Phase II investigations of the Poulson-Englar House (18CA238), Carroll County, Md. (Joseph Hopkins and Associates, for The Arundel Corporation)
- Research Director and Project Archaeologist: Phase I archival assessment and Phase II field investigations, 18 BC 111 Hampstead Hill Site, Baltimore, MD. (Baltimore Center for Urban Archaeology, Baltimore City Life Museums, for the Johns Hopkins Hospital Facilities Department.)
- Field Director: Phase I and II investigations at the National Emergency Training Center, Emmitsburg, MD. (Kemron Environmental Services, for the National Emergency Training Center and the Army Corps of Engineers, Baltimore Division.)
- Field Director: Phase II investigations at the Ben Lomond House, Manassas, VA. (Kemron Environmental Services, for the Prince William County Park Authority.)

# APPENDIX II ARTIFACT CATALOG

Unit Number	Level	cription_	cboMaterial 1	cboDecoration	txtMaterial 2	txtType	cboPortion	txtCategory	cboColor	txtGroup	Count	Comments
N0W15	II	Coal	Coal			Fuel	Fragment	Fuel		Indefinite Use	4	
S15W15	II	Bottle	Glass			Misc Containers	Body	Misc Containers	Clear	Indefinite Use	1	Thick walled vessel, possible partial mold seam or shapping turn
N30E0	I	Tile	Earthenware	Akaline glaze	Ceramic	Materials	Fragment	Materials	Pink	Structural	1	Floor or possibly large wall tile
N45E0	I	Tile	Earthenware	Akaline glaze	Ceramic	Materials	Fragment	Materials	Pink	Structural	1	Floor or possibly large wall tile

Find Number	Artifact Number	Fragment Count	Material 1	Material 2	Description Number	Description	Туре	Category	Group	Portion	TPQ	TAQ	Comments
1	1	1	1 Brass	Metal	Shotgun Shell	Shotgun Shell	Ammunition	Firearms	Activities		1920	1970	"Western, Made in USA, Super X 12ga", high brass
2	1	1	1 Brass	Metal	Shotgun Shell	Shotgun Shell	Ammunition	Firearms	Activities		0	0	Montgomery Ward shotgun shell, "Hawthorne, Reliance, 12GA" low brass?
3	1	1	1 Aluminum	Metal		Beverage Can Tab	Closure	Misc. Closures	Indefinite Use		1965	1975	ring only
4	1	1	1 Brass	Metal	Shotgun Shell	Shotgun Shell	Ammunition	Firearms	Activities		1937	1964	"Winchester - Ranger, Made in USA"
5	1	1	1 Brass	Metal	Shotgun Shell	Shotgun Shell	Ammunition	Firearms	Activities		1898	1932	high brass, "Western, Super-X, Made in USA, 20GA"
6	1	1	1 Brass	Metal	Shotgun Shell	Shotgun Shell	Ammunition	Firearms	Activities		1937		"Winchester Made in USA, Super Speed, No. 12"
7	1	1	1 Iron alloy	Metal	Indefinite	Indefinite	Indefinite	Indefinite	Indefinite Use		0	0	5lbs? Heavy fe alloy disk with hole in center, painted black, concave on one side, 15cm diameter, hole roughly 5cm diam.
8	1	1	1 Brass	Metal	Shotgun Shell	Shotgun Shell	Ammunition	Firearms	Activities		1937		"Remington Express 12 GA" High- brass
9	1	1	1 Brass	Metal	Shotgun Shell	Shotgun Shell	Ammunition	Firearms	Activities		1927	1963	"Western XPERT Made in USA No 12"
10	1	1	1 Brass	Metal	Shotgun Shell	Shotgun Shell	Ammunition	Firearms	Activities		1927	1963	"Western, Made in USA, Super- X, No. 12" High-brass
11	1	1	1 Iron alloy	Metal	Horseshoe	Horseshoe	Animal Husbandry	Animal Husbandry	Activities		0		Half of a horseshoe, with nail still attached, likely thrown
12	1	1	1 Iron alloy	Metal	Horseshoe	Horseshoe	Animal Husbandry	Animal Husbandry	Activities		0	0	horseshoe, likely the other half of Bag 11 horseshoe, partial nail, likely thrown
13	1	1	1 Brass	Metal	Shotgun Shell	Shotgun Shell	Ammunition	Firearms	Activities		1955	0	"Revelation, W.A., 16GA
14	1	1	1 Brass	Metal	Shell Casing	Shell Casing	Ammunition	Firearms	Activities	Base	1933	1933	"A A 33" likely 30-06 Frankfort Arsenal, phila. PA, 1933?
15	1	2	2 Zinc	Metal	Can Lid	Can Lid	Closure	Food/Food Storage	Domestic	Fragment	0	0	two pieces of a mason canning jar zinc lid
16	1	1	1 Brass	Metal	Shotgun Shell	Shotgun Shell	Ammunition	Firearms	Activities		1934	1963	"Remington Express 12Ga" high- brass

17	1	1	l Brass	Metal	Shell Casing	Shell Casing	Ammunition	Firearms	Activities	1933	0	blank cartridge, "F A 33" same headstamp as Bag 14, likely same rounds
18	1	1	l Brass	Metal	Shotgun Shell	Shotgun Shell	Ammunition	Firearms	Activities	1960	0	brass and plastic shotgun shell, rad with black writing, "Western Super X, 4, Mark 5" base stamped "W-W 12 Guage"
19	1	1	l Brass	Metal	Shotgun Shell	Shotgun Shell	Ammunition	Firearms	Activities	1934	1963	"Western Xpress No. 12"
20	1	1	I Iron alloy	Metal	Can	Can	Container	Food/Food Storage	Domestic	0	0	Can base
21	1	1	l Brass	Metal	Shotgun Shell	Shotgun Shell	Ammunition	Firearms	Activities	1934	1963	"Western Made in USA, Super-X No. 20" 20 ga, high brass
22	1	1	I Iron alloy	Metal	Indefinite	Indefinite	Indefinite	Indefinite	Indefinite Use	0	0	12cm long, iron object, 5cm diam loop at one end, 2.5cm wide, likely a old car piston.
23	1	1	l Brass	Metal	Shotgun Shell	Shotgun Shell	Ammunition	Firearms	Activities	1900		"U.M.C. Co. 12 New Club 12" star design around primer, early shell
24	1	1	I Iron alloy	Metal	Wire Nail	Wire Nail	Fastener	Hardware	Structural	0	0	9cm long wire nail

Find Number	Artifact Number	Stratu m	Fragment Count	Material 1	Material 2	Description Number	Description	Туре	Category	Group	Portion	TPQ	TAQ	Comments
1	1	NA	1	Copper alloy	Metal	Dime	Dime	Coin	Commerce	Activities		1986	1986	
2	1	NA	1	Copper alloy	Metal	Penny	Penny	Coin	Commerce	Activities		1982	1982	
3	1	NA	1	Copper alloy	Metal	Penny	Penny	Coin	Commerce	Activities		1978	1978	
4	1	NA	1	Copper alloy	Metal	Dime	Dime	Coin	Commerce	Activities		1967	1967	
5	1	NA	1	Copper alloy	Metal	Penny	Penny	Coin	Commerce	Activities		1968	1968	
6	1	NA	1	Aluminum	Metal	Beverage Can Tab	Beverage Can Tab	Closure	Misc. Closures	Indefinite Use		1965	1975	
7	1	NA	1	Aluminum	Metal	Bottle Cap	Bottle Cap	Closure	Food	Domestic		1987	1991	Twist-off Pepsi cap
8	1	NA	1	Aluminum	Metal	Foil	Foil	Misc. Metal Items	Misc. Metal Items	Indefinite Use		0	0	foil with rolled edge
9	1	NA	2	Iron alloy	Metal	Indefinite	Indefinite	Indefinite	Indefinite	Indefinite Use		0	0	5-10lbs
10	1	NA	1	Aluminum	Metal	Indefinite	Indefinite	Indefinite	Indefinite	Indefinite Use		0	0	ketchup packet
11	1	NA	21	Aluminum	Metal	Foil	Foil	Misc. Metal Items	Misc. Metal Items	Indefinite Use		0	0	
12	1	NA	1	Aluminum	Metal	Beverage Can Tab	Beverage Can Tab	Closure	Misc. Closures	Indefinite Use		1965	1975	Heineken Buckhorn?
13	1	NA	1	Aluminum	Metal			Closure	Misc. Closures	Indefinite Use		1965	1975	Heineken Buckhorn?
14	1	NA	1	Aluminum	Metal	Beverage Can Tab	Beverage Can Tab	Closure	Misc. Closures	Indefinite Use		1965	1975	tab only, no ring
15	1	NA	1	Aluminum	Metal	Beverage Can Tab	Beverage Can Tab	Closure	Misc. Closures	Indefinite Use		1965	1975	ring only, possible Heineken Buckhorn
16	1	NA	1	Aluminum	Metal	Beverage Can Tab	Beverage Can Tab	Closure	Misc. Closures	Indefinite Use		1965	1975	
17	1	NA	1	Aluminum	Metal	Foil	Foil	Misc. Metal Items	Misc. Metal Items	Indefinite Use		0	0	thin foil
18	0	NA	1	Aluminum	Metal	Foil	Foil	Misc. Metal Items	Misc. Metal Items	Indefinite Use		0	0	thin foil
19	1	NA	1	Aluminum	Metal	Beverage Can Tab	Beverage Can Tab	Closure	Misc. Closures	Indefinite Use		1965	1975	
20	1	NA		Indeterminate Metal	Metal	Indefinite	Indefinite	Indefinite	Indefinite	Indefinite Use		0	0	unknown metal alloy tab, 4cm long, 1.2cm wide, with 35cm diam holes.
21	1	NA		Aluminum	Metal	Beverage Can Tab	Beverage Can Tab	Closure	Misc. Closures	Indefinite Use		1965	1975	Tab only
22	1	NA	0	Aluminum	Metal	Beverage Can Tab	Beverage Can Tab	Closure	Misc. Closures	Indefinite Use		0	0	-MISSING-*
23	1	NA	1	Aluminum	Metal	Beverage Can Tab	Beverage Can Tab	Closure	Misc. Closures	Indefinite Use		1965	1975	ring only
24	1	NA	1	Iron alloy	Metal	Bottle Cap	Bottle Cap	Closure	Food	Domestic		1890		crown bottle cap, plastic liner
25	1	NA	1	Aluminum	Metal	Beverage Can Tab	Beverage Can Tab	Closure	Misc. Closures	Indefinite Use		1965	1975	
26	1	NA	1	Aluminum	Metal	Bottle Cap	Bottle Cap	Closure	Food	Domestic		0	0	twist-off cap, not crown. Likely for a larger bottle of beer like a 22-40oz, plastic lined.
27	1	NA	1	Aluminum	Metal	Beverage Can Tab	Beverage Can Tab	Closure	Misc. Closures	Indefinite Use		1975	0	Sta-tab
28	1	NA	1	Aluminum	Metal	Beverage Can Tab		Closure	Misc. Closures	Indefinite Use		1975	0	Sta-tab
29	1	NA	1	Aluminum	Metal			Closure	Misc. Closures	Indefinite Use		1965	1975	ring only
30	1	NA	1	Aluminum	Metal	Beverage Can Tab		Closure	Misc. Closures	Indefinite Use		1975		sta-tab
31	1	NA	1	Aluminum	Metal	Bottle Cap	Bottle Cap	Closure	Food	Domestic	Finish, Neck	0	0	aluminum twist-off cap, Budweiser Beer, attached glass top neck/finish

32	1	NA	1	Aluminum	Metal	Beverage Can Tab	Beverage Can Tab	Closure	Misc. Closures	Indefinite Use	1965	1975	
33	1	NA	1	Aluminum	Metal	Beer Can	Beer Can	Container	Social Drugs- Alcohol	Personal	1965	1975	beer can top with pull-tab opening.
34	1	NA	1	Rubber	-	Insulated Wire	Insulated Wire	Electrical	Electrical	Structural	0	0	black rubber insulated aluminum wire
35	1	NA	1	Aluminum	Metal	Indefinite	Indefinite	Indefinite	Indefinite	Indefinite Use	0	0	thin aluminum triangle, likely can fragment
36	1	NA	1	Iron alloy	Metal	Cut Nail	Nail	Fastener	Hardware	Structural	0	0	Square nail, 4cm long
37	1	NA	1	Aluminum	Metal	Beverage Can Tab	Beverage Can Tab	Closure	Misc. Closures	Indefinite Use	1975	0	Sta-tab
38	1	NA	1	Aluminum	Metal	Beer Can	Beer Can	Container	Social Drugs- Alcohol	Personal	0		beer can top.
39	1	NA	1	Aluminum	Metal	Beer Can	Beer Can	Container	Social Drugs- Alcohol	Personal	0	0	beer can body fragment, gold wheat decoration
40	1	NA	1	Iron alloy	Metal	Sewer Pipe	Sewer Pipe	Materials	Materials	Structural	0		1cm thick iron sewer pipe
41	1	NA	1	Aluminum	Metal	Beverage Can Tab	Beverage Can Tab	Closure	Misc. Closures	Indefinite Use	0	0	
42	1	NA	1	Aluminum	Metal	Beer Can	Beer Can	Container	Social Drugs- Alcohol	Personal	0	0	sta-tab beer can top
43	1	NA	1	Aluminum	Metal	Beer Can	Beer Can	Container	Social Drugs- Alcohol	Personal	0		Beer can top and body
44	1	NA	1	Iron alloy	Metal	Indefinite	Indefinite	Indefinite	Indefinite	Indefinite Use	0	0	Possible thermostat or car part? Found near surface debris and dumping
45	1	NA	1	Aluminum	Metal	Beverage Can Tab	Beverage Can Tab	Closure	Misc. Closures	Indefinite Use	1965	1975	



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May 5, 2017

Mr. Roger Kirchen Director, Division of Review and Compliance Virginia Department of Historic Resources 2801 Kensington Avenue Richmond, VA 23221

Re: Visual Effects of Proposed West Corporate Development and East Parcel Development, Manassas Regional Airport, City of Manassas and Prince William County, Virginia

Dear Mr. Kirchen,

The Federal Aviation Administration hereby requests your review of the visual effects for the proposed West Corporate Redevelopment and East Parcel Development at Manassas Regional Airport in the City of Manassas and Prince William County, Virginia (Attachment A). RS&H's subconsultant, EAC/Archaeology, Inc. (EAC/A), prepared a viewshed study for the proposed West Corporate Redevelopment and East Development. The proposed project represents a federal undertaking under Federal Aviation Administration review and a state undertaking under the Virginia Department of Aviation review. The viewshed study identifies a Visual Area of Potential Effect (APE) and historic properties within that Visual APE. The potential visual impact of the project area was then evaluated for each of these historic properties. This letter report presents the findings of the potential visual impact assessment.

#### 1. Study Purpose

An environmental assessment is being prepared to evaluate the potential effects of the West Corporate Redevelopment and East Parcel Development at Manassas Regional Airport (proposed project) under Section 106 of the National Historic Preservation Act of 1966, as amended and Virginia Code Section 10.1-1118. One of the considerations is the effect of the undertaking on historic resources which are evaluated under Section 106 of the National Historic Preservation Act of 1966 (NHPA). Section 106 of the NHPA outlines a historic preservation review process and requires Federal agencies to consider the direct and indirect effects of their projects on historic resources. The potential for the proposed project to affect the views to and from historic resources in close proximity to the airport prompted the need for a viewshed study and impact assessment.

The primary purpose of this study is to identify a Visual APE, or the APE for Visual Effects. In general, the Visual APE is defined in the regulations implementing the Section 106 review process as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking" [36 CFR Part 800.16(d)].

The second purpose of this study is to identify all the properties listed in or eligible for listing in the National Register of Historic Places (NRHP) which are located within the Preliminary Visual APE, and hence may be visually affected by the project.

The final purpose is to examine and evaluate the impacts of the development on the historic properties within the Visual APE.

#### 2. Proposed Project

The City of Manassas and the Manassas Regional Airport are proposing plans to redevelop existing support facilities along the western edge of the airport, and to develop new support facilities along the east airport boundary (Attachment B). All project elements are within airport owned property, although roughly 14 acres of the proposed development on the east side of that property is currently outside the City of Manassas limits.

The proposed project elements within the West Corporate Redevelopment include: improvements to the intersection of Observation Road and Piper Lane; realignment of Observation Road to the west; demolition of two existing FBO buildings and replacement by a 71,100 square-foot FBO building; new parking lots and expansion of the existing apron, construction of roughly 11 new 3,600 square-foot hangars and construction of adjoining parking lots, demolition and replacement of five existing T-hangars, construction of seven new T-hangars, construction of a new maintenance and storage building on the site of one demolished FBO building, extension of existing apron around the site of new T-hangar construction, construction of a wash-rack north of the T-hangars. Proposed plans also include extension of existing utilities as required to support construction, extension of the existing security fence to encompass the new facilities, and improvements to existing stormwater drainage systems to accommodate the increase in impervious surface resulting from propose construction.

Proposed development within the East Parcel Development includes realignment of Wakeman Drive, construction of new hangar and office structures, with adjoining parking lots. The existing adjacent taxilane would be extended to provide airfield access to the proposed development. Proposed plans also include extension of existing utilities as required to support construction, extension of the existing security fence to encompass the new facilities, and improvements to existing stormwater drainage systems to accommodate the increase in impervious surface resulting from proposed construction.

#### 3. Methodology

The viewshed, also known as a line-of-sight map, is developed using cells in an elevation model (raster data) and observer points (vector data). A straight line is interpolated between the source (observer point) and every other cell within the elevation model. If the height of cells along this line exceeds the height at the source, the line of sight is interrupted.

Spatial data utilized in the viewshed analysis were collected from a few sources. High-resolution Digital Elevation Models (DEMs) were one of the primary tools used to conduct this study. A one-meter resolution digital elevation model (DEM) from the United States Geological Survey (USGS) Earth Explorer website was used for this study. This data source integrated disparate light detection and ranging (Lidar) and bathymetric data sources collected as part of the Coastal National Elevation Database Project. This was a pre-defined, bare-earth DEM which eliminated vegetation and structures. Computer-Aided Design (CAD) files for the planned project were sent to EAC/A in February of 2017. Shapefiles for sites and districts included in or eligible for the National Register of Historic Places were obtained from the National Park Service and V-CRIS websites. Additional data for historic properties eligible or not evaluated for the National Register were collected from the Virginia Cultural Resources Information System (V-CRIS).

The bare-earth surface model with the addition of buildings, but not vegetation, was used to generate the viewshed. Thus, the model represents an absolute worse-case-scenario, something which could only be replicated in winter months when trees and shrubs are bare.

The Visual APE was based on acuity of vision, or the ability of an individual to discern visual details. Visual acuity is dependent on a number of optical and neural factors, but normal visual acuity is usually defined as 20/20. Normal vision implies that at 20 feet (6 meters), a human eye is able to discern separate contours which are 1.75 mm apart. This translates to the discernment of details separated by a visual angle of one arc minute (or 1/60th of a degree), projected across the retina of the eye. Visual resolution, or the smallest number of visual degrees an eye can detect, can be derived from visual acuity. For the purposes of this study, the threshold of visual perception was set at 1.5 miles, as this is the distance that a person with normal (20/20) vision would be able to discern objects spaced 2.3 feet apart from one another. Beyond this threshold, objects, the spaces between them, and background are indistinguishable. Thus, all areas of the Visual APE beyond this 1.5-mile buffer from the boundaries of the project area were eliminated.

The next step was to identify observer viewpoints which would be used to generate the viewshed. For this study, only one viewpoint was selected in the southwest portion of the development. This viewpoint was chosen for several reasons. First of all, a larger quantity of new structures is proposed along the western edge of the airport than along the eastern edge. The western edge is also closer in proximity to a number of historic battlefields, structures, and districts to the west of the airport. Finally, the area to the west and south of the airport has been less affected by residential and industrial development than the areas to the north and east, making it more likely that development in this area could visually affect historic properties. This step utilized the visibility tool, an ability of many GIS platforms to calculate visibility of two given points on the surface of a DEM.

Additional conditions were factored into the viewshed analysis. Each viewshed factored in an observer height offset of 5.7 feet (1.75 meters), the height of an average person, and corrections for earth curvature and light refraction. As such, each resulting viewshed identifies every one-meter-square area an individual standing at an observer point can see. Finally, the height of the expected T-hangar was factored in as 61.0819 meters above mean sea level (200.4 feet above mean sea level), which is the same height as existing T-hangars. The visibility area remaining after these steps were taken served as the finalized Visual APE (Attachment C).

#### 4. Historic Properties Identified

Historic properties, as outlined in the National Historic Preservation Act, are any properties including buildings, sites (both surface and subsurface), structures, and objects listed or determined eligible for listing in the NRHP. For the purposes of discussion, the term "historic properties" refers to standing buildings, sites, structures, objects, or districts. Since archaeological sites which are eligible for or listed in the NRHP are subsurface sites, they will not be impacted visually by the above-ground developments within the Visual APE. Nine historic properties that are eligible for or listed on the NRHP fall within the Visual APE for the proposed work. These are listed below and depicted in Attachment C.

Table 1: Historic Properties within Visual APE

Designation	Name	Status					
076-0014	Moor Green	Listed in NRHP					
076-0024	Bristoe Station Battlefield	Eligible for NRHP					
(076-5161)	Bristoe Station Battlefield	Lingible for tvictin					
076-0024-		Contributes to 076-5344 NRHP					
0001 (076-	10604 Bristow Road	Eligibility					
0607)		Lingionity					
076-0024-	New Hope Baptist Church	Contributes to 076-0024 NRHP					
0025	New Hope Baptist Church	Eligibility					
076-0024-	10741 Milford Road	Contributes to 076-0024 NRHP					
0027	10/41 Williold Koad	Eligibility					
076-0149	Bloom Hill Farm	Eligible for NRHP					
076-5036	Manassas Station Operations						
(0076-5168)	Battlefield (The Civil War in	Eligible for NRHP					
(0070-3108)	Virginia)						
076-5344	Village of Bristoe Historic District	Eligible for NRHP					
155-5020	The Wakeman Site / Cannon	Listed in NRHP					
155-5020	Branch Fort						

There are also several historic resources which have been determined not eligible for the NRHP. These include the Carr Family Cemetery (076-0294), 14502 Vint Hill Road (076-0519), 11712 Nokesville Road (076-0614), 11812 Nokesville Road (076-0615), 10215 Linton Hall Road (076-0658), Conner Farm (076-5042), Prince William LLC House (076-5043), M. Thomas House (076-5043), 11705 Nokesville Road (076-5349), 10905 Bristow Road (076-5394), Blue Grass Acres Farm (076-5395), 9850 Chevalle Road (076-5398), and Orange and Alexandria Railway (076-5399). Because these resources are not considered eligible for the National Register, their viewsheds need no further consideration.

#### **5. Evaluation of Visual Impact**

The viewsheds of the nine properties listed in Table 1 above are considered below. Standards for evaluating potential effects on historic properties are derived from the National Historic Preservation Act of 1966, as amended. The regulations define "effect" as "alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National register" (36 CFR

800.16(i)). Thus, while a historic property may be impacted visually, this may only constitute a negligible impact, meaning that there would not be any noticeable changes to the historic property, or its visual context. An "adverse effect" occurs "when an undertaking may alter, directly or indirectly, any of the characteristics of the historic property that qualify it for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association" (36 CFR 800.5(a)(1)). The following evaluations of visual impact on the historic properties listed above is based primarily on information derived from V-CRIS.

Moor Green (VDHR # 076-0014) is a dwelling that was constructed ca. 1800, and is listed in the NRHP in 1978. The viewshed encompasses a significant portion of the historic property. Several original domestic and farm outbuildings, as well as the original approach to the house, have been destroyed throughout the twentieth century, leaving the house as the only component of the site remaining with integrity. The property is surrounded by single-family residences, constructed in the twentieth century. Thus, because the landscape has been so drastically altered, the view does not contribute to the NRHP listing of this property. In addition, there is a thick wooded area buffer of nearly 2,000 feet separates the property from Manassas Regional Airport, which will likely eliminate all sights and sounds associated with the development even in the winter months. Therefore, the proposed development will have no effect on the historic property.

Bristoe Station Battlefield (VDHR # 076-0024) is a historic district comprising numerous privately-owned properties which was determined as eligible for the NRHP in its current form in 2009. It contains 1,352 acres of the core area of the 1863 Battle of Bristoe Station, which is now surrounded by residential development, a golf course, and Manassas Regional Airport. Because the roads and railroad beds maintain their historic alignment, and much of the district is either under cultivation or wooded, the Bristoe Station Battlefield possesses strong integrity of setting, feeling, and association, as well as location.

The Bristoe Station Battlefield historic district also encompasses several historic properties which contribute to its eligibility for the NRHP. Two of these, New Hope Baptist Church (VDHR # 076-0024-0025) and 10741 Milford Road (VDHR # 076-0024-0027) intersect with the viewshed. While the extant buildings on these properties are twentieth-century noncontributing elements, the surrounding parcels are contributing elements, encompassing the portion of the battlefield which retains integrity and upon which the heaviest fighting occurred. The views from these properties need to be considered within the context of the entire district rather than on an individual basis.

The eastern portion of the Bristoe Station Battlefield historic district, as well as a small, elevated area in the middle, fall within the viewshed of the proposed development. Views from the eastern area of the historic district have already been affected by the golf course and the existing airport buildings. This is also true of the high area in the center of the district along the railroad. This visual impact would only be apparent during the winter months for much of the district, except the area immediately adjacent to the airport property which is not buffered by vegetation (especially at the intersection of Observation Road and Piper Lane). Although the proposed work will be visible from these areas, it will not be substantially different from what is now visible in terms of building style and height. The core area of the district within the historic area of the Village of Bristoe will not be affected. Because the changes do not significantly alter the district's setting, feeling, or association, this may be interpreted as a negligible impact on the historic battlefield.

Bloom Hill Farm (VDHR # 076-0149) is rural dwelling determined eligible for the NRHP in 1993 under Criterion C. The house was constructed in the late eighteenth or early nineteenth century. Two

barns and two additional outbuildings, are recorded on the property. The new residential neighborhood across Lucasville Road is currently within view of the farmstead, and thus the rural landscape which once surrounded the property is no longer intact. The viewshed of the proposed project intersects with the house and one outbuilding, as well as several other portions of the property. Nevertheless, approximately 3,500 feet of forest separates the house from the airport, and thus it is unlikely that the proposed work will be visible from the house, even in the winter months. Thus, the proposed project will have no effect on the historic property.

The southeast corner of the Village of Bristoe Historic District (VDHR # 76-5344) falls within the viewshed of the proposed project. The historic resources previously surveyed within the proposed Village of Bristoe boundaries have been determined eligible for the NRHP under Criterion A for broad patterns of development as a community centered on and built because of the railroad reconstruction during a period of growth after the Civil War and under Criterion C for their collective architectural merit. This historic district is included within the Bristoe Station Battlefield District as a non-contributing resource because the dates of construction are outside the period of significance of the battlefield (1863). Due to the wooded area around the eastern perimeter of the district, it is unlikely that any of the proposed project would be visible from the district excepting possibly the winter months. Even then, because the proposed work closely resembles the building types and heights that would already be visible from the rural district, the proposed project would have a negligible impact on the district.

The individually surveyed historic property at 10604 Bristow Road (VDHR # 076-0024-0001) is a contributing resource within the Village of Bristoe Historic District. The building is within the period of significance of the district and contributes to the district's potential eligibility under NRHP Criterion A for Broad Patterns of development as a community centered on and built as a result of the railroad reconstruction during a period of growth after the Civil War and under Criterion C for architecture. Although the viewshed encompasses much of the historic property, approximately 3,000 feet of forest is situated between the property and the proposed project, making it unlikely that the project will be at all visible. The proposed project will have no effect on the property.

The Manassas Station Operations (VDHR # 076-5036), also known as Bristoe Station Battlefield, Bull Run Bridge, Kettle Run Battlefield, and Union Mills, is a historic battlefield associated with the Manassas Battlefield Historic District which is potentially eligible for the NRHP. The district extends into the Project APE. The historic property includes tracts of land associated with the battles and operations of Bristoe Station, Kettle Run, Bull Run Bridge, and Union Mills, which all took place from August 25 to 27, 1862. It was recommended eligible for listing on the NRHP under Criterion A for its association with the Civil War in Virginia. The NRHP eligible area of the historic property is located, just to the west of the airport, closely following the course of Broad Run. Much of this area is within the viewshed of the proposed project. In some places, as much as 1,000 feet of wooded area separates the airport from this portion of the historic property, making it unlikely that these areas will be visible to each other except during the winter months. However, the existing airport structures as well as the rail station to the north are all within the view of the same area. Given that the proposed structures will be similar in height and size to the structures which are already within view of this area, this work will constitute a negligible effect.

Cannon Branch Fort (VDHR # 155-5020), also known as the Wakeman Site (archaeological site # 44PW227), is a historic fortification listed in the NRHP, which lies to the north of the airport. The western third of the historic property, which is on higher ground, falls within the viewshed of the proposed project. The main components of the historic property are the archaeological remains of a

rectangular earthwork and a possible rifle pit. The site is covered by dense tree cover which shields most views to and from these core components, although this was most likely not the case during the nineteenth century usage of the fort. Because distant views from the archaeological remains do not contribute to its listing on the NRHP, the proposed project will have no effect on this historic property.

#### 6. Conclusion

This report contains a comprehensive evaluation of the proposed development on historic properties that could potentially be visually affected in a worst-case scenario. The proposed project will not be visible from most locations in the nine historic properties identified. For those locations within historic properties where the development is visible, it will not adversely affect the eligibility of the sites.

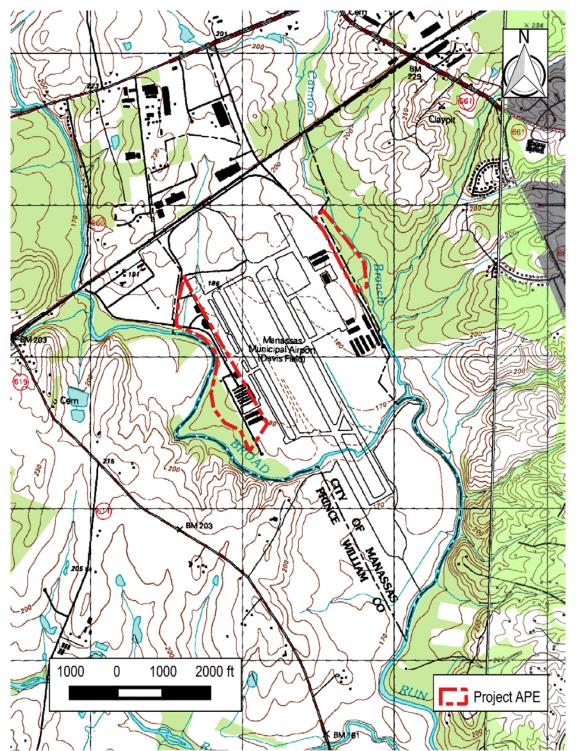
We would be pleased to provide you with any additional information or documentation.

Sincerely,

Susan Stafford

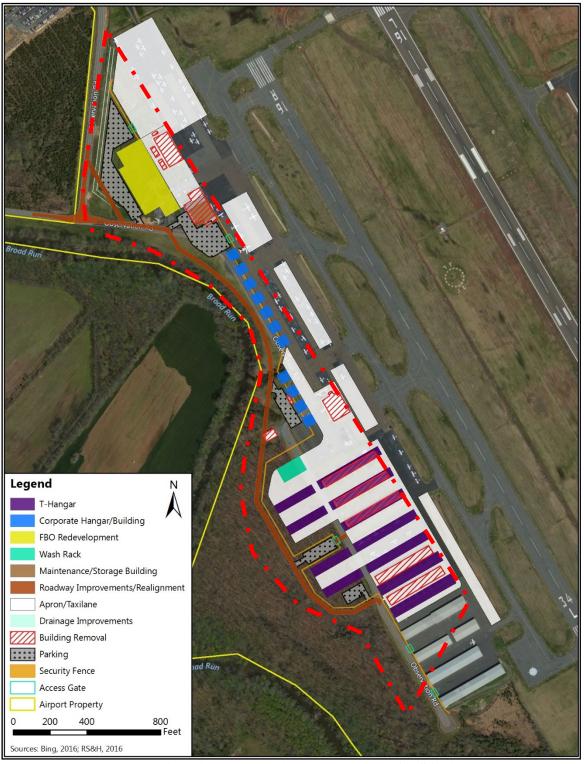
**Environmental Protection Specialist** 

# Attachment A



Project Location on 1994 Nokesville, VA and Independent Hill, VA USGS 7.5 Minute Quadrangle

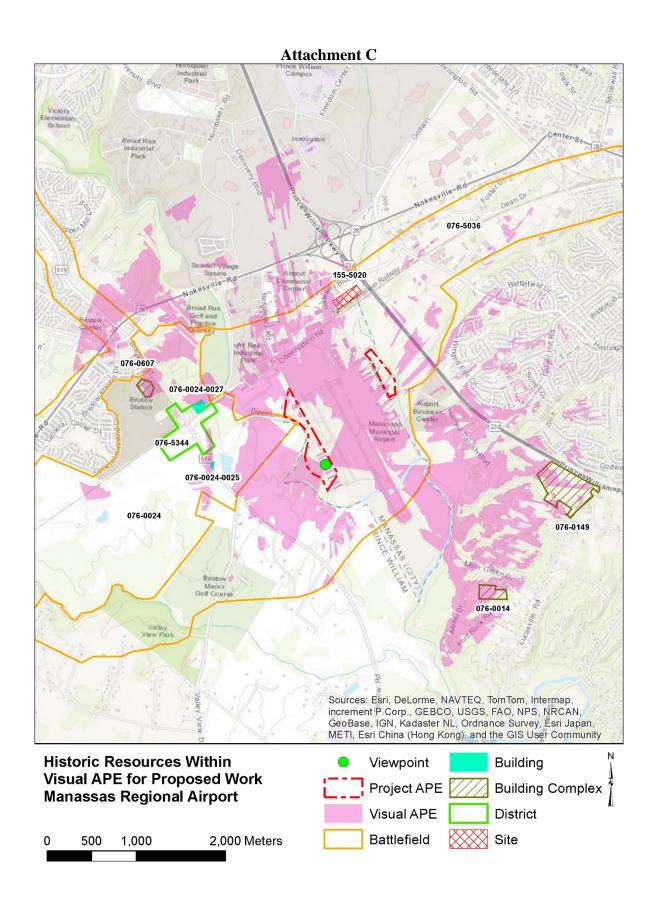
Attachment B
Project APE, western survey area and proposed project elements.

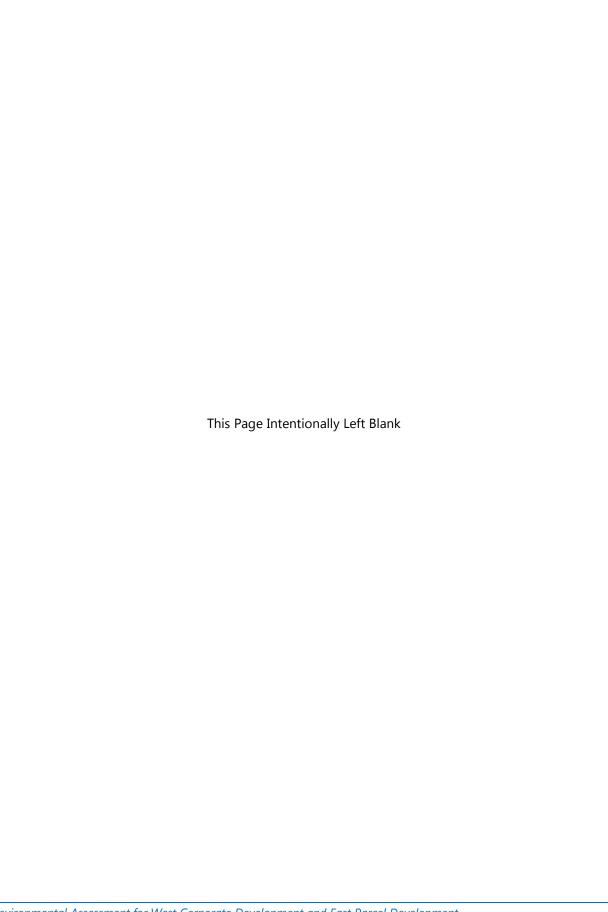


(APE in red, base image courtesy of RS&H).

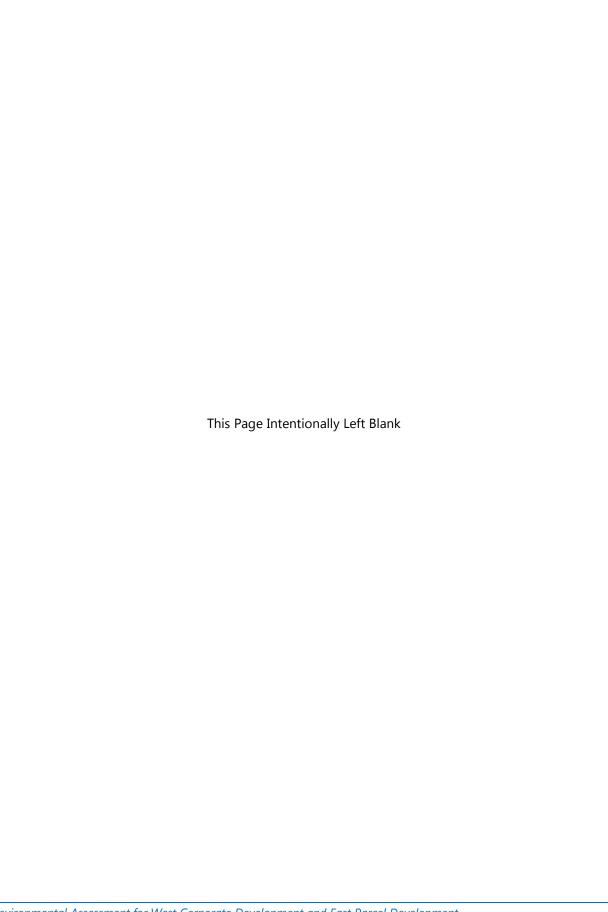
Attachment B (continued)
Project APE, eastern survey area and proposed project elements.
(APE in red, base image courtesy of RS&H)















# Wetland Delineation Report Manassas Regional Airport (HEF) Environmental Assessment for Corporate Development Manassas, VA

Prepared for: RS&H 10748 Deerwood Park Blvd South Jacksonville, FL 32256-0597

Prepared by:
Matt Neely
Senior Environmental Scientist, PWD
Mill Creek Environmental Consultants

21 March 2017

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#### 1.0 INTRODUCTION

#### 1.1 **Background**

RS&H recently hired Mill Creek Environmental Consultants, Ltd. to conduct a wetland delineation on  $\pm$  48 acres of land associated with an FAA mandated Environmental Assessment (EA) being conducted at the Manassas Regional Airport, in Manassas Virginia. The primary objective was to provide a delineation of waters of the US, including wetlands, within the  $\pm$  48 acres study area. This type of delineation is used to produce an accurate wetlands map and supporting data for the purpose of attaining a Jurisdictional Determination (JD) from the U.S. Army Corps of Engineers (USACE). The Office of the Norfolk District USACE handles and processes these requests.

#### 1.2 Wetland Policy

One of the primary federal policies regarding aquatic resources is Section 404 of the Clean Water Act (CWA; Public Law 92-500). This act regulates the discharge of dredge or fill material into waters of the United States, including most wetlands.

In recent years the scope of Section 404 of the CWA has been impacted by multiple court cases concerning the type of waters over which it asserts it's jurisdiction. The decisions in these cases have set the standards by which a jurisditional determination can be made under the CWA. In 2015 the U.S. Environmental Protection Agency (EPA) issued a final Clean Water Rule, which outlines the definition of "Waters of the United States".

In addition to the federal policies discussed above, the Virginia Department of Environmental Quality (VDEQ) administers the Virginia Water Protection Permit Program (VWPP). This program regulates impacts to wetlands and streams in Virginia. The regulation guiding this program is the Virginia Water Protection Permit Regulation (9VAC-25-210 et seq.).

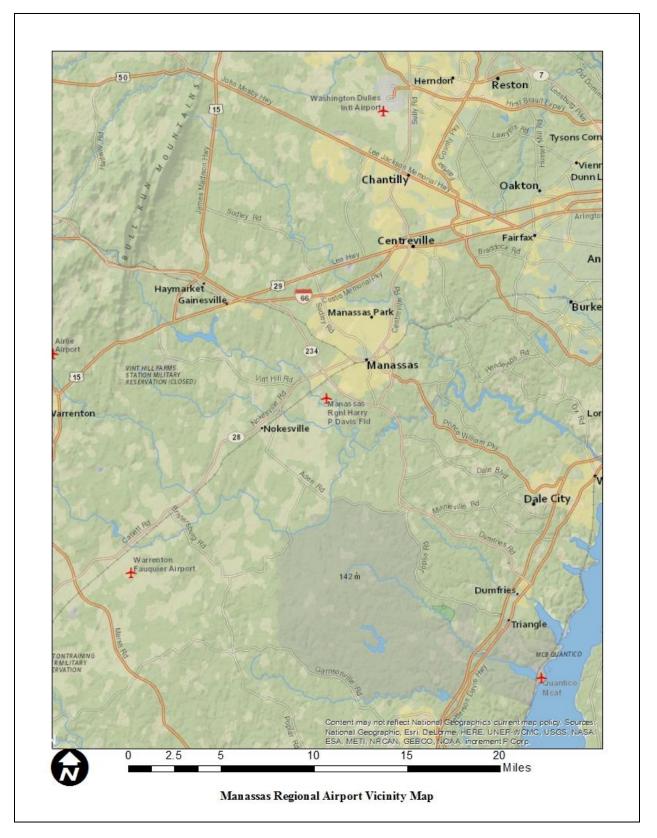


Figure 1-1. Manassas Regional Airport Vicinity Map

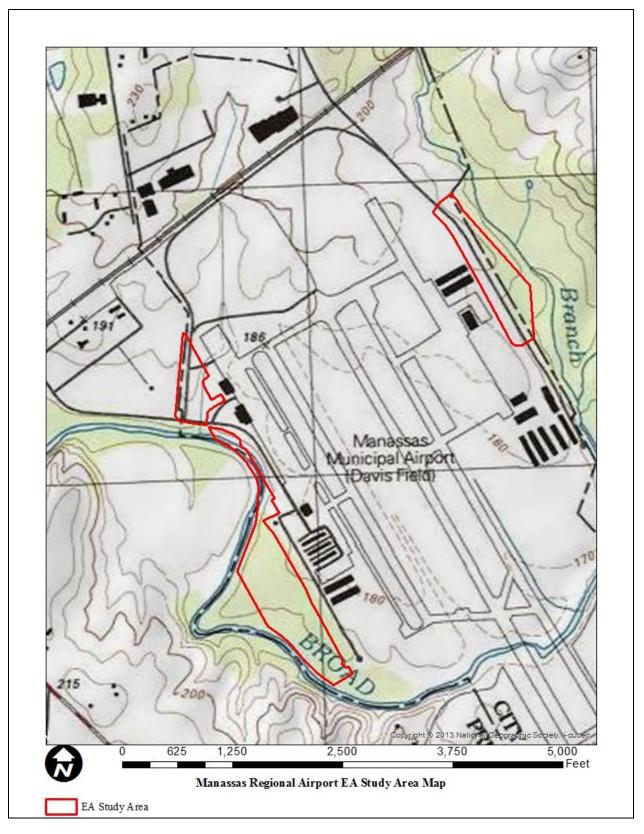


Figure 1-2. Manassas Regional Airport EA Study Area Map

#### 2.0 EA STUDY AREA OVERVIEW

The EA study area is comprised of approximately  $\pm$  48 acres adjacent to the Manassas Regional Airport in Manassas, Virginia. The area is divided into three distinct parcels, two to the west (W) of the airport operations area (AOA) and one to the east (E).



Figure 2-1. Manassas Regional Airport EA Study Area Aerial Map

#### Area A (+ 25 Acres)

The largest of the three parcels within the EA Study area is area A ( $\pm$  25 acres). Area A is immediately adjacent to the hangar, apron, and parking spaces on the west (W) side of the AOA between the fence line and Broad Run.

The vast majority of area A ( $\pm$  22 acres) consists of mature, mixed hardwood forest. Vegetation is comprised of a mature over-story containing species such as red maple (Acer rubrum), pin oak (Quercus palustris), willow oak (Quercus phellos), boxelder maple (Acer negundo), sweetgum (Liquidambar stryaciflua), white oak (Quercus alba), northern red oak (Quercus rubra), black oak (Quercus velutina), tuliptree (Liriodendron tulipifera), American beech (Fagus grandifolia), and various species of Hickory (Carya spp). Most of area A contains a limited shrub or

herbaceous strata. Areas with higher soil moisture content possess herbaceous species such as lizard's tail (*Saururus cernuus*), false nettle (*Boehmeria cylindrica*), shallow sedge (*Carex lurida*), and varying species of rushes (*Juncaceae spp.*).



**Figure 2-2. Area A** (<u>+</u> **25 Acres**)



Figure 2-3. Mature Mixed Hardwood Over-story Limited Shrub and Herbaceous Layer



Figure 2-4. Mature Mixed Hardwood Over-story w/Shrub and Herbaceous Layer

Approximately ± 3 acres of area A consists of graded maintained/mowed grass lots immediately adjacent to observation road. The area is characterized as a level, compactly graded lot consistently cut and compacted by normal maintenance.



Figure 2-5. Maintained Grass Area Adjacent to Observation Road

#### Area B ( $\pm$ 7 Acres)

Area B consists of  $\pm$  7 acres on the west (W) side of the AOA between aircraft parking aprons, hangars, taxiway spaces, and observation road. It is characterized a by mostly level, compactly graded, grass surface that only changes in elevation as it slopes down to the significant stormwater ditch making its way through the area.



Figure 2-6. Area B (+ 7 Acres)

The vegetation in this area consists of maintained fesuces (*festuca spp.*), and other weeds such as broom sedge (*Andropogon virginicus*).



Figure 2-7 Highly Compacted Grass Landscape



Figure 2-8. N/S Storm-water Ditch

#### Area C (± 16 Acres)

Area C consists of  $\pm$  16 acres on the east (E) side of the AOA, immediately east (E) of wakeman drive and west (W) of cannon branch.



Figure 2-9. Area C ( $\pm$  16 Acres)

Almost all  $\pm$  16 acres consists of mature, mixed hardwood forest. Vegetation is comprised of a mature over-story containing species such as white oak (*Quercus alba*), northern red oak (*Quercus rubra*), black oak (*Quercus velutina*), tuliptree (*Liriodendron tulipifera*), American

beech (Fagus grandifolia), eastern redcedar (Juniperus virginiana), red maple (Acer rubrum), pin oak (Quercus palustris), willow oak (Quercus phellos), boxelder maple (Acer negundo), sweetgum (Liquidambar stryaciflua), and various species of hickories (Carya spp.). The limited Shrub strata contains saplings of the species listed above in addition to instances of deerberry (vaccinium stamineum). Areas with higher soil moisture content possess herbaceous species such as lizard's tail (Saururus cernuus), false nettle (Boehmeria cylindrica), shallow sedge (Carex lurida), and varying species of rushes (Juncaceae spp.).



Figure 2-10. Mature Forest w/Limited Shrub Layer



Figure 2-11. Mature Forest w/Thick Herbaceous

#### 2.1 General Climate

According to NOAA's Dulles station, based on data collected since 1963, the coldest month on average is January with an average temperature of 33.2 °F. July is the warmest month on average with an average temperature of 76.7 °F. The normal annual precipitation is around 42 inches. From 1-31 October 2016, Manassas saw 50% of normal precipitation.

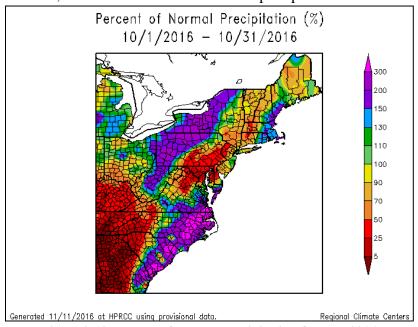


Figure 2-12. Percent of Normal Precipitation October 2016

This departure from normal is approximately 3" less than the normal amount of precipitation for October.

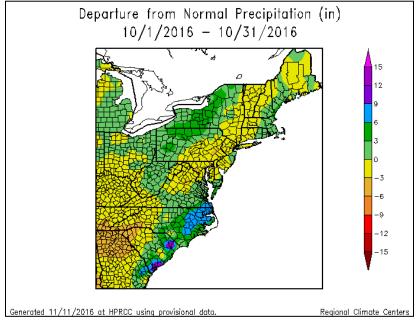


Figure 2-13. Departure from Normal Precipitation (in) October 2016

#### 2.2 Watersheds

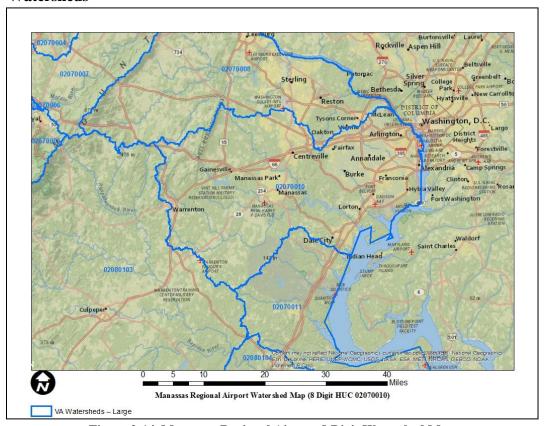


Figure 2-14. Manassas Regional Airport 8 Digit Watershed Map

All three distinct parcels sit between elevations of 160-180'. Precipitation falling within the two parcels to the west (W) of the AOA makes its way via overland sheet-flow and groundwater movement to Broad Run immediately to the west (W) and south (S). Precipitation falling within the parcel to the east (E) makes its way via overland sheet-flow and groundwater movement down slope to the north (N) into Cannon Branch and eventually into Broad Run, which flows into the Middle Potomac-Anacostia-Occoquan basin (HUC02070010).



Figure 2-15. Study Area Watershed and Flowline Map

#### 2.3 **Soil Base Mapping**

According to the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey, Prince William County, there are 5 mapped soil units located within the west (W) portion of the EA study area. Four of the mapped soils within the west (W) portion of the EA study area (Aden silt loams, Bermudian silt loams, Elsinboro sandy loams, and Rowland silt loams) were formed by alluvial deposits associated with floodplains and drainage ways. They range in USDA texture from silt loams to sandy loams and possess slopes from 0-7 percent. One mapped soil unit, Urban land-Udorthents complex, consists of soil that has experienced a significant amount of disturbance due to the grading and filling most likely associated with the Airport's Development.



	#1, Prince William County, Virginia (VA153)							
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI					
1A	Aden silt loam, 0 to 2 percent slopes	1.4	4.5%					
7A	Bermudian silt loam, 0 to 2 percent slopes	1.1	3.4%					
20B	Elsinboro sandy loam, 2 to 7 percent slopes	1.6	5.3%					
54B	Urban land-Udorthents complex, 0 to 7 percent slopes	2.5	8.0%					
Subtotals for #1		6.6	21.3%					
Totals for Area of Interest		31.0	100.0%					

	#2, Prince William Co	unty, Virginia (VA153)	
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1A	Aden silt loam, 0 to 2 percent slopes	11.9	38.3%
7A	Bermudian silt loam, 0 to 2 percent slopes	1.5	4.7%
16A	Delanco fine sandy loam, 0 to 4 percent slopes	3.2	10.2%
20B	Elsinboro sandy loam, 2 to 7 percent slopes	1.7	5.6%
49A	Rowland silt loam, 0 to 2 percent slopes	3.3	10.7%
54B	Urban land-Udorthents complex, 0 to 7 percent slopes	2.8	9.1%
Subtotals for #2		24.4	78.7%
Totals for Area of Interest		31.0	100.0%

Figure 2-16. Manassas Regional Airport EA Study Area Soil Base Map (West)

According to the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey, Prince William County, there are 6 mapped soil units located within the east (E) portion of the EA study area. All six of the mapped units (Arcola, Dulles, Hatboro, Manassas, Panorama, and Rowland) possess a USDA texture of silt loam, and range from 0-7 percent slopes.



	Prince William County, Virginia (VA153)								
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI						
4B	Arcola silt loam, 2 to 7 percent slopes	4.9	31.4%						
17A	Dulles silt loam, 0 to 4 percent slopes	2.7	17.3%						
26A	Hatboro silt loam, 0 to 2 percent slopes	0.1	0.7%						
35B	Manassas silt loam, 2 to 7 percent slopes	0.4	2.7%						
46B	Panorama silt loam, 2 to 7 percent slopes	3.9	25.4%						
49A	Rowland silt loam, 0 to 2 percent slopes	3.5	22.4%						
Totals for Area of Interest		15.5	100.0%						

Figure 2-17. Manassas Regional Airport EA Study Area Soil Base Map (East)

#### 3.0 METHODS

Prior to conducting the delineation of the EA study area provided by RS&H, extensive research based upon historical information available for the given area was conducted by Mill Creek Environmental Consultants. This allowed for the collection of data which in turn would be utilized to create a base map on which the final delineation information would be added to complete the detailed wetland mapping. Once created, this base map was then downloaded into Pathfinder Office and transferred to a Trimble GeoExplorer 6000 mapping unit that would capture the gps locations of the wetland boundaries collected in the field with sub-meter accuracy.

The field delineation was conducted utilizing the methods established in the *Corps of Engineers Wetlands Delineation Manual* (USACE 1987) as well as the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0)*. These manuals provide detailed guidance regarding hydrology, vegetation, and soils, and the indicators of these for which a wetland determination is made.

#### 3.1 **Wetland Field Delineation**

The field delineation was conducted between 24-26 October 2016. During this delineation 33 sampling locations, utilizing Wetland Determination forms for the Eastern Mountains and Piedmont Region were used to make wetland/non-wetland determinations (Appendix A). These determinations are based on the investigation of the required indicators associated with hydrology, vegetation, and soils.

In order to determine positive wetland hydrology, at least one of the 17 primary indicators or 2 of the 12 secondary indicators is required.

The plant species within each stratum (Tree, shrub, herbaceous, and woody vine) were investigated to determine the percent of hydrophytic vegetation present according to the wetland indicator status set forth in the 2016 National Wetland Plant List, Regional List for the Eastern Mountains and Piedmont Region.

(http://rsgisias.crrel.usace.army.mil/nwpl\_static/data/DOC/lists\_2016/Regions/pdf/reg\_EMP\_2016v1.pdf)
If the plant communities present passed either the Rapid Test for Hydrophytic Vegetation, the Dominance Test, or Prevalence Index, then it was given a "wetland vegetation present" status.

At each sampling location soil borings were taken to make a hydric/non-hydric soil determination. These locations were also investigated to determine whether or not they matched the mapped soil types. The Regional Supplement outlines 28 hydric soil indicators, only one of which is required to make a hydric soil determination. Of these, the most commonly found indicator is a depleted soil matrix.

#### 3.2 Wetland Boundary Mapping

Wetland boundaries were marked in the field by pink wetland flagging imprinted with "wetland delineation" in black. The flags were marked with an alpha numeric designator and the location was logged with a Trimble GeoExplorer 6000. Waterways such as

streams or ditches were marked with blue and white "barber pole" tape and labeled with an alpha numeric. All sampling points where a wetland determination form was executed were marked in the field by red and white barber pole tape.

Location data was then downloaded into Pathfinder Office, and post-processed for accuracy. This location data was then exported into ArcGIS software and feature polygons were created to produce a map that would be submitted to the U.S. Army Corps of Engineers for a Preliminary Jurisdictional Determination (JD). This mapping can be found in Appendix A.

#### 3.3 Jurisdiciton

A field confirmation of the wetland boundaries was conducted by Ms. Theresita Crockett-Augustine from the U.S. Army Corps of Engineers on 16 February 2016. The Preliminary Jurisdictional Determination letter associated with this confirmation, dated 3/14/2017 (File NAO-2017-00508, Manassas Regional Airport) can be found in Appendix B.

#### 4.0 RESULTS & CONCLUSIONS

#### 4.1 Results

The wetland delineation associated with the west (W) portion of the EA study area found 3.33 acres of wetlands and 104 linear feet of jurisdictional ditch within the study area boundaries. Of this 3.33 acres, 3.31 acres were determined to be palustrine forested (PFO) wetlands, while .02 acres were determined to be palustrine emergent (PEM) wetlands.

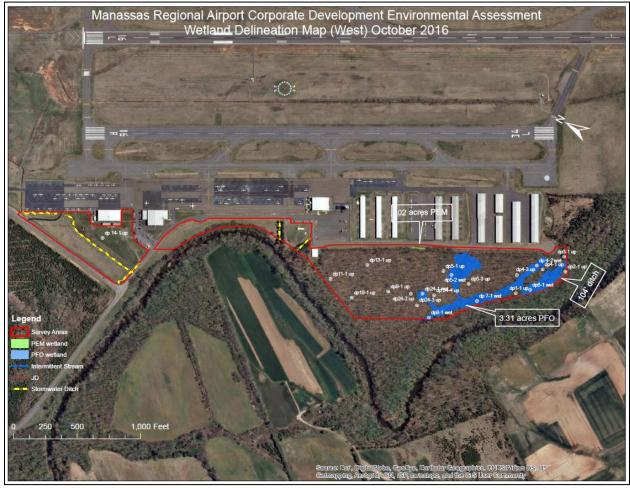


Figure 4-1. Manassas Regional Airport EA Study Area Wetland Delineation Map (West)

The wetland delineation associated with the east (E) portion of the EA study area found 1.514 acres of wetlands, and 10 linear feet of intermittent stream within the study area boundaries. Of this 1.514 acres, 1.51 were determined to be palustrine forested (PFO) wetlands, while .004 acres were determined to be palustrine emergent (PEM) wetlands.



Figure 4-2. Manassas Regional Airport EA Study Area Wetland Delineation Map (East)

Across both study areas a total of 4.84 acres of wetlands and 114 linear feet of RPW were delineated and confirmed by the Corps of Engineers. These totals and are outlined in the JD found in Appendix A.

Aquatic Resource	EA Study Area West	EA Study Area East	Total
PFO Wetlands (Acres)	3.31	1.51	4.82
PEM Wetlands (Acres)	0.02	0.004	0.024
Stream (linear feet)	0	10	10
Jurisdicitonal Ditch (linear feet)	104	0	104

Figure 4-3. Manassas Regional Airport EA Study Area Table of Aquatic Resources

#### 4.2 Conclusions

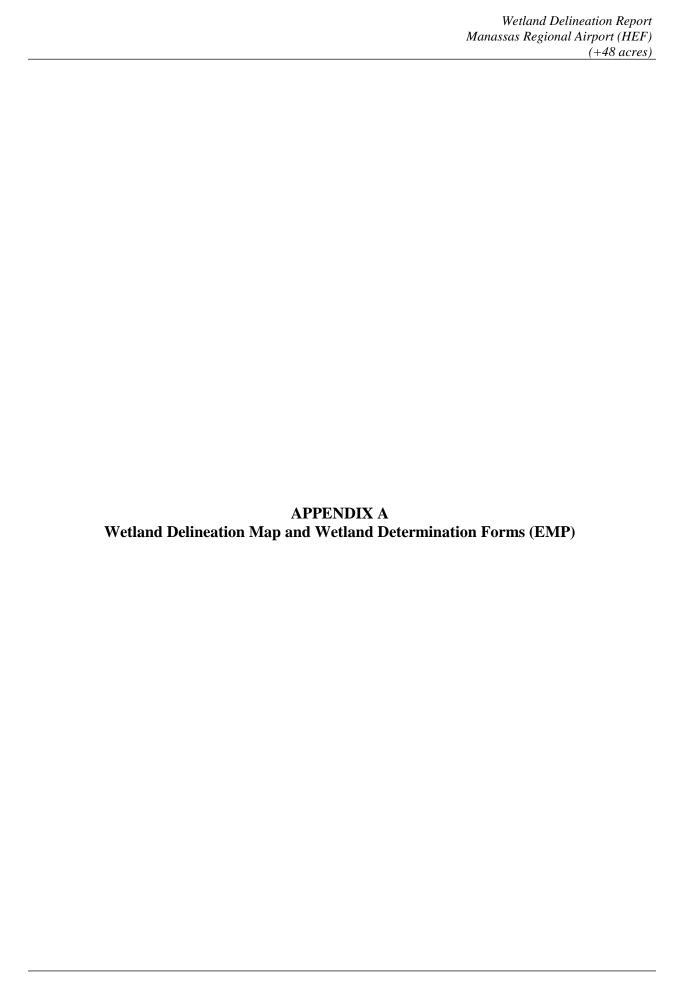
In conclusion, any activity resulting in the dredging, filling, or altering of the jurisdictional waters of the US present may require a permit from the U.S. Army Corps of Engineers or the Virginia Department of Environmental Quality. Further coordination should be conducted prior to commencement of work in those areas.

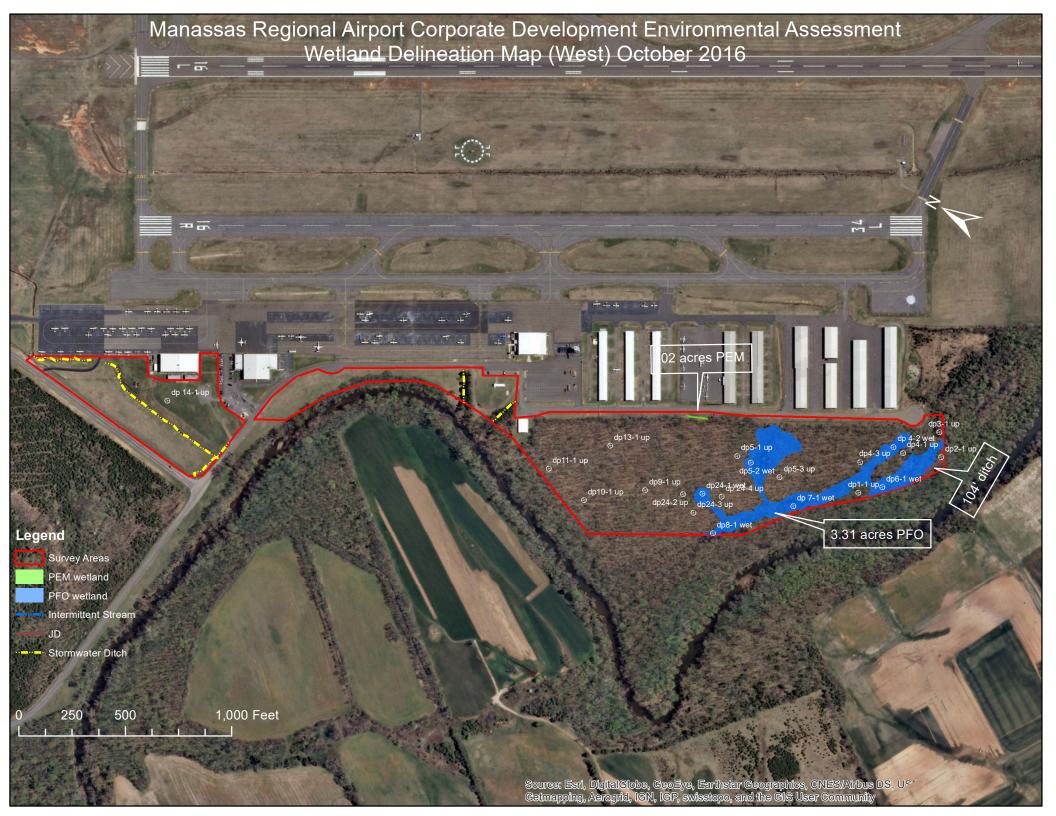
#### 5.0 REFERENCES

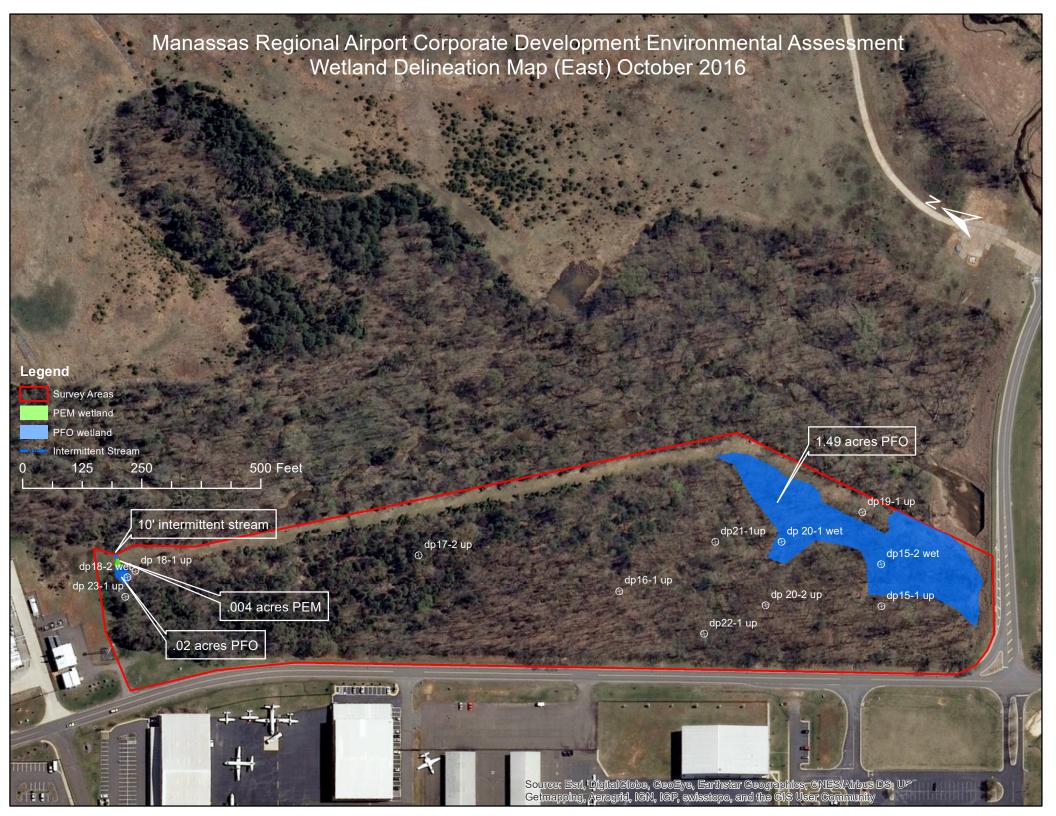
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  <u>Delineation Manual</u>, Technical Report Y-87-1, US Army Engineer Waterways

  Experiment Station, Vicksburg, Mississippi, 100 pp. W/Appendices.
- U.S. Army Corps of Engineers. 2012. <u>Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region</u>, Technical Report ERDC/EL TR-12-9, U.S. Army Engineer and Research Development Center, Environmental Laboratory, Vicksburg, Mississippi.
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- US Department of Agriculture, Natural Resources Conservation Service (NRCS) 2013. Web Soil Survey, Prince William Virginia
- US Fish and Wildlife Service, Biological Services Program, 1979. <u>Classification of Wetlands and Deepwater Habitats of the United States</u>. FWS/OBS-79/31, US Department of the Interior, Washington, D.C., 103 pp.







#### WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Map Unit Name:   Aden Silt Loam	Manassas Regional Airpo	ort	City/County: Manassas	Sampling Date: 24-Oct-16
addorm (hillslope, terrace, etc.): Terrace	plicant/Owner: Manassas Regional	l Airport	State: VA	Sampling Point: 1-1 up
Map Unit Name:   Aden Silt Loam	estigator(s): Matt Neely		Section, Township, Range: S	S T R
Map Unit Name: Aden Silt Loam	dform (hillslope, terrace, etc.):	Terrace	Local relief (concave, convex,	none): none
Map Unit Name: Aden Silt Loam	region (LRR or MLRA): MLRA 1	148 in LRR S Lat.	.: 38°43'0.807"N <b>Lo</b> i	ng.: 77°31'8.626"W
climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation  , Soil  , or Hydrology    significantly disturbed?	-		30 13 01007 11	
Vegetation	•		was Vec No O /If no	
Vegetation				
Immary of Findings - Attach site map showing sampling point locations, transects, important features, et prophytic Vegetation Present? Yes No Table (2) No Table (2) No Table (3) No Table (3) No Table (4) No Table		, or Hydrology Significal	ntiy disturbed? Are "Norma	ll Circumstances" present?
Is the Sampled Area within a Wetland?  Ves No   No   Is the Sampled Area within a Wetland?  Ves No   No   No   No   Is the Sampled Area within a Wetland?  Ves No   No   No   No   Is the Sampled Area within a Wetland?  Ves No   No   No   No   No   No   No   Is the Sampled Area within a Wetland?  Ves No   No   No   No   No   No   No   No	Vegetation, Soil	, or Hydrology 🗌 naturally	problematic? (If needed,	explain any answers in Remarks.)
Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No	ımmary of Findings - At	tach site map showing	sampling point locatio	ns, transects, important features, etc
Is the Sampled Area within a Wetland?   Yes   No   No   No   No   Wetland Hydrology Present?   No   No   No   Wetland Hydrology Present?   Yes   No   No   No   Wetland Hydrology Indicators:   Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Dry Season Water Table (A2)   Presence of Reduced Iron (C4)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Inundation Visible on Aerial Imagery (B7)   Mater-Stained Leaves (B9)   Microtopographic Relief (D4)   FAC-neutral Test (D5)	vdronhytic Vegetation Present?	Yes  No		
etland Hydrology  Netland Hydrology Indicators:    Secondary Indicators (minimum of two required)			To the Commission Area	
Again At crust (B4)    Direct Deposits (B3)   Direct Deposits (B4)   Direct Deposits (B5)			within a Wetland?	Yes ○ No •
Netland Hydrology Indicators:   Secondary Indicators (minimum of two required)	etland Hydrology Present?	res UNO U		
Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)				
Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B3)  Drift deposits (B3)  Algal Mat or Crust (B4)  Innudation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water (A1)  True Aquatic Plants (B14)  Sparsely Vegetated Concave Surface (B8)  Hydrogen Sulfide Odor (C1)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Innudation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  FAC-neutral Test (D5)  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (i				
Surface Water (A1)		one required, check all that apply	w	
High Water Table (A2)	$\overline{}$			
Saturation (A3)	¬ ` ´		` '	
Sediment Deposits (B2)			` '	
Drift deposits (B3)	Water Marks (B1)	Presence of Re	duced Iron (C4)	Dry Season Water Table (C2)
Algal Mat or Crust (B4)	Sediment Deposits (B2)	Recent Iron Re	duction in Tilled Soils (C6)	Crayfish Burrows (C8)
☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Water Table Present? Yes ☐ No ☐ Depth (inches): ☐ Water Table Present? Yes ☐ No ☐ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ☐ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ☐ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ☐ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ☐ Depth (inches): ☐ Dept	_ ' ' '	☐ Thin Muck Surf	ace (C7)	Saturation Visible on Aerial Imagery (C9)
☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ FAC-neutral Test (D		Other (Explain	in Remarks)	
Water-Stained Leaves (B9) Aquatic Fauna (B13)  FAC-neutral Test (D5)  Geld Observations: Surface Water Present?  Water Table Present?  Yes No Depth (inches): Geld Observations: Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Geld Observations: Surface Water Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Pepth (inches):  Yes	_	(P7)		
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Security of the present of t		ery (B7)		
Field Observations:  Sourface Water Present? Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):  Solutionation Present? Yes No Person No Depth (inches):  Solutionation Present? Yes No Person No Pers	_			
Autrace Water Present?  Yes No Depth (inches): Vater Table Present?  Yes No Depth (inches): Vaturation Present?  Yes No Depth (inches): Vaturation Present?  Yes No Depth (inches): Vater Table Present?  Yes No Depth (inches): Value of the present includes capillary fringe)  Vater Table Present?  Yes No Depth (inches): Value of the present includes capillary fringe)  Vater Table Present?  Yes No Depth (inches): Value of the present includes capillary fringe)  Vater Table Present?  Yes No Depth (inches): Value of the present inches includes capillary fringe)  Vater Table Present?  Yes No O				TAC ficular rest (D3)
Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No local No	•• (	Oepth (inches	s):	
Saturation Present?  Yes No Depth (inches):  Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	Water Table Present? Yes	No Depth (inche	s):	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	Saturation Present?		Wetland Hy	rdrology Present? Yes 🔾 No 🗨
	includes capillary fringe)			11.11
emarks:	escribe Recorded Data (stream g	gauge, monitoring well, aerial ph	iotos, previous inspections), if av	/allable:
emarks:				
	Remarks:			

## **VEGETATION** (Five/Four Strata)- Use scientific names of plants. Dominant

Dominant Species?				Sampling Point: 1-1 up			
	Absolute	Re	el.Strat.	Indicator	Dominance Test worksheet:		
Tree Stratum (Plot size: <u>30</u> )	% Cover			Status	Number of Dominant Species		
1 Carya cordiformis	20	<b>V</b>	80.0%	FACU	That are OBL, FACW, or FAC: 3 (A)		
2 Acer negundo		<b>V</b>	20.0%	FAC	Total Number of Dominant		
3		Ц	0.0%		Species Across All Strata:5(B)		
4		Ц	0.0%				
5			0.0%		Percent of dominant Species That Are OBL, FACW, or FAC: 60.0% (A/B)		
6		Ц	0.0%		That Are obe, FACW, of FAC.		
7	0	Ц	0.0%		Prevalence Index worksheet:		
8	0	Ш	0.0%		Total % Cover of: Multiply by:		
Sapling-Sapling/Shrub Stratum (Plot size: 15	, = 5	= To	otal Cover	•	0BL speci es x 1 =0		
	10	<b>V</b>	100.0%	FΔC	FACW speci es 0 x 2 = 0		
1 Asimina triloba			0.0%	TAC	FAC speciles <u>20</u> x 3 = <u>60</u>		
2		$\Box$	0.0%		FACU species $25 \times 4 = 100$		
3		$\exists$	0.0%		UPL species $0 \times 5 = 0$		
4		$\exists$	0.0%		Column Totals: 45 (A) 160 (B)		
5		$\vdash$			dordina rotars.		
6	_	$\vdash$	0.0%		Prevalence Index = B/A = 3.556		
7		$\vdash$	0.0%		Hydrophytic Vegetation Indicators:		
8	_	$\vdash$	0.0%		Rapid Test for Hydrophytic Vegetation		
9			0.0%		✓ Dominance Test is > 50%		
10		Ш	0.0%		Prevalence Index is ≤3.0 <sup>1</sup>		
Shrub Stratum (Plot size:)	10 :	= To	otal Cover	•	Morphological Adaptations <sup>1</sup> (Provide supporting		
1	0		0.0%		data in Remarks or on a separate sheet)		
2			0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)		
3	0		0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must		
4	_		0.0%		be present, unless disturbed or problematic.		
5			0.0%		Definition of Vegetation Strata:		
6			0.0%		Four Vegetation Strata:		
7.			0.0%		Tree stratum - Consists of woody plants, excluding vines, 3		
• •	0 =		otal Cover		in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.		
Herb Stratum (Plot size: 15 )			100.0%	FAC	Sapling/shrub stratum – Consists of woody plants, excluding		
1 _ Microstegium vimineum				FAC	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.		
2			0.0%		Herb stratum – Consists of all herbaceous (non-woody)		
3		$\vdash$	0.0%		plants, regardless of size, and all other plants less than 3.28 ft tall.		
4	0_	$\vdash$	0.0%		Woody vines – Consists of all woody vines greater than 3.28		
5	0_		0.0%		ft in height.		
6			0.0%		Five Vegetation Strata:		
7			0.0%		Tree - Woody plants, excluding woody vines, approximately		
8	0		0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).		
9	0	Ц	0.0%		Sapling stratum – Consists of woody plants, excluding		
10		Ц	0.0%		woody vines, approximately 20 ft (6 m) or more in height and		
11	0	Ц	0.0%		less than 3 in. (7.6 cm) DBH.		
12	0	Ш	0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.		
Woody Vine Stratum (Plot size: 15 )	5	= To	otal Cover	•	Herb stratum – Consists of all herbaceous (non-woody)		
1 Lonicera japonica	5	<b>✓</b>	100.0%	FACU	plants, including herbaceous vines, regardless of size, and		
2			0.0%		woody species, except woody vines, less than approximately 3 ft (1 m) in height.		
3		$\Box$	0.0%		Woody vines – Consists of all woody vines, regardless of		
4			0.0%		height.		
			0.0%				
5					Hydrophytic		
6.	0	Ш	0.0%		Vegetation   Yes • No •		
·-	5		otal Cove		Present!		

Soil Sampling Point: 1-1 up

	ription: (De		the depth	needed t				nfirm the	absence of indicators.)	<u></u>	
Depth (inches)	Colon (	Matrix	0/	Color		lox Feature		Loc2	Taxebure	Dam	u a ulca
0-10	Color (	<b>moist)</b> 4/6	<b>%</b>	Color	(moist)		Type <sup>1</sup>	LOC2	Texture Silt Loam	кеп	narks
					_						
10-13	10YR	4/6	60						Silt Loam		
	10YR	4/3	40						Silt Loam		
13-16	10YR	4/6	90						Silt Loam		
	10YR	5/2	10						Silt Loam		
										ų. <u></u>	
										4.	
-									-		
									-		
<sup>1</sup> Type: C=Con	centration. D	=Depleti	on. RM=Red	duced Matri	x, CS=Cover	ed or Coated	d Sand Gra	ins <sup>2</sup> Loc	ation: PL=Pore Lining. M=	:Matrix	
Hydric Soil 1									Indicators for Probl	ematic Hydri	ic Soils <sup>3</sup> :
Histosol (	'				rk Surface (	•			2 cm Muck (A10)	(MLRA 147)	
	pedon (A2)				lyvalue Belov				Coast Prairie Redo	ox (A16)	
Black Hist	tic (A3) 1 Sulfide (A4)				in Dark Surfa		.KA 14/, 1	48)	(MLRA 147,148)		
	Layers (A5)	)			amy Gleyed I				Piedmont Floodpl (MLRA 136, 147)	ain Soils (F19)	
	:k (A10) (LRR	R N)			dox Dark Su	. ,			Very Shallow Dark	Curface (TF1	2)
	Below Dark		A11)	_	pleted Dark	` ,	)		Other (Explain in		2)
	k Surface (A	•	,		dox Depress					remanoj	
	uck Mineral (	•	N,		n-Manganes .RA 136)	e Masses (F	12) (LRR N	Ι,			
	eyed Matrix (	S4)		Un	nbric Surface	e (F13) (MLR	A 136, 122	2)	•		
Sandy Re		,		Pie	edmont Floor	dplain Soils (	F19) (MLR	A 148)	<sup>3</sup> Indicators of	hydrophytic ve drology must b	egetation and
Stripped	Matrix (S6)			☐ Re	ed Parent Ma	terial (F21)	(MLRA 127	', 147)		isturbed or pro	
Restrictive L	aver (if obs	served):									
Type:											
Depth (inc	ches):								Hydric Soil Present?	Yes 🔾	No 💿
Remarks:									I.		



Photo File: IN	IG_3370.JPG	Orientation:	South -facing
Lat/Long or UTM :	Long/Easting	: 77°31'8.626"W	Lat/Northing: 38°43'0.807"N
Description:			

# No Photo

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

#### WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

State: VA   Sampling Point:   2.1 Up   settigator(s):   Matt Neely   Section, Township, Range: S   T   R	oject/Site: Manassas Regional Air	rport	City/County: Manassas	Sampling Date: 24-Oct-16
dform (hillslope, terrace, etc.): Terrace	Dlicant/Owner: Manassas Region	nal Airport	State: V	A Sampling Point: 2-1 Up
region (LRR or MLRA): MLRA 148 in LRR S	estigator(s): Matt Neely		Section, Township, Range:	S T R
Map Unit Name: Rowland silt loam	form (hillslope, terrace, etc.):	Terrace	Local relief (concave, convex,	(, none): flat Slope:2.0% /1.1
Map Unit Name: Rowland slit loam	region (LRR or MLRA): MLRA	A 148 in LRR S	— at.: 38°42'58.239"N	ong.: 77°31'4.387"W
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   Vegetation	-			
Vegetation	· —		of year? Ves () No () (If n	
Vegetation   , Soil   , or Hydrology   naturally problematic? (If needed, explain any answers in Remarks.)				· · · · · · · · · · · · · · · · · · ·
mmary of Findings - Attach site map showing sampling point locations, transects, important features, etc drophytic Vegetation Present? Yes No	vegetation, Soil	, or Hydrology Signific	antly disturbed? Are "Norma	al Circumstances" present?
drophytic Vegetation Present? Yes No ● dric Soil Present? Yes No ● stand Hydrology Present? Yes No ●  Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply) Surface Water (A1) Surface Water (A1) High Water Table (A2) Hydrogen Sulfide Odor (C1) Saturation (A3) Odidized Rhizospheres along Living Roots (C3) Water Marks (B1) Presence of Reduced Iron (C4) Drift deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Iron Depos	Vegetation, Soil	, or Hydrology 🔲 natura	lly problematic? (If needed	l, explain any answers in Remarks.)
Is the Sampled Area within a Wetland?  Yes No ●  Is the Sampled Area within a Wetland?  Yes No ●  Wetland Hydrology Present?  Ves No ●  Wetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Algal Mat or Crust (B4)  Is the Sampled Area within a Wetland?  Yes No ●  Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Surface Soil Cracks (B6)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Hydrogen Sulfide Odor (C1)  Drainage Patterns (B10)  Drainage Patterns (B10)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Wetland Hydrology Present?  Yes No ●  Depth (inches):  Wetland Hydrology Present?  Yes No ●  Depth (inches):  Wetland Hydrology Present?  Yes No ●  Depth (inches):  Wetland Hydrology Present?  Yes No ●	mmary of Findings - A	Attach site map showin	g sampling point location	ons, transects, important features, etc
dric Soil Present?  Yes	drophytic Vegetation Present?	Yes ○ No ●		
Vetland Hydrology Present?   Yes   No   In the Note   In the Note   No   In the Note   No   In the Note			Is the Sampled Area	
Vertaind Hydrology   Vertaind Hydrology Indicators:   Secondary Indicators (minimum of two required)   Primary Indicators (minimum of one required; check all that apply)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Water Marks (B1)   Presence of Reduced Iron (C4)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Iron Deposits (B5)   Geomorphic Position (D2)   Inundation Visible on Aerial Imagery (B7)   Aquatic Fauna (B13)   Microtopographic Relief (D4)   FAC-neutral Test (D5)   Retail Imagery (B7)   PAC-neutral Test (D5)   PAC-neutral Test			within a Wetland?	Yes ○ No ●
Secondary Indicators (minimum of two required)   Surface Soli Cracks (B6)				
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Drainage Patterns (B10)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drift deposits (C3)  Moss Trim Lines (B16)  Driv Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Saturation Present?  Yes No Depth (inches):  Wetland Hydrology Present? Yes No Pethons Inches):  Wetland Hydrology Present? Yes No Pethons Inches):  Wetland Hydrology Present? Yes No Pethons Inches I	ydrology			
Surface Water (A1)	Vetland Hydrology Indicators:			Secondary Indicators (minimum of two required)
High Water Table (A2)	Primary Indicators (minimum of	f one required; check all that ap	(ylq	Surface Soil Cracks (B6)
Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Depth (inches):  Ves No  Depth (inches):	Surface Water (A1)	True Aquatic	Plants (B14)	Sparsely Vegetated Concave Surface (B8)
Water Marks (B1)		Hydrogen Su	ılfide Odor (C1)	
Sediment Deposits (B2)	_ ` ´			
Drift deposits (B3)				
Algal Mat or Crust (B4)	_			
☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ FAC-neutral Test (D5) ☐ FAC-neutral Test (D5) ☐ Iteld Observations:    Water Table Present?	_ ` ` ` `		` '	
Water-Stained Leaves (B9) Aquatic Fauna (B13)  FAC-neutral Test (D5)  Factor of the fauna (B13)  FAC-neutral Test (D5)		Other (Expla	iii iii Remarks)	
Aquatic Fauna (B13)  FAC-neutral Test (D5)	Inundation Visible on Aerial Ima	agery (B7)		Shallow Aquitard (D3)
Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):	Water-Stained Leaves (B9)			,
urface Water Present? Yes ○ No ○ Depth (inches):	Aquatic Fauna (B13)			FAC-neutral Test (D5)
Water Table Present? Yes No Depth (inches): aturation Present? Yes No Depth (inches): includes capillary fringe)		No (P) Donth (incl	h.c.).	
aturation Present?  Yes No Depth (inches): Wetland Hydrology Present? Yes No No linches)				
includes capillary fringe)  Yes No Depth (inches):		' `	nes): Wetland H	lydrology Present? Yes ○ No ●
escribe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		O No Depth (inch	nes):	,,,
	escribe Recorded Data (stream	gauge, monitoring well, aerial	photos, previous inspections), if a	ivailable:

## **VEGETATION** (Five/Four Strata)- Use scientific names of plants. Dominant

	Dominant Species?				Sampling Point: 2-1 Up		
	Absolute	Re	el.Strat.	Indicator	Dominance Test worksheet:		
Tree Stratum (Plot size: <u>30</u> )	% Cover			Status	Number of Dominant Species		
1 Carya tomentosa	40	<b>✓</b>	72.7%	UPL	That are OBL, FACW, or FAC: (A)		
2. Ailanthus altissima	10		18.2%	FACU	Total Number of Deminant		
3 Juglans nigra	5		9.1%	FACU	Total Number of Dominant Species Across All Strata: 2 (B)		
4	0		0.0%				
5	0		0.0%		Percent of dominant Species That Are ORL FACW or FAC: 0.0% (A/B)		
6.	_		0.0%		That Are OBL, FACW, or FAC: 0.0% (A/B)		
7	0		0.0%		Prevalence Index worksheet:		
8	0		0.0%		Total % Cover of: Multiply by:		
	EE .	= To	otal Cover		0BL species 0 x 1 = 0		
Sapling-Sapling/Shrub Stratum (Plot size:	_)				FACW species x 2 =		
1	0		0.0%		FAC species 0 x 3 = 0		
2	0	Ш	0.0%		1		
3	0		0.0%		17.00 Species		
4	0		0.0%		UPL species $\frac{45}{}$ x 5 = $\frac{225}{}$		
5	0		0.0%		Column Totals: 60 (A) 285 (B)		
6	_		0.0%		Prevalence Index = $B/A = 4.750$		
7	_		0.0%		Hydrophytic Vegetation Indicators:		
8			0.0%		Rapid Test for Hydrophytic Vegetation		
9			0.0%				
10			0.0%		☐ Dominance Test is > 50%		
		 = T/	otal Cover		Prevalence Index is ≤3.0 ¹		
Shrub Stratum (Plot size:)		,			Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)		
1			0.0%		Problematic Hydrophytic Vegetation (Explain)		
2		Н	0.0%				
3	0		0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.		
4	0		0.0%				
5	0	Ш	0.0%		Definition of Vegetation Strata:		
6	0	Ш	0.0%		Four Vegetation Strata:		
7	0		0.0%		Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH),		
Herb Stratum (Plot size:)	0 =	= To	otal Cover		regardless of height.		
1. Carya tomentosa	5	<b>~</b>	100.0%	UPL	Sapling/shrub stratum – Consists of woody plants, excluding		
2		$\overline{\Box}$	0.0%		vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.		
3		$\overline{\Box}$	0.0%		Herb stratum – Consists of all herbaceous (non-woody)		
		$\Box$	0.0%		plants, regardless of size, and all other plants less than 3.28 ft tall.		
4 5		$\overline{\Box}$	0.0%		Woody vines – Consists of all woody vines greater than 3.28		
6		$\Box$	0.0%		ft in height.		
		$\Box$	0.0%		Five Vegetation Strata:		
7		$\Box$	0.0%		Tree - Woody plants, excluding woody vines, approximately		
8					20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).		
9		Н	0.0%		Sapling stratum – Consists of woody plants, excluding		
10		Н	0.0%		woody vines, approximately 20 ft (6 m) or more in height and		
11		Ц	0.0%		less than 3 in. (7.6 cm) DBH.		
12	0	Ш	0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.		
Woody Vine Stratum (Plot size:)	5=	= To	otal Cover		Herb stratum – Consists of all herbaceous (non-woody)		
1	0		0.0%		plants, including herbaceous vines, regardless of size, and		
2.	0		0.0%		woody species, except woody vines, less than approximately 3 ft (1 m) in height.		
3	0		0.0%		Woody vines – Consists of all woody vines, regardless of		
4		$\Box$	0.0%		height.		
5		$\Box$	0.0%				
			0.0%		Hydrophytic		
6		ш	U.U70		Vegetation   Yes ○ No ●		
	0		otal Cover		Present:		

Soil Sampling Point: 2-1 Up

Profile Descri	iption: (Describe to	o the depth	needed to document	the indic	ator or co	onfirm the	absence of indicators.)		
Depth <u>Matrix</u>		Redox Features							
(inches)	Color (moist)	%	Color (moist)	%	Type 1	Loc2	Texture	Remarks	
0-6	10YR 4/6	100					Silt Loam		
6-12	10YR 5/6	100					Silt Loam		
							-		
									_
							-		
							- ,		
1 T C. C		DM D	Matrix CC Carrey			-: 21	tion. D. Donalinian M.	A-L.:.	
		ion. KM=Kea	uced Matrix, CS=Cover	ed or Coate	a Sana Gr	ains ²Loc	cation: PL=Pore Lining. M=1		
Hydric Soil I							Indicators for Proble	ematic Hydric Soils <sup>3</sup> :	
Histosol (A	•		Dark Surface (S	•			2 cm Muck (A10) (	MLRA 147)	
	pedon (A2)		Polyvalue Belov				Coast Prairie Redox (A16)		
Black Histi			☐ Thin Dark Surfa		LRA 147, 1	.48)	(MLRA 147,148)	,	
	Sulfide (A4)		Loamy Gleyed I				☐ Piedmont Floodpla	in Soils (F19)	
	Layers (A5)		Depleted Matrix				(MLRA 136, 147)		
2 cm Muck (A10) (LRR N)		Redox Dark Sui	` '	_		☐ Very Shallow Dark			
Depleted Below Dark Surface (A11)		Depleted Dark		<b>'</b> )		Other (Explain in R	temarks)		
Thick Dark	k Surface (A12)		Redox Depressi	. ,					
Sandy Mu MLRA 147	ck Mineral (S1) (LRR , 148)	N,	Iron-Manganes MLRA 136)						
Sandy Gle	yed Matrix (S4)		Umbric Surface	(F13) (ML	RA 136, 12	.2)	2		
Sandy Red	dox (S5)		☐ Piedmont Flood	lplain Soils	(F19) (MLI	RA 148)	Indicators of b	nydrophytic vegetation and rology must be present,	
Stripped N	Matrix (S6)		Red Parent Ma	terial (F21)	(MLRA 12	7, 147)		turbed or problematic.	
Restrictive L	ayer (if observed):								
Type:	ayer (ii observeu).								
Depth (incl							Hydric Soil Present?	Yes O No 💿	
	103)								
Remarks:									



Photo File: IM	IG_3371.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting:	77°31'4.387"W	Lat/Northing: 38°42'58.239"N
Description:			

# No Photo

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

#### WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Independent (hillslope, terrace, etc.): Terrace	Andform (hillslope, terrace, etc.): Terral program (LRR or MLRA): MLRA 148 in poil Map Unit Name: Rowland silt loam re climatic/hydrologic conditions on the re Vegetation , Soil , or re Vegetation , Soil , or se Vegetation Present? Yes Hydric Soil Present?	race  site typical for Hydrology  Hydrology  h site map  No  No  No	Local reli  Lat.: 38°42'58  this time of year? Yes  significantly disturbed  naturally problemations  showing sampling	i, Township, Range: S lef (concave, convex, in the sample of the sample	none): flat SI ng.: 77°31'3.137"W  NWI classification: , explain in Remarks.) I Circumstances" present? explain any answers in Rem ns, transects, impor	R R
adform (hillslope, terrace, etc.): Terrace   Local relief (concave, convex, none): flat   Slope: 2,0% / 1,1   pregion (LRR or MLRA): MLRA 148 in LRR S   Lat.: 38'42'58.87'N   Long.: 77°31'3.137'W   Datum: NAD 83   IMap Unit Name: Rowland silt loam   NWI classification:   climatic/hydrologic conditions on the site typical for this time of year? Yes   No   (If no, explain in Remarks.)   Vegetation   , Soil   , or Hydrology   significantly disturbed?   Are "Normal Circumstances" present? Yes   No   Vegetation   , Soil   , or Hydrology   naturally problematic? (If needed, explain any answers in Remarks.)    ummary of Findings - Attach site map showing sampling point locations, transects, important features, etc ydrophytic Vegetation Present? Yes   No    ydrophytic Vegetation Present? Yes   No   Est the Sampled Area within a Wetland?   Yes   No    wetland Hydrology Present? Yes   No   True Aquatic Plants (814)   Sparsely Vegetated Concave Surface (88)     High Water Table (A2)   Hydrogen Sulfde Odor (C1)   Oralinge Patterns (810)     High Water Table (A2)   Hydrogen Sulfde Odor (C1)   Oralinge Patterns (810)     Water Marks (81)   Presence of Reduced Iron (C4)   Sparsely Vegetated Concave Surface (88)     High Water Table (B2)   Recent Iron Reduction in Tilled Soils (C5)   Crayfish Burrows (C8)     Diff deposits (B3)   Thin Muck Surface (C7)   Statutation Visible on Aerial Imagery (C9)     Algal Mater Or Crust (44)   Other (Explain in Remarks)   Cegeomorphic Position (D2)     Important Remarks (B1)   Presence of Reduced Iron (C4)   Statutation Visible on Aerial Imagery (C9)     Algal Mater Or Crust (44)   Other (Explain in Remarks)   Statuted or Stressed Plants (D1)     Important Remarks (B1)   Presence of Remarks (B1)   Recent Iron Reduction in Tilled Soils (C6)   Statutation Visible on Aerial Imagery (C9)     Important Remarks (B1)   Presence of Remarks (B1)   Recent Iron Remarks (B1)   Recent Iron Reduction in Remarks (B1)   Recent Iron Remarks (B1)   Recent Iron Remarks (B1)   Recent Iron Remarks (B1)   Recent	bregion (LRR or MLRA): MLRA 148 in Map Unit Name: Rowland silt loam e climatic/hydrologic conditions on the e Vegetation , Soil , or e Vegetation , Soil , or ummary of Findings - Attacl ydrophytic Vegetation Present? Yes ydric Soil Present? Yes Vetland Hydrology Present?	site typical for Hydrology Hydrology h site map No No No	Local reli  Lat.: 38°42'58  this time of year? Yes  significantly disturbed  naturally problemations  showing sampling	sef (concave, convex, respectively).  Solvent No. (If no, ed? Are "Normalic? (If needed, ng point location).  Is the Sampled Area	none): flat SI ng.: 77°31'3.137"W  NWI classification: , explain in Remarks.) I Circumstances" present? explain any answers in Rem ns, transects, impor	Datum: NAD 83   Yes
region (LRR or MLRA): MLRA 148 in LRR S	region (LRR or MLRA): MLRA 148 in Map Unit Name: Rowland silt loam climatic/hydrologic conditions on the Vegetation , Soil , or Vegetation , Soil , or Immary of Findings - Attacled drophytic Vegetation Present? Yes dric Soil Present? Yes etland Hydrology Present?	site typical for Hydrology Hydrology h site map No No No	this time of year? Yes significantly disturbe naturally problematishowing sampling	SONO (If no, ed? Are "Normalic? (If needed, ng point location)  Is the Sampled Area	ng.: 77°31'3.137"W  NWI classification: , explain in Remarks.)  I Circumstances" present? explain any answers in Rem ns, transects, impor	Datum: NAD 83  Yes  No  narks.)
Map Unit Name: Rowland silt loam   NAD 83   NWI classification:   NAD 83   NWI classification:   NAT classification:   NWI classifi	Map Unit Name: Rowland silt loam  climatic/hydrologic conditions on the  Vegetation , Soil , or  Vegetation , Soil , or  Immary of Findings - Attacl  Idrophytic Vegetation Present? Yes  Idric Soil Present? Yes  etland Hydrology Present? Yes	site typical for Hydrology Hydrology  h site map  No  No  No	this time of year? Yes significantly disturbe naturally problemati showing samplir	s No (If no, ed? Are "Normalic? (If needed, ng point location	NWI classification: , explain in Remarks.) I Circumstances" present? explain any answers in Rem ns, transects, impor	Patum: NAD 83  Yes No O
Map Unit Name: Rowland slit loam	Map Unit Name: Rowland silt loam  climatic/hydrologic conditions on the  Vegetation , Soil , or  Vegetation , Soil , or  Immary of Findings - Attacl  drophytic Vegetation Present? Yes  dric Soil Present? Yes  etland Hydrology Present? Yes	site typical for Hydrology Hydrology  h site map  No  No  No	this time of year? Yes significantly disturbe naturally problemati showing samplir	s No (If no, ed? Are "Normalic? (If needed, ng point location	NWI classification: , explain in Remarks.) I Circumstances" present? explain any answers in Rem ns, transects, impor	Yes • No O
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   Vegetation	climatic/hydrologic conditions on the  Vegetation , Soil , or  Vegetation , Soil , or  Immary of Findings - Attacl  Idrophytic Vegetation Present? Yes  Idric Soil Present? Yes  Petland Hydrology Present? Yes	Hydrology Hydrology  h site map  No  No  No	significantly disturbed naturally problemations showing sampling 1	ed? Are "Normalic? (If needed,  ng point location  Is the Sampled Area	, explain in Remarks.) I Circumstances" present? explain any answers in Rem ns, transects, impor	aarks.)
Vegetation	Vegetation , Soil , or Vegetation , Soil , or Vegetation , Soil , or Immary of Findings - Attacl Indrophytic Vegetation Present? Yes	Hydrology Hydrology  h site map  No  No  No	significantly disturbed naturally problemations showing sampling 1	ed? Are "Normalic? (If needed,  ng point location  Is the Sampled Area	I Circumstances" present? explain any answers in Rem ns, transects, impor	aarks.)
Vegetation	Vegetation , Soil , or  Immary of Findings - Attacl  ydrophytic Vegetation Present? Yes ydric Soil Present? Yes etland Hydrology Present? Yes	h site map  No  No  No	naturally problemati	ic? (If needed,  ng point location  Is the Sampled Area	explain any answers in Rem	aarks.)
Attach site map showing sampling point locations, transects, important features, etc ydrophytic Vegetation Present? Yes \ No \ No \ was within a Wetland? Yes \ No \ was wetland? Yes \ No \ was part of the Concare the Accordance to the Concare the Accordance the Secondary Indicates and the Yes \ No \ was within a Wetland? Yes \ No \ was within a Wetland? Yes \ N	ummary of Findings - Attacl ydrophytic Vegetation Present? Yes ydric Soil Present? Yes etland Hydrology Present? Yes	h site map	showing samplir	ng point location	ns, transects, impor	
Advisophytic Vegetation Present? Yes No  Algal Mat or Crust (B4) Drind Equation Deposits (B2) Drind Equation Deposits (B2) Drind Equation Deposits (B3) Drind Equation Deposits (B4) Drind Equation Deposits (B4) Drind Equation Deposits (B3) Drind Equation Deposits (B4) Drind Equation Drind	ydrophytic Vegetation Present? Yes ydric Soil Present? Yes etland Hydrology Present? Yes	s No le No l		Is the Sampled Area		tant features, etc
Is the Sampled Area within a Wetland?  Ves No No No No within a Wetland?  Ves No	ydric Soil Present? Yes etland Hydrology Present? Yes	s O No •			Yes ○ No ●	
within a Wetland?  Yes No   wetland Hydrology Present?  Yes No	etland Hydrology Present?				Yes ○ No ●	
Indicators   Primary Indicators   Secondary   S	etland Hydrology Present? Yes	s No •			Yes O No O	
Interest	ctiana rryarology r resent.		<u> </u>			
Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)	emarks:					
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Dray Season Water Table (C2)  Recent Iron Reduction in Tilled Soils (C6)  Trune Aquatic Plants (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):	lydrology					
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  True Aquatic Plants (B14)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Trinh Muck Surface (C7)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Mater-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Depth (inches):	Wetland Hydrology Indicators:				Secondary Indicators (minim	num of two required)
Surface Water (A1)		equired; check	all that apply)			
Saturation (A3)	Surface Water (A1)	□т	rue Aquatic Plants (B14)			
Water Marks (B1)	High Water Table (A2)	□н	ydrogen Sulfide Odor (C1)	1	☐ Drainage Patterns (B10)	
Sediment Deposits (B2)	¬ ` ´		xidized Rhizospheres along	g Living Roots (C3)	` '	
Drift deposits (B3)	_ ` ´		•	•		(C2)
Algal Mat or Crust (B4)	_ ' ' '			lled Soils (C6)		**I T (CO)
☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5)  Field Observations: Surface Water Present? Yes No Depth (inches): Water Table Present? Yes No Depth (inches): Gaturation Present? Fincludes capillary fringe) Yes No Depth (inches): ☐ Wetland Hydrology Present? Yes No Depth (inches): ☐ Obertain Test (D5)  Wetland Hydrology Present? Yes No Depth (inches): ☐ Obertain Test (D5)	_ ` ` ` ′		` ,			• , , ,
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Solution Present?  Yes No Peth (inches):  Solution Present?			ther (Explain in Remarks)			` '
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):		37)				•,
Field Observations:  Surface Water Present?  Yes No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Water-Stained Leaves (B9)				_ ' '	(D4)
Surface Water Present? Yes No Depth (inches):	Aquatic Fauna (B13)				FAC-neutral Test (D5)	
Vater Table Present? Yes No Depth (inches):		$\sim$				
Saturation Present?  Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches):			Depth (inches):			
includes capillary fringe)  Yes No Depth (inches):	Water Table Present? Yes	No 💿	Depth (inches):			) N- (a)
includes capitally fillinger	VAC	No 💿	Depth (inches):	Wetland Hy	drology Present? Yes	) NO S
	includes capillary fringe)		ell, aerial photos, previo	ous inspections), if av	ailable:	

			ominant ecies? –		Sampling Point: 3-1 up
Tree Stratum (Plot size: 30 )	Absolute % Cover	Re	l.Strat.	Indicator Status	Dominance Test worksheet:
4.6	20	<u>✓</u>	25.0%	UPL	Number of Dominant Species
1 Quercus velutina	25	<ul><li>✓</li></ul>	43.8%	FAC	That are OBL, FACW, or FAC:3(A)
2 Acer rubrum 3 Carya tomentosa	25	<	31.3%	UPL	Total Number of Dominant
3. Carva tomentosa 4.			0.0%	0.2	Species Across All Strata:
5		$\Box$	0.0%		Percent of dominant Species
6		$\overline{\Box}$	0.0%		That Are OBL, FACW, or FAC: 42.9% (A/B)
7		$\Box$	0.0%		Prevalence Index worksheet:
8		$\overline{\Box}$	0.0%		Total % Cover of: Multiply by:
	80	 = To	otal Cover		0BL speci es
Sapling-Sapling/Shrub Stratum (Plot size: 15					FACW species 0 x 2 = 0
1 Asimina triloba		<b>V</b>	100.0%	FAC	FAC species x 3 =165
2			0.0%		FACU species $10 \times 4 = 40$
3		Ц	0.0%		45 225
4			0.0%		ort species
5		$\sqcup$	0.0%		Column Totals: <u>110</u> (A) <u>430</u> (B)
6			0.0%		Prevalence Index = $B/A = \underline{3.909}$
7			0.0%		Hydrophytic Vegetation Indicators:
8		Н	0.0%		Rapid Test for Hydrophytic Vegetation
9			0.0%		☐ Dominance Test is > 50%
0			0.0%		Prevalence Index is ≤3.0 ¹
Shrub Stratum (Plot size:)	15 :	= To	otal Cover		Morphological Adaptations <sup>1</sup> (Provide supporting
1			0.0%		data in Remarks or on a separate sheet)
2			0.0%		Problematic Hydrophytic Vegetation 1 (Explain)
3			0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4			0.0%		be present, unless disturbed or problematic.
5			0.0%		Definition of Vegetation Strata:
6			0.0%		Four Vegetation Strata:
7			0.0%		Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH),
Herb Stratum (Plot size: 15 )	=	= To	otal Cover		regardless of height.
1. Rubus allegheniensis	5	<b>V</b>	50.0%	FACU	Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2. Toxicodendron radicans	5	✓	50.0%	FAC	
3	0		0.0%		Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28
4	0		0.0%		ft tall.
5			0.0%		Woody vines – Consists of all woody vines greater than 3.28 ft in height.
6			0.0%		Five Vegetation Strata:
7			0.0%		Tree - Woody plants, excluding woody vines, approximately
8			0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9			0.0%		diameter at breast height (DBH).
0			0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
1			0.0%		less than 3 in. (7.6 cm) DBH.
2			0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size: 15 )	10=	= To	otal Cover		Herb stratum – Consists of all herbaceous (non-woody)
1 Lonicera japonica	5	<b>~</b>	100.0%	FACU	plants, including herbaceous vines, regardless of size, and
2.	0		0.0%		woody species, except woody vines, less than approximately 3 ft (1 m) in height.
3			0.0%		Woody vines – Consists of all woody vines, regardless of
4			0.0%		height.
5.			0.0%		
6.	0		0.0%		Hydrophytic Vegetation
V-,		 = T	otal Cove		Present? Yes No •
					1

Soil Sampling Point: 3-1 up

Profile Description: (Describe to the depth	needed to document the indicator or confirm the	absence of indicators.)
Depth <u>Matrix</u>	Redox Features	
(inches) Color (moist) %	Color (moist) % Type 1 Loc2	Texture Remarks
0-6 10YR 4/6 100		Silt Loam
6-12 10YR 5/6 100		Silt Loam
<sup>1</sup> Type: C=Concentration. D=Depletion. RM=Redu	ced Matrix, CS=Covered or Coated Sand Grains 2Loc	ration: PL=Pore Lining. M=Matrix
Hydric Soil Indicators:	<u>'</u>	Indicators for Problematic Hydric Soils <sup>3</sup> :
Histosol (A1)	Dark Surface (S7)	
Histic Epipedon (A2)	Polyvalue Below Surface (S8) (MLRA 147,148)	2 cm Muck (A10) (MLRA 147)
☐ Black Histic (A3)	Thin Dark Surface (S9) (MLRA 147, 148)	☐ Coast Prairie Redox (A16) (MLRA 147,148)
Hydrogen Sulfide (A4)	Loamy Gleyed Matrix (F2)	Piedmont Floodplain Soils (F19)
Stratified Layers (A5)	Depleted Matrix (F3)	(MLRA 136, 147)
2 cm Muck (A10) (LRR N)	Redox Dark Surface (F6)	Very Shallow Dark Surface (TF12)
Depleted Below Dark Surface (A11)	Depleted Dark Surface (F7)	Other (Explain in Remarks)
☐ Thick Dark Surface (A12)	Redox Depressions (F8)	_ ,,,
Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)	☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
Sandy Gleyed Matrix (S4)	Umbric Surface (F13) (MLRA 136, 122)	
Sandy Redox (S5)	Piedmont Floodplain Soils (F19) (MLRA 148)	<sup>3</sup> Indicators of hydrophytic vegetation and
Stripped Matrix (S6)	Red Parent Material (F21) (MLRA 127, 147)	wetland hydrology must be present, unless disturbed or problematic.
		diness distanced on problematic
Restrictive Layer (if observed):		
Туре:		Hydric Soil Present? Yes ○ No ●
Depth (inches):		Tryunc Son Fresent: 165 C NO G
Remarks:		



Photo File: IN	IG_3372.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°31'3.137"W	Lat/Northing: 38°42'58.87"N
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

we climatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explaint the climatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explaint the Vegetation Soil No or Hydrology significantly disturbed? Are "Normal Circumber Vegetation No or Hydrology naturally problematic? (If needed, explaint the Vegetation Present? Yes No or Hydrophytic Vegetation Present? Yes No or Hydrophytic Vegetation Present? Yes No or Hydrology Present? Yes No or Wetland Hydrology Present? Yes No or Wetland Hydrology Present? Yes No or Wetland Hydrology Indicators:    Hydrology	Plain any answers in Remarks.)  In transects, important features, etc.  Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
Indiform (hillslope, terrace, etc.): Terrace	Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Datum: NAD 83  NAD 84  NAD
region (LRR or MLRA): MLRA 148 in LRR S	Patum: NAD 83  NWI classification:  Explain in Remarks.)  From the properties of the
Map Unit Name:   Rowland silt loam	NWI classification:  cplain in Remarks.)  rcumstances" present? Yes No plain any answers in Remarks.)  the transects, important features, etc.  Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
climatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explaint vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circum vegetation , Soil , or Hydrology naturally problematic? (If needed, explaint vegetation   , Soil , or Hydrology naturally problematic? (If needed, explaint vegetation present? Yes No vegetation Vegetation No vegetatio	splain in Remarks.)  recumstances" present? Yes No Polain any answers in Remarks.)  rects, important features, etc.  Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
climatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explaint vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circum vegetation , Soil , or Hydrology naturally problematic? (If needed, explaint vegetation   , Soil , or Hydrology naturally problematic? (If needed, explaint vegetation present? Yes No vegetation Vegetation No vegetatio	Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
Vegetation	Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
Vegetation	plain any answers in Remarks.)  It, transects, important features, etc  Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
Attach site map showing sampling point locations, to ydrophytic Vegetation Present? Yes \ No \ O \ Yes \ No \ O \ Is the Sampled Area within a Wetland? Yes \ No \ O \ No \ O \ Wetland Hydrology Present? Yes \ No \ O \ O \ No \ O \ Wetland Hydrology Indicators:    Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
Addrophytic Vegetation Present? Yes No variety No vital Soil Present? Yes No vital N	Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
Agric Soil Present?  Yes No  No  No  Is the Sampled Area within a Wetland?  Yes  No  No  No  No  No  No  No  No  No  N	Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
etland Hydrology Present? Yes No within a Wetland?  Netland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1) True Aquatic Plants (B14)  High Water Table (A2) Hydrogen Sulfide Odor (C1)  Saturation (A3) Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1) Presence of Reduced Iron (C4)  Sediment Deposits (B2) Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3) Thin Muck Surface (C7)  Algal Mat or Crust (B4) Other (Explain in Remarks)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:	Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
Remarks:    Second	Surface Soil Cracks (B6) Sparsely Vegetated Concave Surface (B8) Drainage Patterns (B10)
Wetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Water Marks (B1)  Sediment Deposits (B2)  Prished Observations:  Name of the Marks (B4)  Other (Explain in Remarks)  Mater-Stained Leaves (B9)  Aquatic Fauna (B13)  Second Primary Indicators:  Second Primary	Surface Soil Cracks (B6) Sparsely Vegetated Concave Surface (B8) Drainage Patterns (B10)
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  True Aquatic Plants (B14)  Prue Aquatic Plants (B14)  Presence of Reduced Iron (C4)  Recent Iron Reduction in Tilled Soils (C6)  Other (Explain in Remarks)  Surface (C7)  Algal Mat or Crust (B4)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)	Surface Soil Cracks (B6) Sparsely Vegetated Concave Surface (B8) Drainage Patterns (B10)
Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Prift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  True Aquatic Plants (B14)  Pruse Aquatic Plants (B14)  Presence Of Reduced Iron (C4)  Recent Iron Reduction in Tilled Soils (C6)  Other (Explain in Remarks)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)	Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
High Water Table (A2)  Saturation (A3)  Water Marks (B1)  Sediment Deposits (B2)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Hydrogen Sulfide Odor (C1)  Oxidized Rhizospheres along Living Roots (C3)  Recent Iron Reduction in Tilled Soils (C6)  Thin Muck Surface (C7)  Other (Explain in Remarks)  Under (Explain in Remarks)  Field Observations:	Drainage Patterns (B10)
Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Oxidized Rhizospheres along Living Roots (C3)  Presence of Reduced Iron (C4)  Recent Iron Reduction in Tilled Soils (C6)  Other (Explain in Remarks)  Steled Observations:	
Water Marks (B1)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Presence of Reduced Iron (C4)  Recent Iron Reduction in Tilled Soils (C6)  Other (Explain in Remarks)  Suppose the suppose	Moss Trim Lines (B16)
Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Thin Muck Surface (C7)  Standard (Explain in Remarks)  Standard (Explain in Remarks)  Augustic Fauna (B13)	Dry Season Water Table (C2)
Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:	Crayfish Burrows (C8)
Iron Deposits (B5) Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9) Aquatic Fauna (B13) Field Observations:	Saturation Visible on Aerial Imagery (C9)
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:	Stunted or Stressed Plants (D1)
Water-Stained Leaves (B9) Aquatic Fauna (B13)	Geomorphic Position (D2)
Aquatic Fauna (B13)  Field Observations:	Shallow Aquitard (D3)  Microtopographic Relief (D4)
	FAC-neutral Test (D5)
Surface Water Present? Yes O No O Depth (inches):	
Water Table Present? Yes O No O Depth (inches):	
Saturation Present? Wetland Hydrolog	ology Present? Yes 🔾 No 🖲
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available	able:

			ominant pecies?		Sampling Point: 4-1 up
Tree Stratum (Plot size: 30	Absolute % Cover	Re	el.Strat.	Indicator Status	Dominance Test worksheet:
1 Carva tomentosa	30	<b>V</b>	60.0%	UPL	Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)
2 Quercus rubra	20	<b>V</b>	40.0%	FACU	
3	0		0.0%		Total Number of Dominant Species Across All Strata: 5 (B)
4			0.0%		Species Across Air Strata.
5			0.0%		Percent of dominant Species
6	_		0.0%		That Are OBL, FACW, or FAC: 40.0% (A/B)
7			0.0%		Prevalence Index worksheet:
8.			0.0%		Total % Cover of: Multiply by:
	50	= To	otal Cover		0BL species 0 x 1 = 0
Sapling-Sapling/Shrub Stratum (Plot size: 15	_)				FACW species0 x 2 =0
1 Carpinus caroliniana	10	<b>✓</b>		FAC	FAC species 15 x 3 = 45
2			0.0%		40
3	0		0.0%		
4			0.0%		or species
5	0		0.0%		Column Totals: <u>85</u> (A) <u>355</u> (B)
6	0		0.0%		Prevalence Index = B/A = 4.176
7	0		0.0%		Hydrophytic Vegetation Indicators:
8	0		0.0%		Rapid Test for Hydrophytic Vegetation
9	0		0.0%		Dominance Test is > 50%
10	0		0.0%		Prevalence Index is ≤ 3.0 ¹
		= To	otal Cover		
Shrub Stratum (Plot size:)	0		0.0%		Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
1		П	0.0%		Problematic Hydrophytic Vegetation 1 (Explain)
2		$\Box$	0.0%		
3		$\Box$			<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
4		$\vdash$	0.0%		Definition of Vegetation Strata:
5			0.0%		Four Vegetation Strata:
6			0.0%		Tree stratum – Consists of woody plants, excluding vines, 3
7		Ш	0.0%		in. (7.6 cm) or more in diameter at breast height (DBH),
Herb Stratum (Plot size: 15 )		= 10	otal Cover		regardless of height.
1	0		0.0%		Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2	0		0.0%		Howh streeture. Consists of all howhoods in (man used in)
3	0		0.0%		Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28
4	0		0.0%		ft tall.
5	0		0.0%		Woody vines – Consists of all woody vines greater than 3.28 ft in height.
6	0		0.0%		Five Vegetation Strata:
7	0		0.0%		I -
8			0.0%		Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9.	0		0.0%		diameter at breast height (DBH).
10			0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
11			0.0%		less than 3 in. (7.6 cm) DBH.
12			0.0%		Shrub stratum – Consists of woody plants, excluding woody
	0	= To	otal Cover		vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size: 15 )		<b>✓</b>	00.00/	FACIL	Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and
1 Lonicera japonica				FACU	woody species, except woody vines, less than approximately
2. Smilax rotundifolia		<b>Y</b>	20.0%	FAC	3 ft (1 m) in height.
3			0.0%		Woody vines – Consists of all woody vines, regardless of height.
4			0.0%		
5	0		0.0%		Hydrophytic
6	0		0.0%		Vegetation Var O Na 🔊
	25	= T	otal Cover		Present? Yes V NO S
Remarks: (Include photo numbers here or on a separate	sheet.)				

Soil Sampling Point: 4-1 up

	ription: (De		the depth			confirm the	absence of indicators.)	
Depth (inches)	Color	Matrix (moist)	<b>%</b>		dox Features % Type	1 Loc²	Texture	Remarks
0-4	10YR	( <b>moist</b> ) 4/4	100	Color (moist)		- <u>LOC</u> -	Silt Loam	кетагкѕ
4-12	10YR	5/6	100				Silt Loam	
	<u>-</u>							
	-	-					-	-
	-							·
	-		_			_	•	
1							- DI Di Illian M	Mari
			on. RM=Rec	luced Matrix, CS=Cove	red or Coated Sand (	Grains <sup>2</sup> Loc	ration: PL=Pore Lining. M=	
Hydric Soil 1					(OT)		Indicators for Probl	ematic Hydric Soils <sup>3</sup> :
Histosol (	• •			☐ Dark Surface	• •		2 cm Muck (A10)	(MLRA 147)
	pedon (A2)				w Surface (S8) (MLR		Coast Prairie Redo	ox (A16)
Black Hist	uc (A3) 1 Sulfide (A4	1)			face (S9) (MLRA 147	, 148)	(MLRA 147,148)	
	Layers (A5)			Loamy Gleyed Depleted Matr			Piedmont Floodpla	ain Soils (F19)
	k (A10) (LR			Redox Dark Su			(MLRA 136, 147)	· Confere (TE12)
	Below Dark		۸11\	Depleted Dark	` ,		Very Shallow Dark	
	k Surface (A	•	AII)	Redox Depres			Other (Explain in	Remarks)
	uck Mineral (		N		se Masses (F12) (LRI	R N.		
MLRA 147		(31) (LKK	IN,	MLRA 136)	, , ,	,		
Sandy Gle	eyed Matrix	(S4)		Umbric Surfac	e (F13) (MLRA 136,	122)	3	
☐ Sandy Re	dox (S5)			Piedmont Floo	odplain Soils (F19) (M	1LRA 148)	Indicators of wetland hyd	hydrophytic vegetation and drology must be present,
Stripped I	Matrix (S6)			Red Parent M	aterial (F21) (MLRA	127, 147)		sturbed or problematic.
Restrictive L	aver (if oh	corved):						
Type:	ayei (ii ob	serveu).						
	thes):						Hydric Soil Present?	Yes O No 💿
Remarks:								
Kelliai KS.								



Photo File: IM	IG_3373.JPG	Orientation:		-facing
Lat/Long or UTM :	Long/Easting	: 77°31'5.261"W	Lat/Northing:	38°42'59.901"
Description:				

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

Lat.: 38°43′0.419″N Long.: 77°31′5.195″W Datum: NAD 83  Dil Map Unit Name: Rowland silt loam NWI classification:  The elegetation	Section, Township, Range: S T R   R	oject/Site: Manassas Regional	Airport	City/County: N	Manassas	Sampling	<b>Date:</b> 24-Oct-16
Addrom (hillslope, terrace, etc.): Swale	drorm (hillslope, terrace, etc.): Swale   Local relief (concave, convex, none): concave   Slope: 1.0% / 0.6   region (LRR or MLRA): MLRA 148 in LRR S   Lat.: 38*43'0.419"N   Long.: 77*31'5.195"W   Datum: NAD 83   Map Unit Name: Rowland silt loam   NWT. classification: climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.) Vegetation   , soil   , or Hydrology   significantly disturbed? Are "Normal Circumstances" present? Yes  No    Vegetation   , soil   , or Hydrology   naturally problematic? (If needed, explain any answers in Remarks.)  Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc variophytic Vegetation Present? Yes  No    Is the Sampled Area within a Wetland?  Vegetation Present? Yes  No    Is the Sampled Area within a Wetland?  Vegetation Present? Yes  No    Is the Sampled Area within a Wetland?  Vegetation Present? Yes  No    Is the Sampled Area within a Wetland?  Vegetation Present? Yes  No    Is the Sampled Area within a Wetland?  Vegetation Present? Yes  No    Is the Sampled Area within a Wetland?  Vegetation Present? Yes  No    Is the Sampled Area within a Wetland?  Vegetation Present? Yes  No    Is the Sampled Area within a Wetland?  Vegetation Present? Yes  No    Is the Sampled Area within a Wetland?  Vegetation Present? Yes  No    Is the Sampled Area within a Wetland?  Vegetation Present? Yes  No  Pepth (inches):   Is the Sampled Area within a Wetland?  Vegetation Present? Yes  No  Pepth (inches):   Is the Sampled Area within a Wetland?  Vegetation Present? Yes  No  Pepth (inches):   Is the Sampled Area within a Wetland?  Vegetation Present? Yes  No  Pepth (inches):   Is the Sampled Area within a Wetland?  Vegetation Present? Yes  No  Pepth (inches):   Is the Sampled Area within a Wetland?  Vegetation Present? Yes  No  Pepth (inches):   Is the Sampled Area within a Wetland?  Vegetation Present? Yes  No  Pepth (inches):   Is the Sampled Area within a Wetland?  Vegetation Present? Yes	plicant/Owner: Manassas Regi	onal Airport		State: VA	Sampling Point:	4-2 wet
Map Unit Name: Rowland slit loam	Map Unit Name: Rowland slit loam   National State   Nati	estigator(s): Matt Neely		Section, Towns	hip, Range: S	т	R
Map Unit Name: Rowland slit loam	Map Unit Name: Rowland slit loam   National State   Nati	dform (hillslope, terrace, etc.)	): Swale	Local relief (conc	ave, convex, none)	: concave SI	ope: 1.0% / 0.6
Map Unit Name: Rowland silt loam	Map Unit Name: Rowland silt loam	region (LRR or MLRA): MLI	RA 148 in LRR S	 Lat.: 38°43'0.419"N	Long.:	77°31'5.195"W	
climatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)  Vegetation	Climatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)   Vegetation						
Vegetation	Vegetation	•		is time of year? Yes (a) No	O (If no oval	_	
Vegetation	Vegetation					-	Vec   No
Immary of Findings - Attach site map showing sampling point locations, transects, important features, et advophytic Vegetation Present? Yes No Sirving No Sirving No No Sirving No	Attach site map showing sampling point locations, transects, important features, etc.  Addrophytic Vegetation Present? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Is the Sampled Area within a Wetland? Yes  No  No  Is the Sampled Area within a Wetland? Yes  No  No  Is the Sampled Area within a Wetland? Yes  No  No  Is the Sampled Area within a Wetland? Yes  No  No  Is the Sampled Area within a Wetland? Yes  No  No  Is the Sampled Area within a Wetland? Yes  No  No  Is the Sampled Area within a Wetland? Yes  No  No  Is the Sampled Area within a Wetland? Yes  No  No  Is the Sampled Area within a Wetland? Yes  No  No  Is the Sampled Area within a Wetland? Yes  No  No  Is the Sampled Area within a Wetland? Yes  No  No  Is the Sampled Area within a Wetland? Yes  No  No  Is the Sampled Area within a Wetland? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Is the Sampled Area within a Wetland Hydrology Present? Yes  No  Is the Sampled Area within a Wetland Hydrology Present? Yes  No  Is the Sampled Area within a Wetland Hydrology Present? Yes  No  Is the Sampled Area within a Wetland Hydrology Present? Yes  No  Is the Sampled Area within a Wetland Hydrology Present? Yes  No  Is the Sampled Area within a Wetland Hydrology Present? Yes  No  Is the Sampled Area within a Wetland Hydrology Present? Yes  No  Is the Sampled Area within a Wetland Hydrology Present? Yes  No  Is the Sampled Area within a Wetland Hydrology Present? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Is the Sampled A			significantly disturbed?		•	
Is the Sampled Area within a Wetland?   Yes  No    No    Is the Sampled Area within a Wetland?   Yes  No    No    Is the Sampled Area within a Wetland?   Yes  No    No    Is the Sampled Area within a Wetland?   Yes  No	Is the Sampled Area within a Wetland?   Yes   No   Is the Sampled Area within a Wetland?   Yes   No   Is the Sampled Area within a Wetland?   Yes   No   Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   No   No   No   No   No   N	Vegetation, Soil	, or Hydrology	naturally problematic?	(If needed, expla	in any answers in Rem	arks.)
Addric Soil Present?  Yes No No within a Wetland?  No No No within a Wetland?  No N	Is the Sampled Area within a Wetland?   Yes No   No   No   No   No   No   No   No	ımmary of Findings -	Attach site map sh	nowing sampling poi	nt locations, t	ransects, impor	tant features, etc
Address of the Soil Present?  Wetand Hydrology Present?  Wetand Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Water Marks (B1)  Water Marks (B1)  Drift deposits (B2)  Sediment Deposits (B2)  Sediment Deposits (B2)  Algal Mat or Crust (B4)  Drift deposits (B3)  Algal Mat or Crust (B4)  Drift deposits (B5)  In undation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Algal Mater Fable (A2)  Water-Stained Leaves (B9)  Algal Mater Grust (B4)  Aquatic Fauna (B13)  Wetland Hydrology Indicators:  Within a Wetland?  Yes No Depth (inches):  Water Judicators (minimum of two required)  Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  D pring Patterns (B10)  Water Marks (B1)  Dry Season Water Table (C2)  Craffish Burrows (C8)  Sturtaton Visible on Aerial Imagery (C9)  Sturtated or Stressed Plants (D1)  FAC-neutral Test (D5)  Facility Operations:  F	Addic Soil Present?  Yes No No Situation Hydrology Present?  Wetland Hydrology Indicators:  Wetland Hydrology Indicators:  No Surface Soil Cracks (B6) Sparsely Vegetated Concave Surface (B8) Whater Table (A2) Phydrogen Sulfide Odor (C1) Sparsely Negative Moss Trim Lines (B16) Dry Season Water Table (C2) Dry Season Water Table (C2) Dry Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) Stunted or Stressed Plants (D1) Iron Deposits (B1) Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9) Aquatic Fauna (B13) Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9) Aquatic Fauna (B13) Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9) Aquatic Fauna (B13) Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9) Aquatic Fauna (B13) Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9) Aquatic Fauna (B13) Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9) Aquatic Fauna (B13) Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9) Aquatic Fauna (B13) Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9) Aquatic Fauna (B13) Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9) Aquatic Fauna (B13) Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9) Aquatic Fauna (B13) Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9) Aquatic Fauna (B13) Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9) Aqua	drophytic Vegetation Present	? Yes • No ·				
etland Hydrology Present? Yes No within a Wetland?  Wetland Hydrology Present? Yes No within a Wetland?  Wetland Hydrology Indicators:	ettand Hydrology  Nettand Hydrology Indicators:  Primary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Moss Trim Lines (B16)  Dry Season Water Table (22)  Dry Season Water Table (22)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Wetland Hydrology Present? Yes No  Depth (inches):  Surface Water Present? Yes No  Depth (inches):  Surface Water Table Present? Yes No  Depth (inches):  Surface Water Table Present? Yes No  Depth (inches):  Surface Water Table Present? Yes No  Depth (inches):  Surface Water Present? Yes No  Depth (inches):  Surface Water Table Present? Yes No  Depth (inches):  Surface Water Present? Yes No  Depth (inches):  Surface Water Table Present? Yes No  Depth (inches):  Surface Water Table Present? Yes No  No  Depth (inches):  Surface Water Table Present? Yes No  No  Sur			Is the Si	ampled Area	O O	
Interpretation   Inte	Interpretation   Inte					● No ∪	
Secondary Indicators (minimum of two required)   Surface Soil Cracks (86)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Water-Stained Leaves (B9)   Microtopographic Relief (D4)   Recent Iron Reductions:  Surface Water Present?	Netland Hydrology Indicators:	,					
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  True Aquatic Plants (B14)  Other (Explain in Remarks)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Water Present?  Yes  No  Depth (inches):  Depth (inches):  Jaturation Present?  Yes  No  Depth (inches):  Depth (inches):  Depth (inches):  Jaturation Present?  Yes  No  Depth (inches):  Dep	Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Water Marks (B1)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Algal Mat or Crust (B4)  In undation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Faune (B10)  Water Table Present?  Yes  No  Depth (inches):  Depth (inches):  Vater Table Present?  Yes  No  Depth (inches):  Dury Aquatic Plants (B14)  Dry Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Drift deposits (B3)	ydrology					
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Trine Aquatic Plant (B10)  Recent Iron Reduction in Tilled Soils (C6)  Tripe Aquatic Plant (B10)  Recent Iron Reduction in Tilled Soils (C6)  Tripe Aquatic Plant (B10)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Other (Explain in Remarks)  Thomas Plant (D1)  For Season Water Table (C2)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquaticr (D3)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  For AC-neutral Test (D5)  Recent Iron Reduction in Tilled Soils (C6)  Crayfish Burrows (C8)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquaticr (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Surface Water Prosent?  Wetland Hydrology Present?  Yes No O	Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Water Marks (B1)  Drift deposits (B3)  Algal Mat or Crust (B4)  Innudation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Depth (inches):  Surface Water (A1)  True Aquatic Plants (B14)  Sparsely Vegetated Concave Surface (B8)  Mos Trim Lines (B16)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Drift deposits (B5)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Depth (inches):  Saturation Present?  Yes  No  Depth (inches):  Depth (inches):  Depth (inches):  Saturation Present?  Yes  No  Depth (inches):  Depth (inches):  Surface Water Present?  Yes  No  Depth (inches):  Depth (inches):  Depth (inches):  Saturation Present?  Yes  No  Depth (inches):  Depth (inches):  Saturation Present?  Yes  No  Depth (inches):  Sparsely Vegetated Concave Surface (B8)  Mos Trim Lines (B10)  Moss Trim Lines (B10)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Dry Season Water Table (C2)  Crayfi	Vetland Hydrology Indicators	:		Sec	condary Indicators (minim	um of two required)
High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Depth (inch	High Water Table (A2)	Primary Indicators (minimum	of one required; check all	that apply)			
Saturation (A3)	Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Saturation (D2)  Stunted or Stressed Plants (D1)  FAC-neutral (D5)  Wetland Hydrology Present?  Yes No  Depth (inches):  Saturation Present?  Yes No	Surface Water (A1)	☐ Tru∈	e Aquatic Plants (B14)		Sparsely Vegetated Conc	ave Surface (B8)
Water Marks (B1)	Water Marks (B1)	_ ` '	Hydr	rogen Sulfide Odor (C1)	<b>✓</b>	Drainage Patterns (B10)	
Sediment Deposits (B2)	Sediment Deposits (B2)	¬ ` ´		, , ,	Roots (C3)	` '	
Drift deposits (B3)	Drift deposits (B3)	_ ` ´		* *		•	(C2)
Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	_ ` ` ` ′			(C6)		ial Imagan, (CO)
☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ Field Observations:  Surface Water Present? Yes ☐ No ☐ Depth (inches): ☐ Saturation Present? Yes ☐ No ☐ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ☐ Depth (inches): ☐ Saturation Present? Yes ☐	Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations: Surface Water Present?  Water Table Present?  Water Table Present?  Yes No Depth (inches): Surface Water Table Present?  Water Table Present?  Yes No Depth (inches): Surface Water Table Present?  Wetland Hydrology Present?  Yes No Depth (inches): Surface Water Table Present?  Wetland Hydrology Present?  Yes No Depth (inches): Surface Water Table Present?  Yes No Depth (inches): Surface Water Present?  Yes No Depth (inches): Surface Wat	_ ' ' '		* *			• , , ,
□ Inundation Visible on Aerial Imagery (B7) □ Shallow Aquitard (D3) □ Water-Stained Leaves (B9) □ Aquatic Fauna (B13) □ FAC-neutral Test (D5) □ Shallow Aquitard (D3) □ Microtopographic Relief (D4) □ FAC-neutral Test (D5) □ Vater Table Present? □ Vater	□ Inundation Visible on Aerial Imagery (B7) □ Shallow Aquitard (D3)  ✓ Water-Stained Leaves (B9) □ Microtopographic Relief (D4) □ Aquatic Fauna (B13) ✓ FAC-neutral Test (D5)  Field Observations: Surface Water Present? Yes □ No □ Depth (inches): □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □		□ Othe	er (Explain in Remarks)			` '
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Yes No Depth (inches):	Aquatic Fauna (B13)  Factorial Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Secribe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		magery (B7)			•	,
Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Yes No Depth (inches):  Depth (inches):  Yes No Depth (inches):	Field Observations:  Surface Water Present? Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):  Saturation Present? Yes No Depth (inches):  Includes capillary fringe)  Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	✓ Water-Stained Leaves (B9)				Microtopographic Relief (	(D4)
Surface Water Present? Yes No Depth (inches):	Autrace Water Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Staturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Staturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Staturation Present?  Yes No No Depth (inches):  No Depth (inches):  Staturation Present?  Yes No No Depth (inches):  No Depth (inches):  Staturation Present?  Yes No Depth (inches):  No Depth (inches):  Staturation Present?  Yes No No Depth (inches):  Staturation Present?  Yes No Depth (inches):  Staturation Present?  Yes No No Depth (inches):  Staturation Present?  Yes No Depth (inches	Aquatic Fauna (B13)			<b>✓</b>	FAC-neutral Test (D5)	
Vater Table Present? Yes No Depth (inches):	Vater Table Present? Yes No Depth (inches):		O No O				
Saturation Present? Includes capillary fringe)  Yes No Depth (inches): 4  Wetland Hydrology Present? Yes No No C	Saturation Present? Yes No Depth (inches): 4 Wetland Hydrology Present? Yes No Depth (includes capillary fringe) No Depth (inches): 4 Wetland Hydrology Present? Yes No Depth (inches): 4 Vescribe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:			pth (inches):			
includes capillary fringe)  Yes No Depth (inches): 4	Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:			pth (inches):	Wetland Hydrolo	ny Present? Yes	No O
	escribe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	Va	<b>.s ● No</b> ○ De	epth (inches): 4	Wedana Hydrolo	gy i resent:	
	emarks:		m gauge, monitoring well,	, aerial photos, previous insp	ections), if available	e:	
	emarks:						

Tree Stratum         (Plot size: 30 )           1_Acer rubrum	Absolute % Cover	Re	ecies? _ el.Strat.	Indicator	Dominance Test worksheet:
4. 4	% Cover	Cc			
1 Acer rubrum			ver	Status	
	35	<b>V</b>	58.3%	FAC	Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)
2 Ulmus americana	25	<b>V</b>	41.7%	FACW	
3		$\Box$	0.0%		Total Number of Dominant
<b>V</b> .		$\overline{\Box}$	0.0%		Species Across All Strata:3(B)
4		$\overline{\Box}$	0.0%		Percent of dominant Species
5		$\exists$			That Are OBL, FACW, or FAC: 100.0% (A/B)
6			0.0%		
7			0.0%		Prevalence Index worksheet:
8		Ш	0.0%		Total % Cover of: Multiply by:
Sapling-Sapling/Shrub Stratum (Plot size:	60	= To	otal Cove	r	0BL species 0 x 1 = 0
	_		0.0%		FACW species <u>45</u> x 2 = <u>90</u>
1					FAC species 35 x 3 = 105
2.			0.0%		FACU species x 4 =
3			0.0%		·
4	0		0.0%		
5	0	$\sqcup$	0.0%		Column Totals: <u>80</u> (A) <u>195</u> (B)
6	0		0.0%		Prevalence Index = $B/A = 2.438$
7	0		0.0%		Hydrophytic Vegetation Indicators:
8			0.0%		Rapid Test for Hydrophytic Vegetation
9	_		0.0%		
10	0		0.0%		✓ Dominance Test is > 50%
			otal Cove		✓ Prevalence Index is ≤3.0 ¹
Shrub Stratum (Plot size:)		= 10			Morphological Adaptations <sup>1</sup> (Provide supporting
1	0	Ц	0.0%		data in Remarks or on a separate sheet)
2	0	Ш	0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
3	0		0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4	_		0.0%		be present, unless disturbed or problematic.
5			0.0%		Definition of Vegetation Strata:
6			0.0%		Four Vegetation Strata:
	0	$\overline{\Box}$	0.0%		Tree stratum – Consists of woody plants, excluding vines, 3
7			otal Cove		in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Herb Stratum (Plot size: 15 )					Sapling/shrub stratum – Consists of woody plants, excluding
1. Carex intumescens	20	<b>✓</b>	100.0%	FACW	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2	0		0.0%		Herb stratum – Consists of all herbaceous (non-woody)
3			0.0%		plants, regardless of size, and all other plants less than 3.28
4	0		0.0%		ft tall.
5	0		0.0%		Woody vines – Consists of all woody vines greater than 3.28 ft in height.
6.	0		0.0%		_
7			0.0%		Five Vegetation Strata:
8	0		0.0%		Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
		$\overline{\Box}$	0.0%		diameter at breast height (DBH).
9		H			Sapling stratum – Consists of woody plants, excluding
10		$\exists$	0.0%		woody vines, approximately 20 ft (6 m) or more in height and
11			0.0%		less than 3 in. (7.6 cm) DBH.
12	0	Ш	0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size:)	20	= To	otal Cove	r	Herb stratum – Consists of all herbaceous (non-woody)
1	0		0.0%		plants, including herbaceous vines, regardless of size, and
	0		0.0%		woody species, except woody vines, less than approximately 3 ft (1 m) in height.
2					` ' '
3		1	0.0%		Woody vines – Consists of all woody vines, regardless of height.
4			0.0%		
5	0	$\sqcup$	0.0%		Hydrophytic
6	0		0.0%		Vegetation
	0	= T	otal Cove	r	Present? Yes No
Remarks: (Include photo numbers here or on a separate she					ı

Soil Sampling Point: 4-2 wet

Profile Desc	ription: (Des	cribe to	the depth	needed to	documer	nt the indi	cator or c	onfirm the	absence of indicators.)		
Depth		Matrix				dox Featu					
(inches)	Color (ı		%		moist)	%_	Type 1	Loc²	Texture Remarks	<b>i</b>	
0-5	10YR	4/1	70	5YR	4/6	30	С	M	Silt Loam		
5-8	10YR	4/1	85	5YR	4/6	15	С	M	Silt Loam		
8-14	10YR	5/1	80	7.5YR	4/6	20	С	М	Silt Loam		
			_	-				-			
					-						
1_											
		=Depleti	on. RM=Red	luced Matrix,	CS=Cove	red or Coat	ted Sand Gi	rains <sup>2</sup> Loc	ation: PL=Pore Lining. M=Matrix		
Hydric Soil									Indicators for Problematic Hydric So	ils <sup>3</sup> :	
Histosol (	. ,				Surface (	` '	(60) (141 54		2 cm Muck (A10) (MLRA 147)		
	pedon (A2)			_			(S8) (MLRA		Coast Prairie Redox (A16)		
Black His	tic (A3) n Sulfide (A4)						MLRA 147, :	148)	(MLRA 147,148)		
	Layers (A5)				ny Gieyea eted Matr	Matrix (F2	)		Piedmont Floodplain Soils (F19)		
	ck (A10) (LRR	NI)				ırface (F6)			(MLRA 136, 147)		
	Below Dark S		۸11)	_		Surface (F	7)		<ul><li>✓ Very Shallow Dark Surface (TF12)</li><li>✓ Other (Explain in Remarks)</li></ul>		
	rk Surface (A1	•	411)			sions (F8)	.,		Unier (Explain in Remarks)		
	uck Mineral (S	•	N		•	. ,	(F12) (LRR	N,			
MLRA 14		,1) (LIKIK	11,	MLR	A 136)						
Sandy Gl	eyed Matrix (S	54)		Uml	ric Surfac	e (F13) (M	LRA 136, 12	22)	3		
Sandy Re	edox (S5)			Pied	mont Floo	dplain Soil	s (F19) (ML	.RA 148)	<sup>3</sup> Indicators of hydrophytic vegetation and wetland hydrology must be present,		
Stripped	Matrix (S6)			Red	Parent Ma	aterial (F21	.) (MLRA 12	27, 147)	unless disturbed or problem		
Restrictive L	aver (if ohe	erved):									
Type:											
Depth (inc									Hydric Soil Present? Yes   No	$\circ$	
Remarks:											
remarks.											
I											



Photo File: IM	IG_3374.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°31'5.195"W	Lat/Northing: 38°43'0.419"N
Description:			

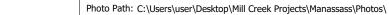
Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

oject/Site: Manassas Regional Air	port		City/County: N	lanassas	Samplin	g Date: 24-Oct-16
plicant/Owner: Manassas Regiona	al Airport			State: VA	Sampling Point	: 4-3 up
estigator(s): Matt Neely			Section, Towns	hip, Range: S	т	R
dform (hillslope, terrace, etc.):	Toeslope		Local relief (cond	ave, convex, no	ne): none	Slope: 4.0% / 2.3
region (LRR or MLRA): MLRA	148 in LRR S	Lat.:	38°43'1.376"N	Long.	: 77°31'6.978"W	Datum: NAD 83
Map Unit Name: Elsinboro silt	laom				NWI classification:	
climatic/hydrologic conditions of	on the site tynic	al for this time of v	ear? Yes 💿 No	O (If no. e	 xplain in Remarks.)	
Vegetation, Soil	or Hydrolog,		ly disturbed?			Yes   No
	-				ircumstances" present?	
Vegetation, Soil	, or Hydrolog	y 🗌 naturally p	roblematic?	(If needed, ex	plain any answers in Re	marks.)
ımmary of Findings - A	ttach site n	nap showing s	sampling poi	nt locations	s, transects, impo	rtant features, etc
drophytic Vegetation Present?		o 🔾				
dric Soil Present?		o	Is the Sa	mpled Area	es O No 💿	
etland Hydrology Present?	Yes O N	o	within a	Wetland?	C5 9 110 9	
lydrology						
Vetland Hydrology Indicators:					Secondary Indicators (mini	mum of two required)
Primary Indicators (minimum of	one required; o	heck all that apply)			Surface Soil Cracks (B6	
Surface Water (A1)		True Aquatic Plar			Sparsely Vegetated Co	•
High Water Table (A2)		Hydrogen Sulfide	Odor (C1)		☐ Drainage Patterns (B10	
Saturation (A3)		Oxidized Rhizospl	heres along Living F	loots (C3)	Moss Trim Lines (B16)	
Water Marks (B1)		Presence of Redu	• ,		Dry Season Water Tabl	e (C2)
Sediment Deposits (B2)			action in Tilled Soils	(C6)	Crayfish Burrows (C8)	
☐ Drift deposits (B3) ☐ Algal Mat or Crust (B4)		☐ Thin Muck Surfac	` '		Saturation Visible on A	• , , ,
Iron Deposits (B5)		Other (Explain in	Remarks)		Stunted or Stressed Pla Geomorphic Position (I	` '
Inundation Visible on Aerial Imag	gery (B7)				Shallow Aquitard (D3)	72)
Water-Stained Leaves (B9)	<i>3-7</i> ( <i>)</i>				☐ Microtopographic Relie	f (D4)
Aquatic Fauna (B13)					FAC-neutral Test (D5)	. ,
ield Observations:						
Surface Water Present? Yes		Depth (inches):				
Water Table Present? Yes	O No 💿	Depth (inches):				O O
Saturation Present?  Yes	○ No ●	Depth (inches):		Wetland Hydro	ology Present? Yes	○ No •
(includes capillary fringe) Describe Recorded Data (stream				ections), if avail:	able:	
(	J. 1 J. 1	<b>5</b> 1,111 p	, <sub> </sub>	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
lemarks:						

		Dominant ——Species?			Sampling Point: 4-3 up		
	Absolute	Re	el.Strat.	Indicator	Dominance Test worksheet:		
Tree Stratum (Plot size: 30	% Cover			Status	Number of Dominant Species		
1 Carya tomentosa	40	<b>V</b>	66.7%	UPL	That are OBL, FACW, or FAC: (A)		
2. Ouercus rubra	10		16.7%	FACU	Total Number of Dominant		
3 Acer rubrum	10		16.7%	FAC	Species Across All Strata: 3 (B)		
4	0		0.0%				
5	0		0.0%		Percent of dominant Species		
6	_		0.0%		That Are OBL, FACW, or FAC: $\underline{66.7\%}$ (A/B)		
7	0		0.0%		Prevalence Index worksheet:		
8.			0.0%		Total % Cover of: Multiply by:		
	- 60	= To	otal Cover		0BL species0 x 1 =0		
Sapling-Sapling/Shrub Stratum (Plot size: 15	) —				FACW species x 2 =		
1 Asimina triloba	20	<b>✓</b>	66.7%	FAC	FAC species $40 \times 3 = 120$		
2. Carpinus caroliniana	10	<b>✓</b>	33.3%	FAC	10 10		
3	0	Ш	0.0%		40 200		
4	0		0.0%		of L species — X 3 = —		
5	0		0.0%		Column Totals: 90 (A) 360 (B)		
6	0		0.0%		Prevalence Index = $B/A = 4.000$		
7	_		0.0%		Hydrophytic Vegetation Indicators:		
8			0.0%		Rapid Test for Hydrophytic Vegetation		
9	_		0.0%				
10	0		0.0%		Dominance Test is > 50%		
	30	= T	otal Cover		Prevalence Index is ≤3.0 ¹		
Shrub Stratum (Plot size:)					Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)		
1		Н	0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)		
2		Н	0.0%				
3		Н	0.0%		Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.		
4	0	$\sqcup$	0.0%				
5	0	Ш	0.0%		Definition of Vegetation Strata:		
6	0	Ш	0.0%		Four Vegetation Strata:		
7	0		0.0%		Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH),		
Herb Stratum (Plot size:)	0	= T	otal Cover	•	regardless of height.		
	0		0.0%		Sapling/shrub stratum – Consists of woody plants, excluding		
1		$\overline{\Box}$	0.0%		vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.		
2		$\exists$	0.0%		Herb stratum – Consists of all herbaceous (non-woody)		
3		$\exists$	0.0%		plants, regardless of size, and all other plants less than 3.28 ft tall.		
4			-		Woody vines – Consists of all woody vines greater than 3.28		
5		$\vdash$	0.0%		ft in height.		
6		$\vdash$	0.0%		Five Vegetation Strata:		
7			0.0%		Tree - Woody plants, excluding woody vines, approximately		
8	0_		0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).		
9	0	Ц	0.0%		Sapling stratum – Consists of woody plants, excluding		
10		Ц	0.0%		woody vines, approximately 20 ft (6 m) or more in height and		
11	0	Ш	0.0%		less than 3 in. (7.6 cm) DBH.		
12	0	Ш	0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.		
Woody Vine Stratum (Plot size:)		= T	otal Cover	•	Herb stratum – Consists of all herbaceous (non-woody)		
1	0		0.0%		plants, including herbaceous vines, regardless of size, and		
2.		П	0.0%		woody species, except woody vines, less than approximately 3 ft (1 m) in height.		
•		$\exists$	0.0%		Woody vines – Consists of all woody vines, regardless of		
3			0.0%		height.		
4							
5			0.0%		Hydrophytic		
6		Ш	0.0%		Vegetation   Yes • No •		
	0		otal Cove				

Soil Sampling Point: 4-3 up

	ription: (De		the depth	needed to docume	nt the indicator o	confirm the	absence of indicators.)	
Depth (inches)	Color	Matrix (moist)	<b>%</b>		edox Features	1 Loc²	Texture	Remarks
0-3	10YR	( <b>moist</b> ) 4/4	100	Color (moist)		- <u>LOC</u>	Silt Loam	кетагкѕ
3-12	10YR	5/6	100				Silt Loam	
							-	
-	-	-					-	·
							-	
1 Type: C-Cen	contration	D-Doploti	on DM-Doc	used Matrix CS-Cov	ared or Coated Sand	Crains 21 or	cations DI -Doro Lining M-	Matrix
			on. KM=Rec	luceu Matrix, CS=Cove	ered or Coated Sand	Grains -Loc	cation: PL=Pore Lining. M=	
Hydric Soil 1				☐ Dark Surface	(67)			ematic Hydric Soils <sup>3</sup> :
·	pedon (A2)				(57) ow Surface (S8) (ML	DA 147 149)	2 cm Muck (A10)	(MLRA 147)
Black Hist					face (S9) (MLRA 14		Coast Prairie Redo	ox (A16)
	າ Sulfide (A4	1)		Loamy Gleyed		7, 110)	(MLRA 147,148)	
	Layers (A5)			Depleted Mat			Piedmont Floodpla (MLRA 136, 147)	ain Soils (F19)
	k (A10) (LR			Redox Dark S			Very Shallow Dark	(Surface (TF12)
	Below Dark		A11)		k Surface (F7)		Other (Explain in	
	k Surface (A	•	/	Redox Depres			Outer (Explain in	remarks
	ıck Mineral (		N,	Iron-Mangane MLRA 136)	ese Masses (F12) (LF	RR N,		
	eyed Matrix	(S4)		Umbric Surfa	ce (F13) (MLRA 136,	, 122)	_	
Sandy Re		(- )		Piedmont Flo	odplain Soils (F19) (	MLRA 148)	<sup>3</sup> Indicators of	hydrophytic vegetation and drology must be present,
	Matrix (S6)			Red Parent M	laterial (F21) (MLRA	127, 147)		sturbed or problematic.
Restrictive L	avor (if ab	comrod):						
Type:	ayei (ii ob	serveu):						
	hes):						Hydric Soil Present?	Yes O No 💿
Remarks:								
Remarks.								





Plot ID: **4-3 up** 

Photo File: IN	IG_3375.JPG	Orientation:		-facing
Lat/Long or UTM :	Long/Easting	: 77°31'6.978"W	Lat/Northing:	38°43'1.376"N
Description:				

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

thregion (LRR or MLRA): MLRA 148 in LRR S	setigator(s): Matt Neely   Section, Township, Range: S   T   R    dform (hillslope, terrace, etc.): Hillside   Local relief (concave, convex, none):   none   Slope:   2,0%   / 1,1    region (LRR or MLRA): MLRA 148 in LRR S   Lat:   38°43′6.507°N   Long:   7°31′10.228°W   Datum: NAD 83    Map Unit Name:   Aden Silt Loam   NUTL classification:    climatic/hydrologic conditions on the site typical for this time of year?   Yes   No   (If no, explain in Remarks.)    Vegetation   , Soil   , or Hydrology   significantly disturbed?   Are "Normal Circumstances" present?   Yes   No   Vegetation   , Soil   , or Hydrology   naturally problematic?   (If needed, explain any answers in Remarks.)    Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc.    drophytic Vegetation Present?   Yes   No   Vegetation   Yes   Yes   No   Vegetation   Yes   Yes   No   Vegetation   Yes   Yes   No   Vegetation   Yes   Yes   No   Yes	pject/Site: Manassas Regional A	irport	City/County: Manass	as	Sampling Date: 24-Oct-16
Indiform (hillslope, terrace, etc.): Hillside: Local relief (concave, convex, none): none Slope: 2.0% / 1.15 bregion (LRR or MLRA): MLRA 148 in LRR S	drorm (hillslope, terrace, etc.): Hillside   Local relief (concave, convex, none): none   Slope: 2,0% / 1,1 region (LRR or MLRA): MLRA 148 in LRR S   Lat.: 38°43'6.507"N   Long: 77°31'10.228"W   Datum: NAD 83   Map Unit Name: Aden Silt Loam   NWI classification:	plicant/Owner: Manassas Regio	onal Airport	Sta	ate: VA Sampl	ing Point: 5-1 up
region (LRR or MLRA): MLRA 148 in LRR S	region (LRR or MLRA): MLRA 148 in LRR S	estigator(s): Matt Neely		Section, Township, R	ange: S T	R
Map Unit Name:   Aden Silt Loam   Aden Silt Loam   NWI classification:	Map Unit Name:   Aden Sit Loam	dform (hillslope, terrace, etc.)	: Hillside	Local relief (concave, o	convex, none): none	<b>Slope:</b> 2.0% / 1.1
Map Unit Name: Aden Silt Loam	Map Unit Name: Aden Silt Loam	region (LRR or MLRA): MLF		 Lat.: 38°43'6.507"N	Long.: 77°31'10.228	
climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation  , Soil  , or Hydrology    significantly disturbed?	climatic/hydrologic conditions on the site typical for this time of year? Yes ® No ( If no, explain in Remarks.)  Vegetation	Map Unit Name: Aden Silt L	oam			
Vegetation	Vegetation	climatic/hydrologic conditions	s on the site typical for this t	ime of year? Yes  No	(If no explain in Rema	rke )
Vegetation	Vegetation				• • •	· • • • • •
Attach site map showing sampling point locations, transects, important features, et ydrophytic Vegetation Present? Yes \ No \ Per	Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc. pdrophytic Vegetation Present? Yes \ No \ \circ \ No \circ \ \c			·		or asone.
Is the Sampled Area within a Wetland?   Yes   No	Advisophytic Vegetation Present? Yes No  Available Mydrology Present? Yes No  Available Mydrology Present? Yes No  Available Mydrology Indicators:    Is the Sampled Area within a Wetland?   Yes No	Vegetation, Soil	, or Hydrology 🔲 na	turally problematic? (If i	needed, explain any answ	ers in Remarks.)
Address of the sent?  Yes No No No No Within a Wetland?  No No No No No Within a Wetland?  No N	Is the Sampled Area within a Wetland?  Ves No No No No Wetland Hydrology Present?  No Ves No	ımmary of Findings	Attach site map sho	wing sampling point k	cations, transects	, important features, etc
Is the Sampled Area within a Wetland?  Yes No	Is the Sampled Area within a Wetland?  Ves No No No No Wetland Hydrology Present?  Veriand Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Seriance Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Algal Mat or Crust (B4)  Water Stained Leaves (B9)  Algal Mat or Crust (B4)  Water-Stained Leaves (B9)  Water-Stained Leaves (B9)  Water-Stained Leaves (B9)  Water Faula (B13)  Water Faula (B13)  Pesence of Reduced Iron (C4)  Drink deposits (B5)  Algal Mat or Crust (B4)  Water-Stained Leaves (B9)  Water-Stained Leaves (B9)  Adqualite Fauna (B13)  Field Observations:  Fauface Water Present?  Ves No Depth (inches):  Water Table Present?  Ves No Depth (inches):  Wetland Hydrology Present?  Ves No Depth (inches):	drophytic Vegetation Present	? Yes O No 💿			
Within a Wetland?   Wetland?   Wetland?   Wetland?   Wetland?   Wetland?   Wetland?   Wetland?   Wetland?   Wetland Hydrology Indicators:   Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Water Marks (B1)   Presence of Reduced Iron (C4)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Iron Deposits (B5)   Geomorphic Position (D2)   Shallow Aquitard (D3)   Water-Stained Leaves (B9)   Aquatic Fauna (B13)   FAC-neutral Test (D5)   FAC-neutral Test (D5)   Saturation Present? Yes   No  Depth (inches):   Wetland Hydrology Present? Yes   No  Seturation Present? Yes   No  Depth (inches):   Wetland Hydrology Present? Yes	Very a company   Ves   No   No   Within a Wetland?   Ves   No   Ves   Wetland   Ves   Ves   No   Ves   Ves   Ves   No   Ves   Ves   Ves   No   Ves   Ves   Ves   No   Ves   Ves   Ves   No   Ves   Ves   Ves   Ves   No   Ves			Is the Sample	d Area O O	
Secondary_Indicators (minimum of two required)   Primary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Dry Season Water Table (C2)   Sectiment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Iron Deposits (B5)   Geomorphic Position (D2)   Shallow Aquitard (D3)   Microtopographic Relief (D4)   Aquatic Fauna (B13)   FAC-neutral Test (D5)	Interpretation   Inte		Yes ○ No •			
Secondary Indicators (minimum of two required)   Surface Soil Cracks (86)	Secondary Indicators (minimum of two required)   Surface Soli Cracks (B6)					
Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	Vetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	vdrology				
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water (PA1)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water (N1)  True Aquatic Plants (B14)  Sparsely Vegetated Concave Surface (B8)  Drift de Odor (C1)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Dry Season Water Table (C2)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Yes No Depth (inches):  Wetland Hydrology Present? Yes No Found Present?  Wetland Hydrology Present?  Yes No Depth (inches):					
Surface Water (A1)	Surface Water (A1)			at apply)		
High Water Table (A2)	High Water Table (A2)					
Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Factoreutral Test (D5)  Depth (inches):  Stutland Hydrology Present?  Wetland Hydrology Present?  Yes  No  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):	Saturation (A3)	¬ ` ´		, ,		
Sediment Deposits (B2)	Sediment Deposits (B2)	Saturation (A3)		• •		
Drift deposits (B3)	Drift deposits (B3)	Water Marks (B1)	Presenc	e of Reduced Iron (C4)	☐ Dry Season V	Vater Table (C2)
Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	Sediment Deposits (B2)	Recent	Iron Reduction in Tilled Soils (C6)	Crayfish Burr	ows (C8)
Geomorphic Position (D2) Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9) Aquatic Fauna (B13) FAC-neutral Test (D5)  Field Observations: Surface Water Present? Ves No Depth (inches): Vater Table Present? Ves No Depth (inches): Saturation Present?	Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Vater Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Saturation Present?	_ ` ` ` `	Thin Mu	ıck Surface (C7)		• , , ,
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Factor of the present of	Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Steld Observations:  Surface Water Present?  Water Table Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):		Other (	Explain in Remarks)		` '
Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Present?	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Present?	_	nageny (R7)			
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):	=	lagery (b/)			` ,
Surface Water Present? Yes No Depth (inches):	Surface Water Present? Yes No Depth (inches):	_				• • •
Vater Table Present? Yes No Depth (inches):	Vater Table Present? Yes No Depth (inches):	ield Observations:				
Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No No linches	Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No location No location Present? Yes No location No	Surface Water Present? Ye	s O No O Depth	(inches):		
Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No linches):	Saturation Present? Yes No Depth (inches):	Water Table Present? Ye	s O No O Depth	(inches):		
includes capillary fringe)	includes capillary fringe)	VA		Wet	land Hydrology Present?	Yes ○ No ●
	rescribe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	includes capillary fringe)				
emarks:						
emarks:						
emarks:						
emarks:						
emarks:						
Remarks:						
Remarks:						
lemarks:						
lemarks:						
Remarks:						
Remarks:						
emarks:						

		C	ecies? -		Sampling Point: <u>5-1 up</u>		
<b>Tree Stratum</b> (Plot size: <u>30</u> )	Absolute % Cover	Re	l.Strat.	Indicator Status	Dominance Test worksheet:		
1 Quercus rubra	25	<b>V</b>	38.5%	FACU	Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)		
2 Quercus phellos		$\overline{\Box}$	15.4%	FAC	indexic obly men, or me.		
3. Carya tomentosa		$\overline{\Box}$	15.4%	UPL	Total Number of Dominant		
4. Acer rubrum			30.8%	FAC	Species Across All Strata: 4 (B)		
5		$\overline{\Box}$	0.0%		Percent of dominant Species		
6.		$\overline{\Box}$	0.0%		That Are OBL, FACW, or FAC: 25.0% (A/B)		
7			0.0%		Prevalence Index worksheet:		
8			0.0%		Total % Cover of: Multiply by:		
		 To	tal Cove		OBL species 0 x 1 = 0		
Sapling-Sapling/Shrub Stratum (Plot size:	)				FACW species 0 x 2 = 0		
1	0	$\sqsubseteq$	0.0%		FAC species 30 x 3 = 90		
2		$\Box$	0.0%		<u> </u>		
3		$\sqcup$	0.0%		1 7 7		
4		$\sqcup$	0.0%		of E specifics		
5		$\sqcup$	0.0%		Column Totals: <u>75</u> (A) <u>285</u> (B)		
6		$\sqcup$	0.0%		Prevalence Index = B/A = 3.800		
7		$\Box$	0.0%		Hydrophytic Vegetation Indicators:		
8	0	$\sqcup$	0.0%		Rapid Test for Hydrophytic Vegetation		
9	0	$\square_{\underline{}}$	0.0%		☐ Dominance Test is > 50%		
10			0.0%		Prevalence Index is ≤3.0 <sup>1</sup>		
Shrub Stratum (Plot size:)	0 :	= To	tal Cove	r	Morphological Adaptations <sup>1</sup> (Provide supporting		
1	0		0.0%		data in Remarks or on a separate sheet)		
2.			0.0%		Problematic Hydrophytic Vegetation 1 (Explain)		
3			0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must		
4			0.0%		be present, unless disturbed or problematic.		
5.	_		0.0%		Definition of Vegetation Strata:		
6			0.0%		Four Vegetation Strata:		
7.		$\Box$	0.0%		Tree stratum - Consists of woody plants, excluding vines, 3		
• •		 = To	tal Cove	r	in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.		
(Plot size: 15	5	<b>~</b>	100.00/	LIDI	Sapling/shrub stratum – Consists of woody plants, excluding		
1 Carya tomentosa			0.0%	UPL	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.		
2		Η-	0.0%		Herb stratum – Consists of all herbaceous (non-woody)		
3		H-	0.0%		plants, regardless of size, and all other plants less than 3.28 ft tall.		
4		$\Box$	0.0%		Woody vines – Consists of all woody vines greater than 3.28		
5		$\Box$	0.0%		ft in height.		
6		$\Box$	0.0%		Five Vegetation Strata:		
7		Π-	0.0%		Tree - Woody plants, excluding woody vines, approximately		
8		Η-	0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).		
9		H	0.0%		Sapling stratum – Consists of woody plants, excluding		
10		Η-	0.0%		woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.		
11		Η-	0.0%		Shrub stratum – Consists of woody plants, excluding woody		
12		 - To	tal Cove	-	vines, approximately 3 to 20 ft (1 to 6 m) in height.		
Woody Vine Stratum (Plot size: 15		_			Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and		
1 Lonicera japonica		ዾ_	100.0%	FACU	woody species, except woody vines, less than approximately		
2		닏-	0.0%		3 ft (1 m) in height.		
3		$\exists$	0.0%		Woody vines – Consists of all woody vines, regardless of height.		
4		$\sqcup$	0.0%		- Incigniti		
5		Ц.	0.0%		Hydrophytic		
6		$\Box_{\perp}$	0.0%		Vegetation No. 20		
	5		tal Cove	_	Present? Yes UNO U		

Soil Sampling Point: 5-1 up

	ption: (De		the depth	needed t				onfirm the	absence of indicators	i.)	
Depth (inches)	Color (	Matrix	<b>%</b>	Cala		dox Feati	res1	Loc²	Toyturo	D	marke
0-5	Color ( 10YR	<b>moist)</b> 5/4	100		r (moist)	%	iype_+	LOC*	Texture Silt Loam	Kei	narks
										_	
5-12	10YR	5/6	100			_			Silt Loam		
									-		
		-	_					-		<del></del>	
										,	
			_					-			
1- 00	5										
		)=Depleti	on. RM=Rec	duced Matr	ix, CS=Cove	red or Coa	ted Sand G	rains <sup>2</sup> Loc	ation: PL=Pore Lining.	M=Matrix	
Hydric Soil In						·			Indicators for Pro	blematic Hydi	ric Soils <sup>3</sup> :
☐ Histosol (A	,				ark Surface (	. ,	(CO) (MI DA	1 47 1 40)	2 cm Muck (A1	0) (MLRA 147)	
Histic Epipe					olyvalue Belo				Coast Prairie Re		
Black Histic					nin Dark Surf			148)	(MLRA 147,148		
Stratified L		,			oamy Gleyed epleted Matr		)			plain Soils (F19)	)
2 cm Muck		N			edox Dark Su				(MLRA 136, 14	-	12)
Depleted B			<b>111</b>		epleted Dark	٠,				ark Surface (TF:	12)
Thick Dark		•	411)		edox Depres		,,		Other (Explain	in Remarks)	
Sandy Muc	,	,	N		on-Mangane	, ,	(F12) (LRR	N,			
MLRA 147,		OI) (LIKIK	11,	M	LRA 136)						
☐ Sandy Gley	ed Matrix (	(S4)		U	mbric Surfac	e (F13) (M	LRA 136, 1	22)	3		
Sandy Red	ox (S5)			Pi	edmont Floo	dplain Soil	s (F19) (ML	RA 148)	Indicators wetland	of hydrophytic v nydrology must	regetation and he present.
Stripped M	atrix (S6)			□ R	ed Parent Ma	aterial (F2	l) (MLRA 12	27, 147)		disturbed or pr	
Restrictive La	ver (if ohs	erved):									
Type:	ye. ( obc	er rea j.									
Depth (inch	es):								Hydric Soil Present	? Yes 🔾	No 💿
Remarks:											
remarks.											



Photo File: IM	IG_3384.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	77°31'10.228"	Lat/Northing: 38°43'6.507"N
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

oject/Site: Manassas Regional Ai	rport	City/County: Manassas	Sampling Date:	24-Oct-16
plicant/Owner: Manassas Region	nal Airport	State: V	A Sampling Point:	5-2 wet
estigator(s): Matt Neely		Section, Township, Range:	s TR	
dform (hillslope, terrace, etc.):	Swale	Local relief (concave, convex,	, none): concave Slope:	0.0% / 0.0
region (LRR or MLRA): MLRA	A 148 in LRR S La	- t.: 38°43'5.823"N		atum: NAD 83
Map Unit Name: Aden Silt Lo		30 13 3.023 11	NWI classification:	
		s a Vas ( No ( res		
	on the site typical for this time o		o, explain in Remarks.)  Al Circumstances" present?  Yes	● No ○
Vegetation, Soil	, or Hydrology  significa	antly disturbed? Are "Norma	al Circumstances" present? Yes	
Vegetation, Soil	, or Hydrology 🔲 naturall	y problematic? (If needed	l, explain any answers in Remarks.)	
ımmarv of Findings - A	Attach site map showing	sampling point location	ons, transects, important	features, etc
/drophytic Vegetation Present?		<u> </u>		
	Yes  No	T. II. C		
dric Soil Present?	Yes • No O	Is the Sampled Area within a Wetland?	Yes   No	
etland Hydrology Present?	Tes Wind C			
lydrology				
Vetland Hydrology Indicators:			Secondary Indicators (minimum of t	(wo required)
_	f one required; check all that app		Surface Soil Cracks (B6)	
Surface Water (A1)	☐ True Aquatic	` '	Sparsely Vegetated Concave Su	rface (B8)
<ul><li>_ High Water Table (A2)</li><li>✓ Saturation (A3)</li></ul>	_ ′ •	fide Odor (C1)	Drainage Patterns (B10)	
Water Marks (B1)		ospheres along Living Roots (C3) educed Iron (C4)	<ul><li>✓ Moss Trim Lines (B16)</li><li>✓ Dry Season Water Table (C2)</li></ul>	
Sediment Deposits (B2)		eduction in Tilled Soils (C6)	Crayfish Burrows (C8)	
Drift deposits (B3)	☐ Thin Muck Su	, ,	✓ Saturation Visible on Aerial Imag	gery (C9)
Algal Mat or Crust (B4)	Other (Explain	` '	Stunted or Stressed Plants (D1)	• , , ,
Iron Deposits (B5)	_	,	✓ Geomorphic Position (D2)	
Inundation Visible on Aerial Ima	agery (B7)		Shallow Aquitard (D3)	
✓ Water-Stained Leaves (B9)			Microtopographic Relief (D4)	
Aquatic Fauna (B13)			FAC-neutral Test (D5)	
ield Observations: jurface Water Present? Yes	No Depth (inche	ec).		
	O (S)	,		
		es): Wetland H	ydrology Present? Yes • No	o O
Saturation Present? includes capillary fringe)  Yes	No      Depth (inche)	es):1		
escribe Recorded Data (stream	n gauge, monitoring well, aerial p	hotos, previous inspections), if a	vailable:	
emarks:				

		_Sr	ecies? .		
	Absolute	Re	el.Strat.	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 30 )	% Cover			Status	
Tree Stratum (************************************					Number of Dominant Species
1 Acer rubrum	60	✓	100.0%	FAC	That are OBL, FACW, or FAC: 3 (A)
0			0.0%		
2			0.070		Total Number of Dominant
3	0		0.0%		Species Across All Strata: 3 (B)
4	0		0.0%		Species / icross / iii structur
4		=	0.070		
5	0		0.0%		Percent of dominant Species
	_		0.0%		That Are OBL, FACW, or FAC: 100.0% (A/B)
6			0.070		
7	0		0.0%		Prevalence Index worksheet:
	0		0.0%		Total % Cover of: Multiply by:
8		ш			Total 70 Cover of: Plateby by:
(B)	,60	= T	otal Cove	r	OBL species 30 x 1 = 30
Sapling-Sapling/Shrub Stratum (Plot size:	_ )				FACW species 5 x 2 = 10
1	_		0.0%		· — — —
•		$\equiv$			FAC species60 x 3 =180
2	0	Ш	0.0%		
3	0		0.0%		FACU species $0 \times 4 = 0$
J		$\equiv$			UPL species $0 \times 5 = 0$
4	0	Ш	0.0%		I
5	0		0.0%		Column Totals: 95 (A) 220 (B)
		$\overline{}$			
6	0	Ш	0.0%_		Prevalence Index = $B/A = 2.316$
7	0		0.0%		
		$\overline{}$	-		Hydrophytic Vegetation Indicators:
8	0	Ш	0.0%		Rapid Test for Hydrophytic Vegetation
9			0.0%		1 _ ' ' ' ' '
		$\equiv$	-		✓ Dominance Test is > 50%
10	0	Ш	0.0%		Prevalence Index is ≤3.0 <sup>1</sup>
	0	= T	otal Cove	r	
Shrub Stratum (Plot size:)	-		Jul. 0010	-	☐ Morphological Adaptations ¹ (Provide supporting
1	0		0.0%		data in Remarks or on a separate sheet)
			0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
2			0.0%		
3	0		0.0%		1 Indicators of hydric soil and wetland hydrology must
			0.0%		be present, unless disturbed or problematic.
4			0.070		
5	0		0.0%		Definition of Vegetation Strata:
			0.0%		Four Vegetation Strata:
6			0.070		1
7	0		0.0%		Tree stratum – Consists of woody plants, excluding vines, 3
	0	_ T	otal Cove		in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Herb Stratum (Plot size: 15 )		- ''	otal Cove	•	-
1 Carex Iurida	15	<b>V</b>	42.9%	OBL	Sapling/shrub stratum – Consists of woody plants, excluding
1 <u>Carex Iurida</u>					vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2. Leersia oryzoides	15	✓	42.9%	OBL	Harb strature Consists of all barbanas or from an area to
3. Carex intumescens	5		14.3%	FACW	Herb stratum – Consists of all herbaceous (non-woody)
J. Carex incumescens		$\equiv$		171011	plants, regardless of size, and all other plants less than 3.28 ft tall.
4	0	Ш	0.0%		Woody vines – Consists of all woody vines greater than 3.28
5	0		0.0%		ft in height.
		$\equiv$			it in neight.
6	0	Ш	0.0%		Five Vegetation Strata:
7	0		0.0%		_
	_				Tree - Woody plants, excluding woody vines, approximately
8	0	Ш	0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9.	0		0.0%		diameter at breast height (DBH).
		$\overline{}$	-		Sapling stratum – Consists of woody plants, excluding
10	0	Ш	0.0%		woody vines, approximately 20 ft (6 m) or more in height and
11	0		0.0%		less than 3 in. (7.6 cm) DBH.
		$\equiv$			Shrub stratum – Consists of woody plants, excluding woody
12	0	Ш	0.0%		vines, approximately 3 to 20 ft (1 to 6 m) in height.
A CONTRACTOR OF THE CONTRACTOR	35	= Te	otal Cove	r	
Woody Vine Stratum (Plot size:)					Herb stratum – Consists of all herbaceous (non-woody)
1	0		0.0%		plants, including herbaceous vines, regardless of size, and
**			0.00/		woody species, except woody vines, less than approximately
2	0	닏	0.0%		3 ft (1 m) in height.
3	0		0.0%		Woody vines - Consists of all woody vines, regardless of
1			0.00/-		height.
4		ᆜ	0.0%		-
5	0		0.0%		l
* ·-					Hydrophytic
6	0	Ш	0.0%		Vegetation
	0	= T	otal Cove	er	Present? Yes S NO C
					l
Remarks: (Include photo numbers here or on a separate sl	neet.)				
·					

Soil Sampling Point: \_5-2 wet

Profile Desci	iption: (De	escribe to	the depth	needed to	docume	nt the indi	cator or co	nfirm the	absence of indicators.)	-	
Depth		Matrix				edox Featu					
(inches)		(moist)	%	Color	(moist)	%	Type 1	Loc <sup>2</sup>	Texture	Remarks	
0-4	10YR	4/1	100						Silt Loam		
4-8	10YR	5/1	70	5YR	4/6	30	С	М	Silt Loam		
8-13	10YR	5/1	80	7.5YR	4/6	20	С	М	Silt Loam		
	-			-					,		
	-			-					-		
	-			-	-				-		
	-	_		-				-	-		
								-			
<sup>1</sup> Type: C=Con	centration.	D=Depleti	on. RM=Red	uced Matrix,	CS=Cove	ered or Coat	ted Sand Gr	ains <sup>2</sup> Loc	cation: PL=Pore Lining. M=I	Matrix	
Hydric Soil	indicators:	<u> </u>							Indicators for Proble	ematic Hydric Soile <sup>3</sup> :	
Histosol (	A1)			☐ Dar	k Surface	(S7)			2 cm Muck (A10) (	•	
Histic Epi	pedon (A2)			Poly	value Belo	ow Surface	(S8) (MLRA	147,148)			
Black Hist				Thir	Dark Sur	face (S9) (I	MLRA 147, 1	48)	Coast Prairie Redox (MLRA 147,148)	x (A16)	
	Sulfide (A4					Matrix (F2	)		☐ Piedmont Floodpla	in Soils (F19)	
	Layers (A5)				leted Mat				(MLRA 136, 147)		
	k (A10) (LR			Redox Dark Surface (F6) Very Shallow Dark Surface (TF12)							
	Below Dark	•	A11)	☐ Depleted Dark Surface (F7) ☐ Other (Explain in Remarks) ☐ Redox Depressions (F8)							
	k Surface (A	•				. ,	(F12) (LRR I	N			
MLRA 147	ick Mineral ( 7, 148)	(S1) (LRR	N,		A 136)	.30 1103303	(1 12) (LIGE)	٠,			
Sandy Gle	eyed Matrix	(S4)		Uml	oric Surfa	ce (F13) (M	LRA 136, 12	2)	3		
Sandy Re	dox (S5)			Pied	mont Flo	odplain Soils	s (F19) (MLF	RA 148)	ا Indicators of ا wetland hyd	hydrophytic vegetation and rology must be present,	
Stripped	Matrix (S6)			Rec	Parent M	laterial (F21	.) (MLRA 12	7, 147)		sturbed or problematic.	
Restrictive L	aver (if ob	served):									
Type:	u y c. ( ob	oc. reaj.									
Depth (inc	hes):								Hydric Soil Present?	Yes 🏵 No 🔾	
Remarks:											



Photo File: IM	IG_3385.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°31'10.192"	Lat/Northing: 38°43'5.823"N
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

Description   Company	setigator(s): Matt Neely   Section, Township, Range: S   T   R	oject/Site: Manassas Regional Ai	irport	City/Col	ınty: Manassas		Sampling D	ate: 24-Oct-16
Addrorm (hillslope, terrace, etc.): Terrace	under make the process of the state of the	plicant/Owner: Manassas Region	nal Airport		State: \	VA Sa	mpling Point:	5-3 up
Map Unit Name:   Aden Silt Loam	Map Unit Name:   Aden Silt Loam	estigator(s): Matt Neely		Section,	, Township, Range:	S	т	R
Map Unit Name: Aden Silt Loam	Map Unit Name: Aden Silt Loam	dform (hillslope, terrace, etc.):	Terrace	Local reli	ef (concave, conve	<b>x, none):</b> rollin	ng <b>Slo</b> r	<b>De:</b> 0.0% /0.0
Map Unit Name: Aden Silt Loam	Map Unit Name: Aden Silt Loam	region (LRR or MLRA): MLR	A 148 in LRR S	<b>Lat.:</b> 38°43'4.	332"N <b>I</b>	 ong.: 77°31'10	.098"W	Datum: NAD 83
climatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)  Vegetation	Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   Vegetation							
Vegetation	Vegetation	•		ol for this time of year? Yes	No C (TE			
Information	Interpretation							Vec   No
Attach site map showing sampling point locations, transects, important features, et ydrophytic Vegetation Present? Yes No vor No vor Is the Sampled Area within a Wetland? Yes No vor Wetland Hydrology Present? Yes No vor	Attach site map showing sampling point locations, transects, important features, etc.  Appropriate Vegetation Present? Yes  No  within a Wetland? Yes  No  within a Wetland Hydrology Present? Yes  No  within a Wetland Hy						os present.	
Is the Sampled Area within a Wetland?   Yes	Advisophytic Vegetation Present? Yes No Portice Soil Present? Present? Yes No Portice Soil Present Present? Yes No Portice Soil Present? Present? Yes No Por	Vegetation, Soil	, or Hydrology	naturally problemati	c? (If neede	d, explain any a	nswers in Remar	ks.)
Address of the sent?  Yes No No No No Within a Wetland?  No No No No No Within a Wetland?  No N	Is the Sampled Area within a Wetland?  Wetland Hydrology Present?  Wetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Algal Mat or Crust (B4)  Water (B4)  Water (B4)  Water (B4)  Drift deposits (B5)  Algal Mat or Crust (B4)  Water Stained Leaves (B9)  Water Stained Leaves (B9)  Algal Mat or Crust (B4)  Water Stained Leaves (B9)  Water Stained Leaves (B9)  Algal Mat or Crust (B4)  Water Stained Leaves (B9)  Algal Mat or Crust (B4)  Water Stained Leaves (B9)  Algal Mat or Crust (B4)  Water Stained Leaves (B9)  Algal Mat or Crust (B4)  Depth (inches):  Water Table Present?  Wetrand Hydrology Present?  Wetrand Hydrology Present?  Wetrand Hydrology Present?  Yes No  Pepth (inches):  Wetrand Hydrology Present?  Yes No  Pepth (inches):  Wetland Hydrology Present?  Yes No  Pepth (inches):  Wetland Hydrology Present?  Yes No  Pepth (inches):  Wetland Hydrology Present?  Yes No  Pepth (inches):	ımmary of Findings - <i>F</i>	Attach site m	ap showing samplin	g point locati	ions, transe	cts, importa	nt features, etc
Is the Sampled Area within a Wetland?  Yes No	Is the Sampled Area within a Wetland?  Ves No No No No within a Wetland?  Ves No	drophytic Vegetation Present?	Yes • No					
etland Hydrology Present? Yes No  within a Wetland?  Wetland Hydrology Indicators:  Wetland Hydrology Indicators:  Wetland Hydrology Indicators:  Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Surface Water (A1)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Hother Crust (B4)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Wetland Hydrology Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Wetland Hydrology Present?  Yes No  Depth (inches):	etland Hydrology Present? Yes No  within a Wetland? Yes No  within a W			, •	s the Sampled Area	a O /		
Agal Mat or Crust (B4)	Agal Mat or Crust (B4) Drift deposits (B3) Dri			_		T Yes ∪ No	•	
Secondary Indicators (minimum of two required)   Surface Soil Cracks (86)	Secondary Indicators (minimum of two required)   Surface Soli Cracks (B6)							
Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)							
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water (PA1)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Drift deposits (B3)  Trinh Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water (N1)  True Aquatic Plants (B14)  Sparsely Vegetated Concave Surface (B8)  Drift de Oor (C1)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (B7)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):  Surface Water Prince Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Sparsely Vegetated Concave Surface (B8)  Daybrace (C1)  Drainage Patterns (B10)  Drainage Pat					C I T		
Surface Water (A1)	Surface Water (A1)		of one required: ch	neck all that annly)				1 of two required)
High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Teield Observations:  Surface Water Present?  Yes  No  Hydrogen Sulfide Odor (C1)  Drainage Patterns (B10)  Noidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (B7)  Shallow Aquitard (D1)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Saturation Present?  Yes  No  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):	High Water Table (A2)		i one required, ci					e Surface (B8)
Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Fireface Water Present?  Yes  No  Depth (inches):	Saturation (A3)	¬ ` ´		_ ` ` ` `			-	c Surface (Bo)
Sediment Deposits (B2)	Sediment Deposits (B2)	Saturation (A3)						
Drift deposits (B3)	Drift deposits (B3)	Water Marks (B1)		Presence of Reduced Iron (C	24)	☐ Dry Seas	son Water Table (C	2)
Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	Sediment Deposits (B2)		Recent Iron Reduction in Til	led Soils (C6)	Crayfish	Burrows (C8)	
Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Fac-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Sat	Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Pethoday  Yes No Peth	_ ` ` ` ′		Thin Muck Surface (C7)				• , , ,
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):	Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):			Other (Explain in Remarks)				(D1)
Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Seturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):	_	ageny (R7)					
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):		agery (b/)					4)
Field Observations: Surface Water Present?  Yes No Depth (inches): Water Table Present?  Yes No Depth (inches): Saturation Present?  Yes No Depth (inches): Saturation Present? Includes capillary fringe)  Wetland Hydrology Present?  Yes No Depth (inches):  Wetland Hydrology Present?	Field Observations:  Surface Water Present? Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):  Saturation Present? Yes No Depth (inches):  Includes capillary fringe) Yes No Depth (inches):	_						7)
Vater Table Present? Yes No Depth (inches):	Vater Table Present? Yes No Depth (inches):	ield Observations:						
Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No o	Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No location No location Present? Yes No location No	Surface Water Present? Yes	; O No 💿	Depth (inches):				
Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No Post No Post No Post No No No Post No No Post No No Post No Post No	Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches):	Water Table Present? Yes	O No 💿	Depth (inches):				
includes capillary fillige)	includes capillary frilinge)	VAC	No 🗨	-	Wetland I	Hydrology Prese	nt? Yes 🔾	No 🖭
	rescribe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), il available:	includes capillary minge)			indepositions) if	available.		
emarks:								
emarks:								
emarks:								
em <b>a</b> rks:								
lemarks:								
lemarks:								
Remarks:								
lemarks:								
demarks:								
lemarks:								
Remarks:								

		Dominant ——Species? —			Sampling Point: <u>5-3 up</u>		
/Diet size, 20	Absolute % Cover	Re	el.Strat.	Indicator Status	Dominance Test worksheet:		
Tree Stratum (Plot size: 30 )	30	<b>✓</b>		FACU	Number of Dominant Species		
1 Quercus rubra		<b>V</b>	40.0%	UPL	That are OBL, FACW, or FAC:3 (A)		
2 Carva tomentosa			0.0%	OIL	Total Number of Dominant		
<b>v</b> .		$\Box$	0.0%		Species Across All Strata:5(B)		
4		Н	0.0%		Percent of dominant Species		
5		$\Box$	0.0%		That Are OBL, FACW, or FAC: 60.0% (A/B)		
6		$\Box$	0.0%		Bassalana Tadas saadah sab		
7		$\exists$	0.0%		Prevalence Index worksheet:  Total % Cover of: Multiply by:		
8			otal Cover				
Sapling-Sapling/Shrub Stratum (Plot size: _15	)	- 10	otal Covel		0BL species 0 x 1 = 0		
1 Acer rubrum	10	<b>~</b>	33.3%	FAC	FACW species 0 x 2 = 0		
2 Carpinus caroliniana	10	<b>✓</b>	33.3%	FAC	FAC species $30 \times 3 = 90$		
3 Asimina triloba	10	<b>~</b>	33.3%	FAC	FACU speciles 30 x 4 = 120		
4	0		0.0%		UPL species $\frac{20}{}$ x 5 = $\frac{100}{}$		
5			0.0%		Column Totals: 80 (A) 310 (B)		
6			0.0%		Prevalence Index = B/A = 3.875		
7	_		0.0%		· —		
8			0.0%		Hydrophytic Vegetation Indicators:		
9	_	$\overline{\Box}$	0.0%		Rapid Test for Hydrophytic Vegetation		
	0	$\Box$	0.0%		✓ Dominance Test is > 50%		
10			otal Cover		Prevalence Index is ≤3.0 ¹		
Shrub Stratum (Plot size:)		_ ''			Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)		
1	0		0.0%		Problematic Hydrophytic Vegetation (Explain)		
2		Н	0.0%				
3	0_	Ц	0.0%		Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.		
4	0_		0.0%				
5	0		0.0%		Definition of Vegetation Strata:		
6	0	Ш	0.0%		Four Vegetation Strata:		
7	0		0.0%		Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH),		
Herb Stratum (Plot size:)	0	= T	otal Cover		regardless of height.		
1	0		0.0%		Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.		
2.	_	$\overline{\Box}$	0.0%				
3		$\overline{\Box}$	0.0%		Herb stratum – Consists of all herbaceous (non-woody)		
4		$\Box$	0.0%		plants, regardless of size, and all other plants less than 3.28 ft tall.		
5	0	$\overline{\Box}$	0.0%		Woody vines – Consists of all woody vines greater than 3.28 ft in height.		
6	0	$\overline{\Box}$	0.0%				
7		$\overline{\Box}$	0.0%		Five Vegetation Strata:		
		$\Box$	0.0%		Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in		
8		П	0.0%		diameter at breast height (DBH).		
		Н	0.0%		Sapling stratum – Consists of woody plants, excluding		
10		Н	0.0%		woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.		
11		$\vdash$	0.0%		Shrub stratum – Consists of woody plants, excluding woody		
12		ш - т	0.0% otal Cover		vines, approximately 3 to 20 ft (1 to 6 m) in height.		
Woody Vine Stratum (Plot size:)		_ ''	otal Covel		Herb stratum – Consists of all herbaceous (non-woody)		
1	0	Ш	0.0%		plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately		
2	0		0.0%		3 ft (1 m) in height.		
3	0		0.0%		Woody vines – Consists of all woody vines, regardless of		
4			0.0%		height.		
5			0.0%		Hadaaaladia		
6	0		0.0%		Hydrophytic Vegetation		
V.,	0		-		Present? Yes   No		
	U	= 1	otal Cove				

Soil Sampling Point: 5-3 up

	ription: (De		the depth			confirm the	absence of indicators.)	
Depth (inches)	Color	Matrix (moist)	<b>%</b>		edox Features % Type	1 Loc²	Texture	Remarks
0-5	10YR	(moist) 5/4	100	Color (moist)		- <u>LOC</u> 2	Silt Loam	кетагкѕ
5-12	10YR	5/6	100				Silt Loam	
							-	
	-			-				-
-	-	-					-	
1 Typo: C-Con	contration	D-Doploti	on DM-Doc	lucad Matrix CS-Cove	ared or Coated Sand	Crains 21 or	cations DI -Doro Lining M-	Matrix
			on. KM=Rec	luced Matrix, CS=Cove	ered or Coaled Sand	Grains -Loc	cation: PL=Pore Lining. M=	
Hydric Soil I				☐ Dark Surface	(67)			ematic Hydric Soils <sup>3</sup> :
	pedon (A2)				(57) ow Surface (S8) (MLF	ολ 147 148\	2 cm Muck (A10)	(MLRA 147)
Black Hist					face (S9) (MLRA 147		Coast Prairie Redo	ox (A16)
	າ Sulfide (A4	1)		Loamy Gleyed		, 110)	(MLRA 147,148)	
	Layers (A5)			Depleted Mati			Piedmont Floodpla (MLRA 136, 147)	ain Soils (F19)
	k (A10) (LR			Redox Dark S			Very Shallow Dark	(Surface (TF12)
	Below Dark		A11)	Depleted Dark	. ,		Other (Explain in	
_ `	k Surface (A	•	/	Redox Depres			Outer (Explain in	remarks)
	ıck Mineral (		N,	☐ Iron-Mangane MLRA 136)	ese Masses (F12) (LR	R N,		
	eyed Matrix	(S4)		Umbric Surfac	ce (F13) (MLRA 136,	122)	_	
Sandy Re		(- ')		☐ Piedmont Floo	odplain Soils (F19) (N	MLRA 148)	<sup>3</sup> Indicators of	hydrophytic vegetation and
	Matrix (S6)				aterial (F21) (MLRA			drology must be present, sturbed or problematic.
Restrictive L	ayer (if ob	served):						
Type:	de = = \.						Hydric Soil Present?	Yes ○ No •
	hes):							
Remarks:								



Photo File: IN	IG_3386.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	77°31'10.098"	Lat/Northing: 38°43'4.332"N
Description:			

Photo File: None.bmp	Orientation:		-facing
Lat/Long or UTM: Long/Easting: 0		Lat/Northing: 0	
Description:			

Verland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Water Marks (B1)  Presence of Reduced Iron (C4)  Porith deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water Table Leaves (B9)  Aquatic Fauna (B13)  Pepth (inches):  Water Table Present?  Ves No  Depth (inches):  Water Table Present?  Ves Candary Indicators (minimum of two required)  Secondary Indicators (minimum of two required)  Sparsely Vegetated Concave Surface (B8)  Drange Patterns (B10)  Drange Patterns (B				
dform (hillslope, terrace, etc.): Floodplain   Local relief (concave, convex, none): flat   Slope: 0.09/m / 0.0   1.00		nal Airport	State: VA	Sampling Point: 6-1 wet
region (LRR or MLRA): MLRA 148 in LRR S	estigator(s): Matt Neely		Section, Township, Range:	S TR
Map Unit Name: Rowland slit loam	dform (hillslope, terrace, etc.):	: Floodplain	Local relief (concave, convex,	none): flat Slope: 0.0% / 0.0
Map Unit Name: Rowland slit loam	region (LRR or MLRA): MLR	XA 148 in LRR S Lat	.: 38°42'59 944"N <b>L</b> o	
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)	-		30 1233131111	
Vegetation   , Soil   , or Hydrology   significantly disturbed?   Are "Normal Circumstances" present?   Yes			Vec No O (75 m)	
Vegetation				
mmary of Findings - Attach site map showing sampling point locations, transects, important features, etc drophytic Vegetation Present? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Is the Sampled Area within a Wetland? Yes  No  No  Is the Sampled Area within a Wetland? Yes  No  No  No  No  No  No  No  No  No  N	Vegetation, Soil	, or Hydrology    significal	ntly disturbed? Are "Norma	al Circumstances" present?
droiphytic Vegetation Present? Yes  No  Is the Sampled Area within a Wetland? Ves  No  No  Is the Sampled Area within a Wetland? Ves  No  No  No  Is the Sampled Area within a Wetland? Ves  No  No  No  No  No  No  No  No  No  N	Vegetation , Soil	, or Hydrology 🔲 naturally	problematic? (If needed	, explain any answers in Remarks.)
Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No	mmary of Findings - /	Attach site map showing	sampling point location	ons, transects, important features, etc
Is the Sampled Area within a Wetland?  Yes No			у салага да р	
### within a Wetland?    Yes   No				
Agal Mat or Crust (B4)  Porinder Optosits (B3)  Algal Mat or Crust (B4)  In Innurdation Visible on Aerial Imagery (B7)  Wetland Hydrology Indicators:  Primary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Surface Water (A1)  Sparsely Vegetated Concave Surface (B8)  Hydrogen Sulfide Odor (C1)  Algal Mat or Crust (B2)  Algal Mat or Crust (B4)  In Innurdation Visible on Aerial Imagery (B7)  Water Stained Leaves (B9)  Aquatic Fauna (B13)  Depth (inches):  Water Table Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):			Is the Sampled Area within a Wetland?	Yes   No
Vetland Hydrology Indicators:  Secondary Indicators (minimum of two required)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Iron Deposits (B5)  Water Table (A2)  Hydrogen Sulface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Water Table (B1)  Water Table (A2)  Sediment Deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Water Table (Present?  Water Table (Present?  Yes  No  Depth (inches):  Water Table Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Wetland Hydrology Present?  Yes  No  Depth (inches):	etland Hydrology Present?	Yes ♥ No ∪		
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Water Marks (B1)  Presence of Reduced Iron (C4)  Prise Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Tele Aquatic Plants (B14)  Sparsely Vegetated Concave Surface (B8)  Prainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):	ydrology			
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Water Marks (B1)  Presence of Reduced Iron (C4)  Prise Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Tele Aquatic Plants (B14)  Sparsely Vegetated Concave Surface (B8)  Prainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):				Consider Indicator (minimum of the manimum)
Surface Water (A1)			v)	
High Water Table (A2)	_			
Saturation (A3)	High Water Table (A2)	Hydrogen Sulfi	de Odor (C1)	
Sediment Deposits (B2)	Saturation (A3)	Oxidized Rhizo	spheres along Living Roots (C3)	
✓ Drift deposits (B3)	Water Marks (B1)	Presence of Re	educed Iron (C4)	Dry Season Water Table (C2)
Algal Mat or Crust (B4)		Recent Iron Re	eduction in Tilled Soils (C6)	
☐ Iron Deposits (B5) ☐ Shallow Aquitard (D3) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Water-Stained Leaves (B9) ☐ Depth (inches): ☐ Ves ☐ No ☐ No ☐ Depth (inches): ☐ Ves ☐ No ☐ No ☐ Depth (inches): ☐ Ves ☐ No ☐ N	_ ` ` ` ´		• •	
☐ Inundation Visible on Aerial Imagery (B7) ☐ Water-Stained Leaves (B9) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Imagery (B7) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ Imagery (B7) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ Imagery (B7) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ Imagery (B7) ☐		U Other (Explain	in Remarks)	
Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Sield Observations:  Surface Water Present?  Ves ○ No ○ Depth (inches):  Saturation Present?  Yes ○ No ○ Depth (inches):	_	nagery (B7)		
Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Vater Table Present?  Yes No Depth (inches):  Saturation Present?	✓ Water-Stained Leaves (B9)			
urface Water Present? Yes ○ No ○ Depth (inches):	_			
Vater Table Present? Yes No Depth (inches):				
Saturation Present?  Includes capillary fringe)  Yes No Depth (inches):  Wetland Hydrology Present? Yes No No Depth (inches):	urface Water Present? Yes	s No O Depth (inche	s):	
Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches):	Vater Table Present? Yes	s O No O Depth (inche	s):	
includes capillarly fillinge)	Saturation Present?		Wetland H	ydrology Present? Yes   No
	includes capillary fringe)			vailables

		_Si	ecies? .		p
	Absolute	R	el.Strat.	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: <u>30</u> )	% Cover			Status	Dominance rest worksheet:
Tree Stratum (Free Sizer So					Number of Dominant Species
1 Acer negundo	30	✓	60.0%	FAC	That are OBL, FACW, or FAC: 6 (A)
O. Cominue conclinione	20	<b>V</b>	40.0%	FAC	
2. Carpinus caroliniana			10.070	TAC	Total Number of Dominant
3	0	Ш	0.0%		Species Across All Strata: 6 (B)
4	0		0.0%		Species / ici oss / iii ocraca:
4		H			Develop of development Consider
5	0	Ш	0.0%		Percent of dominant Species
	_	П	0.0%		That Are OBL, FACW, or FAC: 100.0% (A/B)
6		$\equiv$			
7	0	Ш	0.0%		Prevalence Index worksheet:
8	0		0.0%		Total % Cover of: Multiply by:
0		_			
Diot size:	50	= T	otal Cove	er	OBL speci es <u>20</u> x 1 = <u>20</u>
Sapling-Sapling/Shrub Stratum (Plot size:)		_			FACW species
1	0		0.0%		
•			0.0%		FAC species $75 \times 3 = 225$
2			0.0%		FACU species $0 \times 4 = 0$
3	0		0.0%		· ·
	_		0.0%		UPL species $0 \times 5 = 0$
4			0.0%		1
5	0	Ш	0.0%		Column Totals: 105 (A) 265 (B)
			0.0%		5 1 5 1 5 2
6					Prevalence Index = $B/A = 2.524$
7	0		0.0%		Hydronhytic Vogotation Indicators
			0.0%		Hydrophytic Vegetation Indicators:
8		=			Rapid Test for Hydrophytic Vegetation
9	0	Ш	0.0%		✓ Dominance Test is > 50%
	0		0.0%		
10		ш	0.070		✓ Prevalence Index is ≤3.0 ¹
Shrub Stratum (Plot size:)	0	= T	otal Cove	er	Morphological Adaptations <sup>1</sup> (Provide supporting
	_				data in Remarks or on a separate sheet)
1	0	Ш	0.0%		· · · · · ·
2	0		0.0%		☐ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
<del>-</del> -		$\overline{}$			1
3	0	Ш	0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4	0		0.0%		be present, unless disturbed or problematic.
			0.00/		Definition of Vegetation Strata:
5	0	Ш	0.0%		Definition of Vegetation Strata:
6	0		0.0%		Four Vegetation Strata:
		$\overline{}$			Tree stratum – Consists of woody plants, excluding vines, 3
7	0	Ш	0.0%		in. (7.6 cm) or more in diameter at breast height (DBH),
(Diet size, 45	0	= T	otal Cove	er	regardless of height.
Herb Stratum (Plot size: 15 )					Sapling/shrub stratum – Consists of woody plants, excluding
1 Saururus cernuus	20	<b>✓</b>	50.0%	OBL	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
	10	<b>✓</b>	25.0%	FACW	Trines, less than 5 m. DDH and greater than 5.25 it (1 m) tan.
2. Boehmeria cylindrica			23.070	TACW	Herb stratum – Consists of all herbaceous (non-woody)
3. Dichanthelium acuminatum	10	✓	25.0%	FAC	plants, regardless of size, and all other plants less than 3.28
1	0		0.0%		ft tall.
4					Woody vines - Consists of all woody vines greater than 3.28
5	0	Ш	0.0%		ft in height.
6	0		0.0%		
		$\equiv$			Five Vegetation Strata:
7	0	Ш	0.0%		Tree - Woody plants, excluding woody vines, approximately
8	_		0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
-		$\overline{\Box}$			diameter at breast height (DBH).
9	0	ш	0.0%		j , ,
10.	0		0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
. • .		$\overline{}$	-		less than 3 in. (7.6 cm) DBH.
11	0	ш	0.0%		1
12	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody
	40	_ T	otal Cove		vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size: 15 )		= 10	otal Cove	er .	Herb stratum – Consists of all herbaceous (non-woody)
	15	~	100.0%	FΛC	plants, including herbaceous vines, regardless of size, and
		Ľ	100.070	TAC	woody species, except woody vines, less than approximately
2	0	Ш	0.0%		3 ft (1 m) in height.
		П	0.0%		Woody vince - Consists of all woody vince regardless of
3			-		Woody vines – Consists of all woody vines, regardless of height.
4	0	$\sqcup$	0.0%		noight.
	_		0.0%		
5		=	0.070		Hydrophytic
6	0		0.0%		Vonetation
	15	_ T	otal Cove		Present? Yes No
		_ '	Juli COVE	-1	
Remarks: (Include photo numbers here or on a separate she	et.)				
remarker (ancience prioco municera nere or on a separace sne					

Soil Sampling Point: 6-1 wet

	ription: (De		the depth	needed to				onfirm the	absence of indicators.)		
Depth (inches)	Matrix   Redox Features   Color (moist)   % Type   Loc²		l oc²	- Texture	Do-	marks					
0-3	10YR	5/2	90	5YR	4/6	10	C Type	M	Silt Loam	Reii	iidi KS
3-8	10YR	5/2		5YR	4/6	30	C	M	Silty Clay Loam		
8-14	10YR	5/1	85	7.5YR	7.5YR 4/6 15 C M				Silty Clay Loam		
				-							
										,	
-	-	-		-							
				-							
<sup>1</sup> Type: C=Con	centration. [	D=Depleti	on. RM=Rec	uced Matrix,	CS=Cove	ered or Coa	ited Sand Gr	ains <sup>2</sup> Loo	cation: PL=Pore Lining. M=	Matrix	
Hydric Soil 1									Indicators for Proble	ematic Hydr	ic Soils <sup>3</sup> :
Histosol (	,				k Surface	. ,			2 cm Muck (A10)	(MLRA 147)	
	pedon (A2)						(S8) (MLRA		Coast Prairie Redo	x (A16)	
Black Hist	. ,	`					MLRA 147, 1	.48)	(MLRA 147,148)		
	Sulfide (A4) Layers (A5)			_	ny Gieyed leted Mati	Matrix (F2	<u>(1)</u>		Piedmont Floodpla (MLRA 136, 147)	ain Soils (F19)	Į.
	k (A10) (LRF			_		urface (F6)	1			Curfaco (TE1	12)
	Below Dark		A11)			Surface (I			☐ Very Shallow Dark Surface (TF12) ☐ Other (Explain in Remarks)		
	k Surface (A	•	(11)			sions (F8)	,		Outer (Explain in i	(Ciliarks)	
Sandy Mu	ıck Mineral (	•	N,		-Mangane A 136)	ese Masses	(F12) (LRR	N,			
MLRA 147	-	(C.1)				رF13) (N	ILRA 136, 12	2)			
Sandy Gle	eyed Matrix (	(54)		_			ls (F19) (MLI		<sup>3</sup> Indicators of	hydrophytic v	egetation and
	Matrix (S6)						1) (MLRA 12		wetland hyd	drology must b sturbed or pro	be present,
запрреа	1100110 (50)				i i di ciit i i	ateriai (i 2	1) (MEION 12	7, 147)	uniess di	sturbed or pre	Diematic.
Restrictive L	ayer (if ob	served):									
Type:									Hydric Soil Present?	Yes 💿	No O
Depth (inc	thes):								,		
Remarks:											



Photo File: IN	IG_3387.JPG	Orientation:		-facing
Lat/Long or UTM :	Long/Easting	: 77°31'7.618"W	Lat/Northing:	38°42'59.944"
Description:				

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

oject/Site: Manassas Regional A	irport	City/County:	Manassas	Sampling	<b>Date:</b> 25-Oct-16
plicant/Owner: Manassas Regio	onal Airport		State: VA	Sampling Point:	7-1 wet
estigator(s): Matt Neely		Section, Towns	ship, Range: S	т	R
dform (hillslope, terrace, etc.)	: Floodplain	Local relief (con-	cave, convex, none)	: concave Sic	ope: 0.0% / 0.0
region (LRR or MLRA): MLR	RA 148 in LRR S	 Lat.: 38°43'3.14"N	Long.:	77°31'11.214"W	Datum: NAD 83
Map Unit Name: Rowland si				NWI classification:	
climatic/hydrologic conditions		time of year? Yes • N	(If no eyn	ain in Remarks.)	
				-	Yes   No
Vegetation , Soil		significantly disturbed?		umstances" present?	
Vegetation, Soil	, or Hydrology 🔲 r	naturally problematic?	(If needed, expla	in any answers in Rema	ırks.)
ımmary of Findings - A	Attach site map sh	owing sampling po	int locations,	transects, import	ant features, etc
drophytic Vegetation Present	? Yes • No ·				
/dric Soil Present?	Yes   No	Is the S	ampled Area	<b></b>	
etland Hydrology Present?	Yes   No	within a	Wetland?	● No ○	
Remarks:					
ydrology					
Vetland Hydrology Indicators:			Se	condary Indicators (minimu	ım of two required)
Primary Indicators (minimum o	of one required; check all t	nat apply)		Surface Soil Cracks (B6)	in or two reduired?
Surface Water (A1)	☐ True	Aquatic Plants (B14)		Sparsely Vegetated Conca	eve Surface (B8)
High Water Table (A2)	☐ Hydro	gen Sulfide Odor (C1)		Drainage Patterns (B10)	
Saturation (A3)	Oxidiz	ed Rhizospheres along Living I	Roots (C3)	Moss Trim Lines (B16)	
Water Marks (B1)		nce of Reduced Iron (C4)		Dry Season Water Table (	(C2)
Sediment Deposits (B2)		it Iron Reduction in Tilled Soils	` '	Crayfish Burrows (C8)	(60)
☐ Drift deposits (B3) ☐ Algal Mat or Crust (B4)		Muck Surface (C7)		Saturation Visible on Aeria Stunted or Stressed Plant	• , , ,
Iron Deposits (B5)	Uther	(Explain in Remarks)	<b>▽</b>	Geomorphic Position (D2)	` '
Inundation Visible on Aerial Im	nagery (B7)			Shallow Aquitard (D3)	
✓ Water-Stained Leaves (B9)			<b>✓</b>	Microtopographic Relief (I	D4)
Aquatic Fauna (B13)			✓	FAC-neutral Test (D5)	
Field Observations:	0 0				
	·	th (inches):			
	s O No O Dep	th (inches):		Nos 🗨	No O
Saturation Present? (includes capillary fringe)	s   No   Dep	th (inches):6	Wetland Hydrolo	gy Present? Tes 🥌	NO C
Describe Recorded Data (strear	n gauge, monitoring well,	aerial photos, previous insp	pections), if availabl	e:	
`			,,		
emarks:					

			ominant		Sampling Point: <u>7-1 wet</u>
	Absolute	Re	ecies? - el.Strat.	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 30 )	% Cover			Status	Number of Dominant Species
1 . Acer rubrum	25	✓	55.6%	FAC	That are OBL, FACW, or FAC:5(A)
2. Quercus palustris	20	<b>✓</b>	44.4%	FACW	Total Number of Dominant
3	0		0.0%		Species Across All Strata:5(B)
4	0		0.0%		
5	0		0.0%		Percent of dominant Species That Are OBL FACW or FAC: 100.0% (A/B)
6	0		0.0%		That Are OBL, FACW, or FAC: $100.0\%$ (A/B)
7	0		0.0%		Prevalence Index worksheet:
8	0		0.0%		Total % Cover of: Multiply by:
Sapling-Sapling/Shrub Stratum (Plot size: 15)	45	= To	otal Cove	r	0BL speci es <u>10</u> x 1 = <u>10</u>
			02.20/	FAC	FACW species <u>30</u> x 2 = <u>60</u>
1 . Carpinus caroliniana		<b>✓</b>	83.3%	FAC	FAC speciles 35 x 3 = 105
2. Quercus alba			16.7%	FACU	FACU species $\frac{2}{x}$ $x$ $4$ = $\frac{8}{x}$
3		$\vdash$	0.0%		UPL species $0 \times 5 = 0$
4			0.0%		l '
5			0.0%		Column Totals:
6		$\sqcup$	0.0%		Prevalence Index = $B/A = 2.377$
7			0.0%		Hydrophytic Vegetation Indicators:
8		Ц	0.0%		Rapid Test for Hydrophytic Vegetation
9		Ш	0.0%		✓ Dominance Test is > 50%
0	0	Ш	0.0%		✓ Prevalence Index is ≤3.0 <sup>1</sup>
		= T	otal Cove	•	Morphological Adaptations <sup>1</sup> (Provide supporting
1	0		0.0%		data in Remarks or on a separate sheet)
2.	0		0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
3	0		0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4		$\overline{\Box}$	0.0%		be present, unless disturbed or problematic.
5		$\overline{\Box}$	0.0%		Definition of Vegetation Strata:
		$\Box$	0.0%		Four Vegetation Strata:
6	0	$\Box$	0.0%		Tree stratum – Consists of woody plants, excluding vines, 3
7		 _ T/	otal Cove		in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Herb Stratum (Plot size: 15 )					Sapling/shrub stratum – Consists of woody plants, excluding
1 . Boehmeria cylindrica	10	<b>✓</b>	50.0%	FACW	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2. Carex Iurida	10	<b>V</b>	50.0%	OBL	Herb stratum – Consists of all herbaceous (non-woody)
3		Ц	0.0%		plants, regardless of size, and all other plants less than 3.28
4	0		0.0%		ft tall.   Woody vines – Consists of all woody vines greater than 3.28
5	0		0.0%		ft in height.
6	0		0.0%		Five Vegetation Strata:
7	0	Ш	0.0%		Tree - Woody plants, excluding woody vines, approximately
8	0	Ш	0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9	0		0.0%		diameter at breast height (DBH).
0	0		0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
1	0		0.0%		less than 3 in. (7.6 cm) DBH.
2	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody
Noody Vine Stratum (Plot size:)	20	= T	otal Cove	r	vines, approximately 3 to 20 ft (1 to 6 m) in height.  Herb stratum – Consists of all herbaceous (non-woody)
1	0		0.0%		plants, including herbaceous vines, regardless of size, and
	0	$\Box$			woody species, except woody vines, less than approximately
2			0.0%		3 ft (1 m) in height.
3			0.0%		Woody vines – Consists of all woody vines, regardless of height.
4			0.0%		-
5	0		0.0%		Hydrophytic
6	0		0.0%		Vegetation Present? Yes  No
·	0		otal Cove		

Soil Sampling Point: 7-1 wet

	ription: (De		the depth	needed to				onfirm the	absence of indicators.)			
Depth (inches)			l oc²	- Texture	Remarks							
0-6	10YR	4/1	80	7.5YR	4/6	<del></del>	C Type	M	Silt Loam	Reii	iidi KS	
6-10	10YR	5/1	80	7.5YR	4/6		C	M	Silt Loam			
10-14	10YR	5/1	85	7.5YR	7.5YR 5/6 15 C M				Silty Clay Loam			
									-			
										•		
-					-							
								-				
<sup>1</sup> Type: C=Con	centration. [	)=Depleti	on. RM=Red	duced Matrix,	CS=Cove	ered or Coa	ited Sand Gr	ains <sup>2</sup> Loo	cation: PL=Pore Lining. M=	Matrix		
Hydric Soil 1									Indicators for Probl	ematic Hydr	ic Soils <sup>3</sup> :	
Histosol (	,				k Surface	. ,			2 cm Muck (A10)	(MLRA 147)		
	pedon (A2)						(S8) (MLRA		Coast Prairie Redo	x (A16)		
Black Hist	. ,	١					MLRA 147, 1	148)	(MLRA 147,148)			
	Sulfide (A4) Layers (A5)				ny Gieyed leted Mat	d Matrix (F2	<u>2)</u>		Piedmont Floodpla (MLRA 136, 147)	ain Soils (F19)	)	
	k (A10) (LRF					urface (F6)	)			Curfaco (TE1	2)	
	Below Dark		A11)	_		k Surface (I			☐ Very Shallow Dark Surface (TF12) ☐ Other (Explain in Remarks)			
	k Surface (A	•	(11)			sions (F8)	,		Outer (Explain in	(Ciliarks)		
Sandy Mu	ıck Mineral (	•	N,		-Mangane A 136)	ese Masses	(F12) (LRR	N,				
MLRA 147	-	(C.1)			-	ce (F13) (N	1LRA 136, 12	22)				
Sandy Gle	eyed Matrix (	(54)					ls (F19) (MLI		<sup>3</sup> Indicators of	hydrophytic v	egetation and	
	Matrix (S6)			_			1) (MLRA 12		wetland hyd	drology must b sturbed or pro	be present,	
запрреа	riddix (50)			Kec	i arciit i	iateriai (i 2	1) (MLION 12	7, 147)	uniess un	sturbed or pre	objettiatic.	
Restrictive L	ayer (if obs	served):										
Type:									Hydric Soil Present?	Yes 💿	No O	
Depth (inc	thes):								,		110 =	
Remarks:												



Photo File: MG\_3388.JPG Orientation: -facing

Lat/Long or UTM: Long/Easting: 77°31'11.214" Lat/Northing: 38°43'3.14"N

Description:

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

plicant/Owner:   Mansassa Regional Airport   State   VA   Sampling Point:   8-1 wet vestigator(s):   Matt Neely   Section, Township, Range: S   T   S   S   T   S   S   T   S   S	onlicant/Owner: Manassas Regional			
Are from (hillslope, terrace, etc.): Floodplain   Local relief (concave, convex, none): concave   Slope:	Pileane, Carrieri	Airport	State:	VA Sampling Point: 8-1 wet
Map Unit Name:   Rowland silt loam   Rowland	estigator(s): Matt Neely		Section, Township, Rang	e: S T R
Map Unit Name: Rowland slit loam	dform (hillslope, terrace, etc.):	Floodplain	Local relief (concave, conv	rex, none): concave Slope:0.0% /0
Map Unit Name: Rowland slit loam	region (LRR or MLRA): MLRA 1	148 in LRR S	– ht.: 38°43'5.727"N	Long.: 77°31'14.929"W Datum: NAD 83
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  If no, explain in Remarks.)   Vegetation	Map Unit Name: Rowland silt lo			
Vegetation	climatic/hydrologic conditions or	n the site tynical for this time	of year? Yes   No (1	f no explain in Remarks )
Vegetation				<b>v</b> (a) <b>v</b> (
Immary of Findings - Attach site map showing sampling point locations, transects, important features, et vidrophytic Vegetation Present? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Secondary Indicators (minimum of two required) No  Secondary Indicators (minimum of two required) No  Surface Soil Cracks (B6)  Surface Soil Cracks (B6)  Present? No  Secondary Indicators (minimum of two required) No  Surface Soil Cracks (B6)  Present? No  Secondary Indicators (minimum of two required) No  Surface Soil Cracks (B6)  Present (B16)  No  Surface Soil Cracks (B6)  Present (B16)  No  Secondary Indicators (minimum of two required) No  Surface Soil Cracks (B6)  No  No  No  No  No  No  No  No  No  N			-	mai di cambances present.
Is the Sampled Area within a Wetland?   Yes No   No   Is the Sampled Area within a Wetland?   Yes No   No   Is the Sampled Area within a Wetland?   Yes No   No   Is the Sampled Area within a Wetland?   Yes No   No   No   No   No   No   No   No	Vegetation, Soil	, or Hydrology	ly problematic? (If need	led, explain any answers in Remarks.)
Addric Soil Present?  Yes No No within a Wetland?  No N	ımmary of Findings - Ati	tach site map showin	g sampling point loca	tions, transects, important features, e
Is the Sampled Area within a Wetland?  Ves No No within a Wetland?  Ves No	drophytic Vegetation Present?	Yes   No		
etland Hydrology Present? Yes No within a Wetland?  Wetland Hydrology Indicators:    No   Within a Wetland?   Yes   No   No   No   No   No   No   No   N			To the Sampled Ar	
Agal Mat or Crust (B4) Other (Explain in Remarks)    Algal Mat or Crust (B4) Other (Explain in Remarks)   Algal Mat or Crust (B4) Other (E			within a Wetland?	Yes No O
Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Sturted or Stressed Plants (D1)   Microtopographic Relief (D4)   Aquatic Fauna (B13)   Present?   Yes   No  Depth (inches):   Wetland Hydrology Present?   Yes   No  Depth (inches):   Wetland Hydrology Present?   Yes   No  Septh (inches):   Yes				
Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	vdrologv			
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Trinh Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Teled Observations:  Surface Water Present?  Yes  No  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Water-Stained Leaves (B9)  No  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):				
Surface Water (A1)		one required: check all that an	nlv)	
High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes No  Depth (inches):	$\overline{}$			
Saturation (A3)	_ ` ´		* *	
Sediment Deposits (B2)	Saturation (A3)		• •	
Drift deposits (B3)	Water Marks (B1)	Presence of F	Reduced Iron (C4)	☐ Dry Season Water Table (C2)
Algal Mat or Crust (B4)	Sediment Deposits (B2)	Recent Iron [	Reduction in Tilled Soils (C6)	Crayfish Burrows (C8)
Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  ✓ Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):	_ ` ` ` `	Thin Muck Su	ırface (C7)	
Inundation Visible on Aerial Imagery (B7)  ✓ Water-Stained Leaves (B9)  — Aquatic Fauna (B13)  ✓ FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Vater Table Present?  Vater Table Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):		Other (Explai	n in Remarks)	
Water-Stained Leaves (B9)  Aquatic Fauna (B13)  No ● Depth (inches):  Saturation Present?  Yes ○ No ● Depth (inches):	_	en/ (R7)		
Aquatic Fauna (B13)  Factorial Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Yes No Depth (inches):  Depth (inches):  Yes No Depth (inches):  Yes No Depth (inches):	_	siy (D7)		
Surface Water Present? Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):  Saturation Present? Yes No Depth (inches):  Saturation Present? Yes No Depth (inches):	_ ` ′			
Vater Table Present? Yes No Depth (inches): includes capillary fringe) Yes No Depth (inches):	ield Observations:			
Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No Concludes capillary fringe)	Surface Water Present? Yes	O No Depth (inch	nes):	
includes capillary fringe)  Yes No Depth (inches):	Water Table Present? Yes	O No Depth (inch	nes):	
includes capillally fillinge)	VAC \		Wetland	d Hydrology Present? Yes ● No ○
	includes capillary fringe)			if available:
	emarks:			
emarks:				
Remarks:				
emarks:				
emarks:				
emarks:				
Remarks:				

			ominant oecies?		Sampling Point: 8-1 wet
Tree Stratum (Plot size: 30 )	Absolute % Cover	Re	el.Strat.	Indicator Status	Dominance Test worksheet:
1 Quercus palustris	30	<b>V</b>	50.0%	FACW	Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)
2. Acer rubrum	20	✓	33.3%	FAC	
3 Ouercus montana			16.7%	UPL	Total Number of Dominant Species Across All Strata: 3 (B)
4.			0.0%		Species Across Air Strata.
5			0.0%		Percent of dominant Species
6			0.0%		That Are OBL, FACW, or FAC: 100.0% (A/B)
7			0.0%		Prevalence Index worksheet:
8			0.0%		Total % Cover of: Multiply by:
V.,		= To	otal Cover		OBL species 25 x 1 = 25
Sapling-Sapling/Shrub Stratum (Plot size:	_				FACW species 30 x 2 = 60
1			0.0%		FAC species 20 x 3 = 60
2			0.0%		FACU species $0 \times 4 = 0$
3			0.0%		UPL species $\frac{10}{2}$ x 5 = $\frac{50}{2}$
4			0.0%		or E specifics
5	_	Н	0.0%		Column Totals: <u>85</u> (A) <u>195</u> (B)
6	_	Н	0.0%		Prevalence Index = B/A = 2.294
7		Н	0.0%		Hydrophytic Vegetation Indicators:
8	_	Н	0.0%		Rapid Test for Hydrophytic Vegetation
9		Н	0.0%		✓ Dominance Test is > 50%
10		Ш	0.0%		✓ Prevalence Index is ≤3.0 <sup>1</sup>
Shrub Stratum (Plot size:)	:	= To	otal Cover		☐ Morphological Adaptations ¹ (Provide supporting
1	0		0.0%		data in Remarks or on a separate sheet)
2	0		0.0%		Problematic Hydrophytic Vegetation 1 (Explain)
3	0		0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4	0		0.0%		be present, unless disturbed or problematic.
5	0		0.0%		Definition of Vegetation Strata:
6	0		0.0%		Four Vegetation Strata:
7	0		0.0%		Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH),
Herb Stratum (Plot size: 15 )	0 =	= To	otal Cover		regardless of height.
1. Carex lurida	25	<b>V</b>	100.0%	OBL	Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2	0		0.0%		
3			0.0%		Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28
4	0		0.0%		ft tall.
5	0		0.0%		Woody vines - Consists of all woody vines greater than 3.28   ft in height.
6	0		0.0%		Five Vegetation Strata:
7	0		0.0%		
8	0		0.0%		Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9.	0		0.0%		diameter at breast height (DBH).
10	0		0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
11			0.0%		less than 3 in. (7.6 cm) DBH.
12	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody
Woody Vine Stratum (Plot size:)	25	= To	otal Cover		vines, approximately 3 to 20 ft (1 to 6 m) in height.  Herb stratum – Consists of all herbaceous (non-woody)
1	0		0.0%		plants, including herbaceous vines, regardless of size, and
2.		$\overline{\Box}$	0.0%		woody species, except woody vines, less than approximately   3 ft (1 m) in height.
•		$\Box$	0.0%		Woody vines – Consists of all woody vines, regardless of
3 4		$\Box$	0.0%		height.
5		$\Box$	0.0%		
- ·		$\Box$	0.0%		Hydrophytic
6		니 = 편	otal Cover		Vegetation   Yes • No •
	U				

Soil Sampling Point: 8-1 wet

Profile Descri	iption: (Describe to	the depth	needed to docume	nt the ind	icator or co	onfirm the	e absence of indicators.)		
Depth	Matrix			edox Feat			_		
(inches)	Color (moist)	%	Color (moist)	%	Type 1	Loc2	Texture Remarks		
0-8	10YR 4/1	80	7.5YR 4/6	20	C	M	Silt Loam		
8-13	10YR 5/1	90	7.5YR 4/6	10	С	М	Silty Clay Loam		
							<u> </u>		
<sup>1</sup> Type: C=Cond	rentration D=Denletion	nn RM=Red	uced Matrix CS=Cove	ered or Coa	nted Sand Gr	ains 21 o	ocation: PL=Pore Lining. M=Matrix		
Hydric Soil I		on. Ki-i-keu	uced Matrix, C5=C0VC	ired or coa	iteu Sanu Gi	allis Lo			
Histosol (A			Dark Surface	(67)			Indicators for Problematic Hydric Soils <sup>3</sup> :		
·	pedon (A2)		Polyvalue Belo	. ,	(CO) (MI DA	147 140)	2 cm Muck (A10) (MLRA 147)		
Black Histi			Thin Dark Sur				Coast Prairie Redox (A16)		
	Sulfide (A4)					140)	(MLRA 147,148)		
	Layers (A5)		<ul><li>Loamy Gleyed</li><li>✓ Depleted Mate</li></ul>	-	<u>2)</u>		Piedmont Floodplain Soils (F19)		
	k (A10) (LRR N)		Redox Dark S				(MLRA 136, 147)		
			Depleted Dark	٠,,			☐ Very Shallow Dark Surface (TF12)		
	Below Dark Surface (A	411)	Redox Depres		17)		Other (Explain in Remarks)		
	k Surface (A12)		☐ Iron-Mangane	, ,	(F12) (LDD	N			
MLRA 147	ck Mineral (S1) (LRR   '. 148)	N,	MLRA 136)	JC Masses	(I IZ) (LIKK	14,			
	yed Matrix (S4)		Umbric Surface	ce (F13) (M	1LRA 136, 12	22)			
Sandy Red			☐ Piedmont Flo	odplain Soi	ls (F19) (MLI	RA 148)	<sup>3</sup> Indicators of hydrophytic vegetation and		
	Matrix (S6)		Red Parent M				wetland hydrology must be present, unless disturbed or problematic.		
						, ,			
Restrictive La	ayer (if observed):								
Type:							Hydric Soil Present? Yes  No		
Depth (incl	hes):						nydric soil Present? Yes  No		
Remarks:									



Photo File: IM	IG_3390.JPG	Orientation:		-facing
Lat/Long or UTM :	Long/Easting:	77°31'14.929"	Lat/Northing:	38°43'5.727"N
Description:				

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

oject/Site: Manassas Regional	Airport	City/County:	Manassas	Sampling	<b>Date:</b> 25-Oct-16
plicant/Owner: Manassas Regi	onal Airport		State: VA	Sampling Point:	9-1 up
estigator(s): Matt Neely		Section, Town	nship, Range: S	т	R
dform (hillslope, terrace, etc.)	): Hillside	Local relief (co	ncave, convex, none	): flat S	Slope: 0.0% / 0.0
region (LRR or MLRA): MLF	RA 148 in LRR S	 <b>Lat.:</b> 38°43'9,468"N	Long.:	77°31'14.684"W	Datum: NAD 83
Map Unit Name: Aden Silt L	oam			NWI classification:	
climatic/hydrologic condition	s on the site typical	for this time of year? Yes	No O (If no, exn	lain in Remarks.)	
Vegetation , Soil		significantly disturbed?		umstances" present?	Yes   No
	ı			•	
Vegetation, Soil	, or Hydrology	naturally problematic?	(If needed, expl	ain any answers in Ren	narks.)
ımmary of Findings -	Attach site ma	p showing sampling po	int locations,	transects, impo	rtant features, etc
drophytic Vegetation Present	? Yes O No	•			
dric Soil Present?	Yes O No (	• Is the	Sampled Area	○ No ●	
etland Hydrology Present?	Yes O No		a Wetland?	○ No ⊛	
emarks:					
lydrology					
Wetland Hydrology Indicators:			Se	condary Indicators (minin	num of two required)
Primary Indicators (minimum	of one required; che	ck all that apply)		Surface Soil Cracks (B6)	
Surface Water (A1)		True Aquatic Plants (B14)		Sparsely Vegetated Con	cave Surface (B8)
High Water Table (A2)		Hydrogen Sulfide Odor (C1)		Drainage Patterns (B10)	)
Saturation (A3)		Oxidized Rhizospheres along Living	Roots (C3)	Moss Trim Lines (B16)	
Water Marks (B1)	L	Presence of Reduced Iron (C4)		Dry Season Water Table	e (C2)
Sediment Deposits (B2)  Drift deposits (B3)		Recent Iron Reduction in Tilled Soi	ls (C6)	Crayfish Burrows (C8)	wial Imagany (CO)
Algal Mat or Crust (B4)		Thin Muck Surface (C7)		Saturation Visible on Ae Stunted or Stressed Plan	- , , ,
Iron Deposits (B5)		Other (Explain in Remarks)		Geomorphic Position (D	` ,
Inundation Visible on Aerial Ir	nagery (B7)			Shallow Aquitard (D3)	,
Water-Stained Leaves (B9)				Microtopographic Relief	(D4)
Aquatic Fauna (B13)				FAC-neutral Test (D5)	
Field Observations:	O O				
	s O No O	Depth (inches):			
	s O No 💿	Depth (inches):	Water and Developing	oav Present? Yes	○ No ●
Saturation Present? includes capillary fringe) Ye	s O No 💿	Depth (inches):	Wetland Hydrolo	igy Present?	J 110 S
	— m gauge, monitoring	well, aerial photos, previous ins	spections), if availab	le:	
emarks:					

			minant ecies? –		Sampling Point: 9-1 up			
	Absolute	Re	.Strat.	Indicator	Dominance Test worksheet:			
Tree Stratum (Plot size: <u>30</u> )	% Cover			Status	Number of Dominant Species			
1 Carya tomentosa		<b>_</b> _	75.0%	UPL	That are OBL, FACW, or FAC: 0 (A)			
2 Ouercus velutina		<b>_</b> _	25.0%	UPL	Total Number of Dominant			
3		Н-	0.0%		Species Across All Strata: 4 (B)			
4		님.	0.0%		Developt of deminant Charles			
5		Ц.	0.0%		Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)			
6		Н.	0.0%					
7		Ц.	0.0%		Prevalence Index worksheet:			
8		Ш,	0.0%		Total % Cover of: Multiply by:			
Sapling-Sapling/Shrub Stratum (Plot size: 15	) — 40	= To	tal Cove	•	0BL speci es 0 x 1 = 0			
1 Carya tomentosa	10	<b>V</b>	100.0%	UPL	FACW species x 2 =			
2		$\overline{\Box}$	0.0%		FAC speci es x 3 = 0			
3		$\overline{\Box}$	0.0%		FACU species $20 \times 4 = 80$			
		$\Box$	0.0%		UPL species $\frac{50}{}$ x 5 = $\frac{250}{}$			
4		$\Box$	0.0%		Column Totals:70 (A)330 (B)			
5		$\Box$	0.0%					
6			0.0%		Prevalence Index = B/A = 4.714			
7		$\Box$	0.0%		Hydrophytic Vegetation Indicators:			
8		Η-	0.0%		Rapid Test for Hydrophytic Vegetation			
9		Η.			☐ Dominance Test is > 50%			
10	10	Ч.	0.0%		Prevalence Index is ≤3.0 <sup>1</sup>			
Shrub Stratum (Plot size:)	10	= To	tal Cove	7	☐ Morphological Adaptations ¹ (Provide supporting			
1	0	Ц.	0.0%		data in Remarks or on a separate sheet)			
2	0	Ц.	0.0%		Problematic Hydrophytic Vegetation 1 (Explain)			
3	0	Ш	0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must			
4	0		0.0%		be present, unless disturbed or problematic.			
5	0		0.0%		Definition of Vegetation Strata:			
6	0		0.0%		Four Vegetation Strata:			
7	0		0.0%		Tree stratum – Consists of woody plants, excluding vine in. (7.6 cm) or more in diameter at breast height (DBH),			
Herb Stratum (Plot size:)	0	= To	tal Cove	r	regardless of height.			
1.	0		0.0%		Sapling/shrub stratum – Consists of woody plants, excluding			
		$\Pi$	0.0%		vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.			
2		$\Box$	0.0%		Herb stratum – Consists of all herbaceous (non-woody)			
3 4		П	0.0%		plants, regardless of size, and all other plants less than 3.28 ft tall.			
F		$\Box$	0.0%		Woody vines – Consists of all woody vines greater than 3.28			
5 6		$\overline{\Box}$	0.0%		ft in height.			
7.		$\Box$	0.0%		Five Vegetation Strata:			
• •		$\Box$	0.0%		Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in			
8			0.0%		diameter at breast height (DBH).			
9		H-	0.0%		Sapling stratum – Consists of woody plants, excluding			
10		H	0.0%		woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.			
11		Η-	0.0%		Shrub stratum – Consists of woody plants, excluding woody			
12		 - To	tal Cove		vines, approximately 3 to 20 ft (1 to 6 m) in height.			
Woody Vine Stratum (Plot size: 15 )		_			Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and			
1. Lonicera japonica		✓_	100.0%	FACU	woody species, except woody vines, less than approximately			
2		$\sqcup$	0.0%		3 ft (1 m) in height.			
3	0		0.0%		Woody vines – Consists of all woody vines, regardless of			
4		$\square_{\underline{}}$	0.0%		height.			
5			0.0%		Hydrophytic			
6	0		0.0%		Vagatation			
	20	= To	tal Cove		Present? Yes No •			

Soil Sampling Point: 9-1 up

Depth		Matrix			lox Features			
(inches)	Color	(moist)	%	Color (moist)		Loc2	Texture	Remarks
0-4	10YR	4/4	100				Silt Loam	
4-12	10YR	5/6	100				Silt Loam	
	-	-				-		
	-	-						<del>,</del>
	-							
			_					
	-						-	
	-						-	·
<sup>l</sup> Type: C=Cor	centration. I	D=Depleti	on. RM=Red	duced Matrix, CS=Cover	ed or Coated Sand G	rains <sup>2</sup> Loc	ation: PL=Pore Lining. M=	Matrix
Hydric Soil	Indicators:						Indicators for Probl	ematic Hydric Soils <sup>3</sup> :
Histosol (	(A1)			Dark Surface (	S7)		2 cm Muck (A10)	(MLRA 147)
	pedon (A2)				v Surface (S8) (MLRA		Coast Prairie Redo	
Black His	` ,				ace (S9) (MLRA 147,	148)	(MLRA 147,148)	(110)
	n Sulfide (A4			Loamy Gleyed I			Piedmont Floodpla	ain Soils (F19)
	Layers (A5)			Depleted Matrix			(MLRA 136, 147)	
	ck (A10) (LRI	-		Redox Dark Sui			☐ Very Shallow Dark	
	Below Dark		A11)	Depleted Dark			Other (Explain in	Remarks)
	rk Surface (A			Redox Depressi	` ,	N		
Sandy Mu MLRA 14	uck Mineral ( 7, 148)	(S1) (LRR	N,	MLRA 136)	e Masses (F12) (LRR			
	eyed Matrix	(S4)			e (F13) (MLRA 136, 1		3 Indicators of	hydrophytic vegetation and
Sandy Re					dplain Soils (F19) (ML		wetland hyd	drology must be present,
Stripped	Matrix (S6)			Red Parent Ma	terial (F21) (MLRA 12	27, 147)	unless di	sturbed or problematic.
Restrictive L	ayer (if ob	served):						
Туре:								
Depth (inc	ches):						Hydric Soil Present?	Yes O No 💿
Remarks:								



Photo File: IN	IG_3391.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°31'14.684"	Lat/Northing: 38°43'9.468"N
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

me of year? Yes No (If no, exhificantly disturbed? Are "Normal Ciurally problematic? (If needed, exhifing sampling point locations  Is the Sampled Area within a Wetland?	Sampling Point:  T R Ine): flat Slope:
Local relief (concave, convex, nor  Lat.: 38°43'11.683"N Long.:  me of year? Yes No (If no, explications)  No (If no, explications)  Is the Sampled Area within a Wetland?  Is the Sampled Area within a Wetland?  Lat.: 38°43'11.683"N Long.:  Is the Sampled Area within a Wetland?  Is the Sampled Area within a Wetland?  Is the Sampled Area within a Wetland?  Yes (If no explications)  Is the Sampled Area within a Wetland?  Yes (If no, explications)  Is the Sampled Area within a Wetland?	Secondary Indicators (minimum of two required)  Secondary Indicators (B6)  Surface Soil Cracks (B6)  Datum: NAD 83  NAD 83  Datum: NAD 83  NAD 84  NAD 83  NAD 83  NAD 84  NAD 84  NAD 83  NAD 84  NAD
Lat.: 38°43'11.683"N Long.:  me of year? Yes No (If no, expiricantly disturbed? Are "Normal Citurally problematic? (If needed, expiring sampling point locations  Is the Sampled Area within a Wetland?  Is the Sampled Area within a Wetland?  Sulfide Odor (C1)  Rhizospheres along Living Roots (C3)  of Reduced Iron (C4)  on Reduction in Tilled Soils (C6)  kt Surface (C7)	Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Datum: NAD 83  NAD 84  NAD
me of year? Yes No (If no, exhificantly disturbed? Are "Normal Citurally problematic? (If needed, exhifing sampling point locations  Is the Sampled Area within a Wetland?	NWI classification:  xplain in Remarks.)  ircumstances" present? Yes No  xplain any answers in Remarks.)  5, transects, important features, etc  es No   Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
me of year? Yes No (If no, exhificantly disturbed? Are "Normal Citurally problematic? (If needed, exhifing sampling point locations  Is the Sampled Area within a Wetland?	NWI classification:  xplain in Remarks.)  ircumstances" present? Yes No  xplain any answers in Remarks.)  5, transects, important features, etc  es No   Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
Is the Sampled Area within a Wetland?  Is apply)  In a Sulfide Odor (C1)  Rhizospheres along Living Roots (C3)  of Reduced Iron (C4)  ron Reduction in Tilled Soils (C6)  Is the Sampled Area within a Wetland?  Yether Sampled Area within a Wetland?	xplain in Remarks.) ircumstances" present? Yes No plain any answers in Remarks.)  s, transects, important features, etc.  es No Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
Is the Sampled Area within a Wetland?  Is apply)  In a Sulfide Odor (C1)  Rhizospheres along Living Roots (C3)  of Reduced Iron (C4)  ron Reduction in Tilled Soils (C6)  Is the Sampled Area within a Wetland?  Yether Sampled Area within a Wetland?	ircumstances" present? Yes No Splain any answers in Remarks.)  5, transects, important features, etc  es No Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
Is the Sampled Area within a Wetland?	Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
Is the Sampled Area within a Wetland?  Apply  apply  apply  actic Plants (B14)  a Sulfide Odor (C1)  Rhizospheres along Living Roots (C3)  of Reduced Iron (C4)  con Reduction in Tilled Soils (C6)  dx Surface (C7)	Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
Is the Sampled Area within a Wetland?  Lapply) Latic Plants (B14) In Sulfide Odor (C1) Rhizospheres along Living Roots (C3) of Reduced Iron (C4) Loon Reduction in Tilled Soils (C6) Rk Surface (C7)	Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
within a Wetland?  apply) latic Plants (B14) n Sulfide Odor (C1) Rhizospheres along Living Roots (C3) of Reduced Iron (C4) on Reduction in Tilled Soils (C6) k Surface (C7)	Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
within a Wetland?  apply) latic Plants (B14) n Sulfide Odor (C1) Rhizospheres along Living Roots (C3) of Reduced Iron (C4) on Reduction in Tilled Soils (C6) k Surface (C7)	Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
within a Wetland?  apply) latic Plants (B14) n Sulfide Odor (C1) Rhizospheres along Living Roots (C3) of Reduced Iron (C4) on Reduction in Tilled Soils (C6) k Surface (C7)	Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)
abply) latic Plants (B14) In Sulfide Odor (C1) Rhizospheres along Living Roots (C3) of Reduced Iron (C4) ron Reduction in Tilled Soils (C6) k Surface (C7)	Surface Soil Cracks (B6) Sparsely Vegetated Concave Surface (B8) Drainage Patterns (B10)
abply) latic Plants (B14) In Sulfide Odor (C1) Rhizospheres along Living Roots (C3) of Reduced Iron (C4) ron Reduction in Tilled Soils (C6) k Surface (C7)	Surface Soil Cracks (B6) Sparsely Vegetated Concave Surface (B8) Drainage Patterns (B10)
abply) latic Plants (B14) In Sulfide Odor (C1) Rhizospheres along Living Roots (C3) of Reduced Iron (C4) ron Reduction in Tilled Soils (C6) k Surface (C7)	Surface Soil Cracks (B6) Sparsely Vegetated Concave Surface (B8) Drainage Patterns (B10)
abply) latic Plants (B14) In Sulfide Odor (C1) Rhizospheres along Living Roots (C3) of Reduced Iron (C4) ron Reduction in Tilled Soils (C6) k Surface (C7)	Surface Soil Cracks (B6) Sparsely Vegetated Concave Surface (B8) Drainage Patterns (B10)
natic Plants (B14) In Sulfide Odor (C1) Rhizospheres along Living Roots (C3) of Reduced Iron (C4) Iron Reduction in Tilled Soils (C6) Ick Surface (C7)	Sparsely Vegetated Concave Surface (B8) Drainage Patterns (B10)
Rhizospheres along Living Roots (C3) of Reduced Iron (C4) on Reduction in Tilled Soils (C6) ck Surface (C7)	Drainage Patterns (B10)
of Reduced Iron (C4) on Reduction in Tilled Soils (C6) k Surface (C7)	Moss Trim Lines (B16)
on Reduction in Tilled Soils (C6) k Surface (C7)	
k Surface (C7)	Dry Season Water Table (C2)
1	Crayfish Burrows (C8)
kplain in Remarks)	Saturation Visible on Aerial Imagery (C9)
	Stunted or Stressed Plants (D1) Geomorphic Position (D2)
	Shallow Aquitard (D3)
]	Microtopographic Relief (D4)
	FAC-neutral Test (D5)
(inches):	
(inches):	ology Present? Yes O No 💿
(inches):	ology Present? Tes C NO C
ial photos, previous inspections), if availa	able:
(inches): Wetland Hyd	

			ominant oecies? _		Sampling Point: <u>10-1 up</u>
	Absolute	Re	el.Strat.	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 30 )	% Cover		over	Status	Number of Dominant Species
1 Carya tomentosa	30	<b>✓</b>	66.7%	UPL	That are OBL, FACW, or FAC:
2 Ouercus velutina	15	<b>✓</b>	33.3%	UPL	Tatal Number of Descined
3	0		0.0%		Total Number of Dominant Species Across All Strata: 4 (B)
4	0		0.0%		
5			0.0%		Percent of dominant Species
6			0.0%		That Are OBL, FACW, or FAC: 50.0% (A/B)
7	_		0.0%		Prevalence Index worksheet:
8.			0.0%		Total % Cover of: Multiply by:
<u> </u>	45	 = Ta	otal Cover		0BL species 0 x 1 = 0
Sapling-Sapling/Shrub Stratum (Plot size: 15	)				FACW species 0 x 2 = 0
1 Asimina triloba	20	<b>✓</b>	80.0%	FAC	
2 Carpinus caroliniana	5	✓	20.0%	FAC	FAC speci es $25 \times 3 = 75$
3	0		0.0%		FACU species $0 \times 4 = 0$
4			0.0%		UPL speci es $\frac{45}{}$ x 5 = $\frac{225}{}$
5	_		0.0%		Column Totals:
6			0.0%		Prevalence Index = B/A = 4.286
		$\overline{\Box}$	0.0%		,
7		$\Box$	0.0%		Hydrophytic Vegetation Indicators:
8		H	0.0%		Rapid Test for Hydrophytic Vegetation
9			-		☐ Dominance Test is > 50%
10		Ш	0.0%		Prevalence Index is ≤3.0 <sup>1</sup>
Shrub Stratum (Plot size:)	25 :	= To	otal Cover	•	Morphological Adaptations <sup>1</sup> (Provide supporting
1	0		0.0%		data in Remarks or on a separate sheet)
2.	0		0.0%		☐ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
3	0		0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4	_		0.0%		be present, unless disturbed or problematic.
5			0.0%		Definition of Vegetation Strata:
		$\Box$	0.0%		Four Vegetation Strata:
6					Tree stratum – Consists of woody plants, excluding vines, 3
7	0_	_	0.0%		in. (7.6 cm) or more in diameter at breast height (DBH),
Herb Stratum (Plot size:)	:	= 10	otal Cover		regardless of height.
1	0		0.0%		Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2	_		0.0%		
3	0_		0.0%		Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28
4	0		0.0%		ft tall.
5	0		0.0%		Woody vines – Consists of all woody vines greater than 3.28 ft in height.
6			0.0%		
7		$\overline{\Box}$	0.0%		Five Vegetation Strata:
		$\overline{\Box}$	0.0%		Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
8			0.0%		diameter at breast height (DBH).
9		Н			Sapling stratum – Consists of woody plants, excluding
10			0.0%		woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.
[1			0.0%		Shrub stratum – Consists of woody plants, excluding woody
12	0	Ш	0.0%		vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size:)	:	= To	otal Cover	•	Herb stratum – Consists of all herbaceous (non-woody)
1	0_		0.0%		plants, including herbaceous vines, regardless of size, and
2.	0		0.0%		woody species, except woody vines, less than approximately 3 ft (1 m) in height.
3	0	$\bar{\Box}$	0.0%		Woody vines – Consists of all woody vines, regardless of
4		$\overline{\sqcap}$	0.0%		height.
			0.0%		
5					Hydrophytic
6		Ш	0.0%		Vegetation   Present?   Yes ○ No ●
	0		otal Cove		

Soil Sampling Point: 10-1 up

Profile Descri	iption: (De	scribe to	the dept	needed to documen	t the indic	ator or co	onfirm the	absence of indicators.)	·	
Depth		Matrix		Re	dox Featu					
(inches)	Color	(moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc2	Texture	Remarks	
0-5	2.5Y	5/4	100					Fine Sandy Loam		
5-13	2.5Y	5/6	100					Fine Sandy Loam		
								-		
		-						-		
		-						-		
		-			-					
		-			-			-		
<sup>1</sup> Type: C=Cond	centration. [	D=Depletio	on. RM=Re	duced Matrix, CS=Cover	ed or Coate	ed Sand Gr	ains <sup>2</sup> Loc	ation: PL=Pore Lining. M=N	Matrix	
Hydric Soil I	ndicators:							Indicators for Proble	umatic Hydric Soils <sup>3</sup> :	
Histosol (A	A1)			Dark Surface (	S7)			2 cm Muck (A10) (	•	
Histic Epip	pedon (A2)			Polyvalue Belov	w Surface (	S8) (MLRA	147,148)			
☐ Black Histi	ic (A3)			Thin Dark Surf	ace (S9) (M	ILRA 147, 1	148)	Coast Prairie Redox (MLRA 147,148)	(A16)	
☐ Hydrogen	Sulfide (A4	)		Loamy Gleyed	Matrix (F2)			Piedmont Floodpla	in Soils (F19)	
Stratified	Layers (A5)			Depleted Matri	x (F3)			(MLRA 136, 147)	363 (1.13)	
2 cm Mucl	k (A10) (LRI	R N)		Redox Dark Su	rface (F6)			Very Shallow Dark	Surface (TF12)	
Depleted I	Below Dark	Surface (A	A11)	Depleted Dark	Surface (F	7)		Other (Explain in R	temarks)	
☐ Thick Dark	k Surface (A	12)		Redox Depress						
Sandy Mu MLRA 147	ck Mineral ( ', 148)	S1) (LRR	N,	☐ Iron-Manganes MLRA 136)	e Masses (	F12) (LRR	N,			
_	yed Matrix	(S4)		Umbric Surface	e (F13) (ML	RA 136, 12	22)			
Sandy Red		,		Piedmont Floo	dplain Soils	(F19) (ML	RA 148)	<sup>3</sup> Indicators of hydrophytic vegetation and wetland hydrology must be present,		
Stripped N	Matrix (S6)			Red Parent Ma	terial (F21)	) (MLRA 12	7, 147)		turbed or problematic.	
B										
Restrictive La	ayer (IT ob	servea):								
Type:	h o a ) .							Hydric Soil Present?	Yes O No 💿	
Depth (incl	nes):									
Remarks:										



Photo File: IM	IG_3392.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°31'16.968"	Lat/Northing: 38°43'11.683"N
Description:			

Photo File: <b>No</b>	ne.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

Datum: NAD 83   NAD 83   NAD 84   NAD 84   NAD 85   NAD	Section, Township, Range: S	setigator(s): Matt Nocly   Section, Township, Range: S   T   R    Indiform (hillslops, terrace, etc.): Swale   Local relief (concave, convex, none): concave   Slope:0_0% _/0_0  pregion (LRR or MLRA): MILRA 148 in LRR S   Lat:38°43'13.865'N   Long:: 77'31'16.395'W   Datum: NAD 83'  IMap Unit Name: Aden Silt Loam   NWI classification   NWI classification    IMap Unit Name: Aden Silt Loam   NWI classification   NWI classification    IMap Unit Name: Aden Silt Loam    IMap Unit Name: Aden Silt Loam   NWI classification    Imap Unit Name: Aden Silt Loam   NWI classification   NWI classification    Imap Unit Name: Aden Silt Loam   NWI classification   NWI classification   NWI classification    Imap Unit Name: Aden Silt Loam   NWI classification   NWI cl	oject/Site: Manassas Regional A	irport	City/County:	1anassas	Sampling	<b>Date:</b> 25-Oct-16
Indiform (hillslope, terrace, etc.): Swale	Indiform (hillslope, terrace, etc.): Swale	Local relief (concave, convex, none): concave Slope: 0.0.0% / 0.0 pregion (LRR or MLRA): MLRA 148 in LRR S	plicant/Owner: Manassas Regio	nal Airport		State: VA	Sampling Point:	11-1 up
bregion (LRR or MLRA): MLRA 148 in LRR S	bregion (LRR or MLRA): MLRA 148 in LRR S	region (LRR or MLRA): MLRA 148 in LRR S	vestigator(s): Matt Neely		Section, Towns	hip, Range: S	т	R
I Map Unit Name: Aden Silt Loam	I Map Unit Name: Aden Silt Loam	Map Unit Name:   Aden Silt Loam	ndform (hillslope, terrace, etc.)	: Swale	Local relief (cond	ave, convex, none)	concave <b>SI</b>	lope: 0.0% / 0.0 °
Map Unit Name: Aden Silt Loam	Map Unit Name: Aden Silt Loam	Map Unit Name:   Aden Silt Loam	oregion (LRR or MLRA): MLR	A 148 in LRR S	 Lat.: 38°43'13.865"N	Long.: 7	77°31'16.395"W	Datum: NAD 83
climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation  , Soil  , or Hydrology    significantly disturbed?	climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation  , Soil   , or Hydrology	climatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)  Vegetation						
Vegetation	Vegetation	Vegetation   , Soil   , or Hydrology   significantly disturbed?   Are "Normal Circumstances" present?   Yes	·		time of year? Yes • N	O (If no eval:	_	
e Vegetation	e Vegetation	Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc ydrophytic Vegetation Present? Yes No					-	Yes  No
Attach site map showing sampling point locations, transects, important features, e ydrophytic Vegetation Present? Yes \ No \ vortice Soil Present? Yes \ No \ vortice	Attach site map showing sampling point locations, transects, important features, el ydrophytic Vegetation Present? Yes \ No \ very No \	Attach site map showing sampling point locations, transects, important features, etc.    very prophytic Vegetation Present?					•	
ydrophytic Vegetation Present? Yes \ No \ \circle \ No \ \circle \ Yes \ No \ \circle \ No \ \circle \ Yes \ No \ \circle \ Depth (inches): \ \circle \ Wetland Hydrology Present? Yes \ No \ \circle \ Depth (inches): \ \circle \ Wetland Hydrology Present? Yes \ No \ \circle \ Depth (inches): \ \circle \ Wetland Hydrology Present? Yes \ No \ \circle \ Depth (inches): \ \circle \ Wetland Hydrology Present? Yes \ No \ \circle \ Depth (inches): \ \circle \ Wetland Hydrology Present? Yes \ No \ \circle \ Depth (inches): \ \circle \ Wetland Hydrology Present? Yes \ No \ \circle \ Depth (inches): \ \circle \ Wetland Hydrology Present? Yes \ No \ \circle \ Depth (inches): \ \circle \ Wetland Hydrology Present? Yes \ No \ \circle \ Depth (inches): \ \circle \ Wetland Hydrology Present? Yes \ No \ \circle \ Depth (inches): \ \circle \ Wetland Hydrology Present? Yes \ No \ \circle \ Depth (inches): \ \circle \ Wetland Hydrology Present? Yes \ No \ \circle \ Depth (inches): \ \circle \ Wetland Hydrology Present? Yes \ No \ \circle \ Depth (inches): \ \circle \ Wetland Hydrology Present? Yes \ No \ \circle \ Depth (inches): \ \circle \ Wetland Hydrology Present? Yes \ No \ \circle \ Depth (inches): \ \circle \ \circ	ydrophytic Vegetation Present? Yes \ No \ \circle \ Depth (inches): \ Yes \ No \ \circle \ Depth (inches): \ Yes \ No \ \circle \ Depth (inches): \ Yes \ No \ \circle \ Depth (inches): \ Yes \ No \ \circle \ Depth (inches): \ Yes \ No \ \circle \ Depth (inches): \ Yes \ No \ \circle \ Depth (inches): \ Yes \ No \ \circle \ Depth (inches): \ Yes \ No \ \circle \ Depth (inches): \ Yes \ No \ \circle \ Depth (inches): \ Yes \ No \ \circle \ Depth (inches): \ Yes \ No \ \circle \ Depth (inches): \ Yes \ No \ \circle \ Depth (inches): \ Yes \ No \ \circle \ Depth (inches): \ Yes \ No \ \circle \ Depth (inches): \ Yes \ No \ \circle \ Depth (inches): \ \ Yes \ No \ \circle \ Depth (inches): \ \ Yes \ No \ \circle \ Depth (inches): \ \ Yes \ No \ \circle \ Depth (inches): \ \ Yes \ No \ \circle \ Depth (inches): \ \ Yes \ No \ \circle \ Depth (inches): \ \ \ Yes \ No \ \circle \ Depth (inches): \ \ Yes \ No \ \circle \ Depth (inches): \ \ Yes \ No \ \circle \ Depth (inches): \ \ Yes \ No \ \circle \ Depth (inches): \ \ Yes \ No \ \circle \ Depth (inches): \ \ Yes \ No \ \circle \ Depth (inches): \ \ Yes \ No \ \circle \ Depth (inches): \ \ Yes \ No \ \circle \ Depth (inches): \ \ Yes \ No \ \circle \ Depth (inches): \ \ Yes \ No \ \circle \ Depth (inches): \ \ \circle \ \ \circle \ \circle \ \ \circle \	Advance Soil Present?  Yes  No    No    Is the Sampled Area within a Wetland?  Yes  No    No    Is the Sampled Area within a Wetland?  Yes  No    No    Is the Sampled Area within a Wetland?  Yes  No    No    Is the Sampled Area within a Wetland?  Yes  No    No    Is the Sampled Area within a Wetland?  Yes  No    No    Is the Sampled Area within a Wetland?  Yes  No    No    Is the Sampled Area within a Wetland?  Yes  No    No    Is the Sampled Area within a Wetland?  Yes  No    No    Is the Sampled Area within a Wetland?  Yes  No    No    Is the Sampled Area within a Wetland?  Yes  No    Is the Sampled Area within a Wetland?  Is the Sampled Area within a Wetland?  Yes  No    Is the Sampled Area within a Wetland?  Is the Sampled Area wit	e Vegetation 🔲 , Soil 🔲	, or Hydrology 🔲 r	naturally problematic?	(If needed, expla	in any answers in Rem	arks.)
ydric Soil Present? Yes No ●	ydric Soil Present? Yes No ●	ydric Soil Present?  Yes	ummary of Findings - A	Attach site map sho	owing sampling poi	nt locations, t	ransects, impor	tant features, etc
Addric Soil Present?  Yes No	Addric Soil Present?  Yes No	Is the Sampled Area within a Wetland?    Ves	ydrophytic Vegetation Present?	Yes O No •				
Agal Mat or Crust (B4) Drift deposits (B3) Dri	Agal Mat or Crust (B4) Drift deposits (B3) Dri	etland Hydrology  Netland Hydrology Indicators:  Primary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Surface Water Praser Yes No Depth (inches):  Surface Water Table Present? Yes No Depth (inc			Is the S	ampled Area	O (S)	
Alydrology  Wetland Hydrology Indicators:	Alydrology  Wetland Hydrology Indicators:  Primary Indicators (minimum of one required: check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Algal Mat or Crust (B4)  Thin Muck Surface (C7)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Again Mat or Crust (B4)   Other (Explain in Remarks)   Secondary Indicators (Ininimum of two required)   Other (Explain in Remarks)   Other (Explain in Remarks)	•				○ No ●	
## Addrology    Metland Hydrology Indicators:	### Applicators:    Secondary Indicators (minimum of two required)	Wetland Hydrology Wetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Drainage Patterns (B10)  D						
Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)						
Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Trinh Muck Surface (C7)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Depth (inches):  Saturation Present?  Westland Hydrology Present?  Yes  No  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Drift deposits (B3)  Trin Muck Surface (C7)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Aquatic Fauna (B13)  Field Observations:  Surface Water (A1)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D1)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Thin Muck Surface (C7)  Saturation Visible on Aerial Imagery (C9)  Algal Mat or Crust (B4)  I ron Deposits (B5)  I nundation Visible on Aerial Imagery (B7)  Mater-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	lydrology					
Surface Water (A1)	Surface Water (A1)	Surface Water (A1)	Wetland Hydrology Indicators:			_Sec	ondary Indicators (minim	um of two reauired)
High Water Table (A2)	High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Hydrogen Sulfide Odor (C1)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Pepth (inches):  Depth (inches):	High Water Table (A2)	Primary Indicators (minimum o	of one required; check all t	hat apply)			
Saturation (A3)	Saturation (A3)	Saturation (A3)	Surface Water (A1)	True /	Aquatic Plants (B14)		Sparsely Vegetated Cond	cave Surface (B8)
Water Marks (B1)	Water Marks (B1)	Water Marks (B1)	High Water Table (A2)	Hydro	gen Sulfide Odor (C1)		Drainage Patterns (B10)	
Sediment Deposits (B2)	Sediment Deposits (B2)	Sediment Deposits (B2)	_ ` ´			` '	, ,	
Drift deposits (B3)	Drift deposits (B3)	Drift deposits (B3)	_ ` ′		` ,			(C2)
Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	_ ' ' '			(C6)		ial Imagany (CO)
☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Water Table Present? Yes ○ No ○ Depth (inches): ☐ Water Table Present? Yes ○ No ○ Depth (inches): ☐ Water Table Present? Yes ○ No ○ Depth (inches): ☐ Wetland Hydrology Present? Yes ○ No ○ Depth (inches): ☐ Wetland Hydrology Present? Yes ○ No ○ Depth (inches): ☐ Wetland Hydrology Present? Yes ○ No ○ Depth (inches): ☐ Wetland Hydrology Present? Yes ○ No ○ Depth (inches): ☐ Yes ○ No ○ No ○ Depth (inches): ☐ Yes ○ No ○ No ○ Depth (inches): ☐ Yes ○ No ○ Depth (inches): ☐ Yes ○ No ○ No ○ Depth (inches): ☐ Yes ○ No ○ No ○ Depth (inches): ☐ Yes ○ No ○ N	☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5)	Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Surface Water Table Present?  Yes No Persent?	_ ` ` ` `		* *			• , , ,
□ Inundation Visible on Aerial Imagery (B7) □ Shallow Aquitard (D3) □ Water-Stained Leaves (B9) □ Microtopographic Relief (D4) □ Aquatic Fauna (B13) □ FAC-neutral Test (D5)  Field Observations: Surface Water Present? Yes ○ No ○ Depth (inches): □ Water Table Present? Yes ○ No ○ Depth (inches): □ Water Table Present? Yes ○ No ○ Depth (inches): □ Water Table Present? Yes ○ No ○ Depth (inches): □ Wetland Hydrology Present? Yes ○ No ○ Depth (inches): □ Wetland Hydrology Present? Yes ○ No ○ Depth (inches): □ Output (inches):	□ Inundation Visible on Aerial Imagery (B7) □ Water-Stained Leaves (B9) □ Aquatic Fauna (B13) □ FAC-neutral Test (D5)  Field Observations: Surface Water Present? Water Table Present? Ves ○ No ○ Depth (inches): Saturation Present? Fincludes capillary fringe)  Ves ○ No ○ Depth (inches): Depth (inches):  Wetland Hydrology Present?  Yes ○ No ○ Depth (inches):	□ Inundation Visible on Aerial Imagery (B7) □ Shallow Aquitard (D3) □ Water-Stained Leaves (B9) □ Microtopographic Relief (D4) □ Aquatic Fauna (B13) □ FAC-neutral Test (D5)  Field Observations: Surface Water Present? Yes □ No □ Depth (inches): □ Water Table Present? Yes □ No □ Depth (inches): □ Water Table Present? Yes □ No □ Depth (inches): □ Water Table Present? Yes □ No □ Depth (inches): □ Wetland Hydrology Present? Yes □ No □ Depth (inches): □ Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	_	U Other	(Explain in Remarks)			` '
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):	Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Secribe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	_	nagery (B7)				,
Field Observations:  Surface Water Present?  Yes No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Field Observations:  Surface Water Present?  Yes No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Field Observations:  Surface Water Present? Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):  Saturation Present? Yes No Depth (inches):  Saturation Present? Yes No Depth (inches):  Secribe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	Water-Stained Leaves (B9)				Microtopographic Relief (	(D4)
Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Surface Water Present? Yes No Depth (inches):	Surface Water Present? Yes No Depth (inches):	Aquatic Fauna (B13)				FAC-neutral Test (D5)	
Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Water Table Present? Yes No Depth (inches):	Water Table Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No Sescribe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		0 0				
Saturation Present? (includes capillary fringe)  Yes No Depth (inches):  Depth (inches):	Saturation Present? (includes capillary fringe)  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (includes capillary fringe)  Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		•	th (inches):			
(includes capillary fringe)  Yes No Depth (inches):	(includes capillary fringe)  Yes No Depth (inches):	Yes No ● Depth (inches):  Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	Water Table Present? Yes	3 O No O Dep	th (inches):		Vos	) No (0)
		Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	VAC	S ○ No • Dep	th (inches):	Wetland Hydrolog	y Present? Tes	) NO S
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	3 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -			n gauge, monitoring well,	aerial photos, previous insp	ections), if available	2:	
Remarks:								
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Remarks:								
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Remarks:								
Remarks:								
Remarks:								

	Dominant ———Species?				Sampling Point: 11-1 up		
	Absolute	Re	el.Strat.	Indicator	Dominance Test worksheet:		
Tree Stratum (Plot size: <u>30</u> )	% Cover			Status	Number of Dominant Species		
1 Quercus velutina	25	<b>✓</b>	38.5%	UPL	That are OBL, FACW, or FAC: (A)		
2. Carva tomentosa		<b>V</b>	30.8%	UPL	Total Number of Dominant		
3. Ouercus alba	15	<b>✓</b>	23.1%	FACU	Species Across All Strata:5(B)		
4 Ouercus rubra	5	Ц	7.7%	FACU			
5			0.0%		Percent of dominant Species That Are OBL, FACW, or FAC: 20.0% (A/B)		
6			0.0%		That Are obe, FACW, of FAC.		
7	0	Ш	0.0%		Prevalence Index worksheet:		
8			0.0%		Total % Cover of: Multiply by:		
Sapling-Sapling/Shrub Stratum (Plot size: 15	) 65 :	= To	otal Cover		0BL speci es x 1 =0		
1 Carpinus caroliniana	_	<b>✓</b>	71.4%	FAC	FACW species x 2 =		
		<ul><li>✓</li></ul>	28.6%	UPL	FAC speci es5 x 3 =15		
			0.0%		FACU species $\frac{20}{}$ x 4 = $\frac{80}{}$		
3		$\exists$	0.0%		UPL species $\frac{47}{235}$ x 5 = $\frac{235}{2}$		
4		$\exists$	0.0%		Column Totals: 72 (A) 330 (B)		
5		$\exists$	0.0%				
6		$\exists$	0.0%		Prevalence Index = B/A = 4.583		
7		$\exists$	0.0%		Hydrophytic Vegetation Indicators:		
8		$\exists$	0.0%		Rapid Test for Hydrophytic Vegetation		
9		Н	0.0%		Dominance Test is > 50%		
10					Prevalence Index is ≤3.0 <sup>1</sup>		
Shrub Stratum (Plot size:)		= 10	otal Cover		Morphological Adaptations <sup>1</sup> (Provide supporting		
1		Н	0.0%		data in Remarks or on a separate sheet)		
2			0.0%		Problematic Hydrophytic Vegetation 1 (Explain)		
3	0		0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must		
4	0		0.0%		be present, unless disturbed or problematic.		
5	0		0.0%		Definition of Vegetation Strata:		
6	0	Ш	0.0%		Four Vegetation Strata:		
7	0		0.0%		Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH),		
Herb Stratum (Plot size:)	0 :	= To	otal Cover		regardless of height.		
1	0		0.0%		Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.		
2.	_		0.0%				
3			0.0%		Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28		
4	0		0.0%		ft tall.		
5	0		0.0%		Woody vines – Consists of all woody vines greater than 3.28 ft in height.		
6	0		0.0%		Five Vegetation Strata:		
7			0.0%				
8	0		0.0%		Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in		
9.	0		0.0%		diameter at breast height (DBH).		
10	0		0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and		
11			0.0%		less than 3 in. (7.6 cm) DBH.		
12	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody		
	0 :	= To	otal Cover		vines, approximately 3 to 20 ft (1 to 6 m) in height.		
Woody Vine Stratum (Plot size:)	0		0.0%		Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and		
1		П			woody species, except woody vines, less than approximately		
2			0.0%		3 ft (1 m) in height.		
3			0.0%		Woody vines – Consists of all woody vines, regardless of height.		
4			0.0%		-		
5			0.0%		Hydrophytic		
6		Ш	0.0%		Vegetation   Present?   Yes ○ No ●		
V.,	0		otal Cover		I Dracanty ICS C INC C		

Soil Sampling Point: 11-1 up

Profile Descr	iption: (De	escribe to	the depth	needed to document	the indicator	or confirm the	e absence of indicators.)	
Depth		Matrix			ox Features		_	
(inches)	Color	(moist)	%	Color (moist)	Тур	e <sup>1</sup> Loc²	Texture	Remarks
0-4	2.5Y	6/4	100				Silt Loam	
4-10	2.5Y	6/6	100				Silt Loam	
10-14	2.5Y	6/4	90				Silt Loam	
	2.5Y	6/3	10				Silt Loam	
	-		_		-			
	-	_						
	-			-				
1								
			on. RM=Red	luced Matrix, CS=Covere	ed or Coated Sar	id Grains <sup>2</sup> Lo	cation: PL=Pore Lining. M=	
Hydric Soil I		l		□ p. i.c. c //	771		Indicators for Proble	ematic Hydric Soils <sup>3</sup> :
Histosol (A	•			Dark Surface (S	•	UDA 147 140)	2 cm Muck (A10)	(MLRA 147)
	pedon (A2)				V Surface (S8) (N		Coast Prairie Redo	x (A16)
Black Hist	Sulfide (A4	1)			ice (S9) (MLRA 1	47, 140)	(MLRA 147,148)	
	Layers (A5)			Loamy Gleyed Notrix			Piedmont Floodpla	ain Soils (F19)
	k (A10) (LR			Redox Dark Sur	` '		(MLRA 136, 147)	
			***	Depleted Dark	• ,		☐ Very Shallow Dark	
l — ·	Below Dark	,	A11)	Redox Depressi			Other (Explain in I	Remarks)
	k Surface (/	•		☐ Iron-Manganes	` '	I DD N		
□□ Sandy Mu MLRA 147	ck Mineral ', 148)	(S1) (LRR	N,	MLRA 136)	e Masses (F12) (	LKK IV,		
Sandy Gle	eyed Matrix	(S4)		Umbric Surface	(F13) (MLRA 13	6, 122)	3	
Sandy Red	dox (S5)			☐ Piedmont Flood	Iplain Soils (F19)	(MLRA 148)	Indicators of wetland hyd	hydrophytic vegetation and drology must be present,
Stripped N	Matrix (S6)			Red Parent Ma	terial (F21) (MLF	A 127, 147)		sturbed or problematic.
Restrictive La	ayer (if ob	served):						
Туре:								
Depth (incl	hes):						Hydric Soil Present?	Yes ○ No •
Remarks:								



Photo File: IM	IG_3393.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°31'16.395"	Lat/Northing: 38°43'13.865"N
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

plicant/Owner: Manassas Regional Airport	oject/Site: Manassas Regional A	irport	City/County:	Manassas	Samplin	g Date: 25-Oct-16
andform (hillslope, terrace, etc.): Hillside: Local relief (concave, convex, none): flat: Slope: 0.0% / 0.0 bregion (LRR or MLRA): MLRA 148 in LRR S	plicant/Owner: Manassas Regio	onal Airport		State: VA	Sampling Point	:13-1 up
region (LRR or MLRA): MLRA 148 in LRR S	estigator(s): Matt Neely		Section, Town	ship, Range: S	т	R
Map Unit Name: Aden Silt Loam	dform (hillslope, terrace, etc.)	: Hillside	Local relief (con	cave, convex, none)	flat \$	Slope: 0.0% / 0.0
Map Unit Name: Aden Silt Loam	region (LRR or MLRA): MLR	XA 148 in LRR S		Long.:	77°31'13.416"W	Datum: NAD 83
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   Vegetation	-					
Vegetation	· —		r this time of year? Yes • N	In (If no expl		
Vegetation		_	¬		•	Yes  No
Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc. pdrophytic Vegetation Present? Yes \ No \ \circ \ No \circ \ \c		_			-	
Advisophytic Vegetation Present? Yes No  Available Mydrology Present? Yes No  Available Mydrology Present? Yes No  Available Mydrology Indicators:    Is the Sampled Area within a Wetland?   Yes No	Vegetation, Soil	, or Hydrology	_ naturally problematic?	(If needed, expla	in any answers in Rer	narks.)
Is the Sampled Area within a Wetland?  Ves No No No No Wetland Hydrology Present?  No Ves No	ımmary of Findings - A	Attach site map	showing sampling po	int locations, f	transects, impo	rtant features, etc
Is the Sampled Area within a Wetland?  Ves No No No No Wetland Hydrology Present?  Veriand Hydrology Indicators:  Ves No Person Required:  Ves No Person Reduced Into (B14)  Ves No Person Reduced Into (C1)  Veriand Hydrology Indicators:  Ves No Person Reduced Into (C1)  Veriand Rydrology Indicators:  Ves No Person Reduced Into (C1)  Veriand Rydrology Indicators:  Ves No Person Reduced Into (C1)  Veriand Rydrology Indicators:  Ves No Person Reduced Into (C2)  Veriand Rydrology Indicators:  Ves No Person Reduced Into (C4)  Veriand Rydrology Indicators:  Ves No Person Rydrology	drophytic Vegetation Present?	Yes O No 💿	1			
Very a company   Ves   No   No   Within a Wetland?   Ves   No   Ves   Wetland   Ves   Ves   No   Ves   Ves   Ves   No   Ves   Ves   Ves   No   Ves   Ves   Ves   No   Ves   Ves   Ves   No   Ves   Ves   Ves   Ves   No   Ves			Is the S	ampled Area	O O	
Interpretation   Inte		Yes O No 💿			○ No ●	
Secondary Indicators (minimum of two required)   Surface Soli Cracks (B6)						
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drift deyosits (C1)  Drainage Patterns (B10)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Yes No Depth (inches):  Wetland Hydrology Present? Yes No Found Present?  Wetland Hydrology Present? Yes No Found Present?  Wetland Hydrology Present? Yes No Found Present?  Wetland Hydrology Present? Yes No Found Present? Yes No Found Present?  No Field Observations:  Depth (inches):	lydrology					
Surface Water (A1)	Wetland Hydrology Indicators:			Ser	condary Indicators (mini	mum of two required)
High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Teield Observations:  Surface Water Present?  Yes  No  Depth (inches):	Primary Indicators (minimum c	of one required; check	all that apply)			
Saturation (A3)	Surface Water (A1)		True Aquatic Plants (B14)		Sparsely Vegetated Cor	ncave Surface (B8)
Water Marks (B1)	High Water Table (A2)		Hydrogen Sulfide Odor (C1)		Drainage Patterns (B10	)
Sediment Deposits (B2)	_ ` ´			Roots (C3)	, ,	
Drift deposits (B3)	_ ` ´		` '			e (C2)
Algal Mat or Crust (B4)				; (C6)		orial Imagony (CO)
Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Peth (inches):  Saturation Present?	_ ` ` ` `		• •			• , , ,
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Peth (inches):  Saturation Present?			Other (Explain in Remarks)			` '
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):	Inundation Visible on Aerial Im	nagery (B7)				,
Field Observations:  Surface Water Present?  Yes No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Water-Stained Leaves (B9)				Microtopographic Relief	(D4)
Furface Water Present?  Yes No Depth (inches):  Vater Table Present?  Yes No Depth (inches):  Faturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):	Aquatic Fauna (B13)				FAC-neutral Test (D5)	
Water Table Present? Yes No Depth (inches):		- O No O	5 4 4 4 3			
Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No No						
includes capillary fringe)  Yes No Depth (inches):			Depth (inches):	Wetland Hydrolo	av Present? Yes	○ No ●
	VAC	; ○ No	Depth (inches):	Wedana Hyarolo	gy i resent: 100	
		n gauge, monitoring v	vell, aerial photos, previous insp	pections), if available	e:	
	lemarks:					
emarks:						
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lemarks:						
Remarks:						

Name   Committee   Committee		Dominant Species?				Sampling Point: <u>13-1 up</u>		
1. Quercus visibilina 25			Re	el.Strat.		Dominance Test worksheet:		
1. Querous weeklines	Tree Stratum (Plot size: 30 )	% Cover	_		Status	Number of Dominant Species		
3. Ase rubnum	1 Quercus velutina	25		45.5%	UPL	l '		
3. Ascer tabulbum    4	2. Carva tomentosa		✓	36.4%	UPL	Total Number of Deminant		
Description	3. Acer rubrum	10		18.2%	FAC			
That Are CRIL, FACW, or FAC   25,0% (A/8)	4	0		0.0%				
6	5	0		0.0%				
Sapiling Sapiling Shrub Stratum   Plot size: 15   S5 = Total Cover	6	0		0.0%		I nat Are OBL, FACW, or FAC: 25.070 (A/D)		
Sapiling-	7	0		0.0%		Prevalence Index worksheet:		
FACH Species   1.5	8	0		0.0%		Total % Cover of: Multiply by:		
1. Carpinus caroliniana 2. Querous velutina 3.	(0)	55 :	= To	otal Cover		0BL speci es0 x 1 =0		
1. Caronus carolinisna  5						FACW species $0 \times 2 = 0$		
2. Querous velutina 3.	1 Carpinus caroliniana							
1	2. Quercus velutina				UPL			
10	3					17.00 Species		
0	4			0.0%		or species X 5 -		
Note	5			0.0%		Column Totals:65 (A)295 (B)		
Nytrophytic Vegetation Inclicators:   Rapid Test for Hydrophytic Vegetation   Dominance Test is > 50%   Dominance Test is Test	6	0		0.0%		Prevalence Index = B/A = 4.538		
8	7	0		0.0%		Hydrophytic Vegetation Indicators:		
0 0.0%   Dominance Test is > 50%   Prevalence Index is ≤3.0 ¹ Shrub Stratum (Plot size: )   10 = Total Cover   O.0%   O.0%   Prevalence Index is ≤3.0 ¹ Shrub Stratum (Plot size: )   O 0.0%   O.0%   Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Pour Vegetation Strata:   Pour Strata:   Pour Vegetation Strata:   Pour Stra	8			0.0%				
O	9			0.0%				
Shrub Stratum   (Plot size:   )	10	0		0.0%		l —		
1		10 :	= To	otal Cover				
2		0		0.0%				
3			$\overline{\Box}$			Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)		
4.			$\Box$			1 Indicators of hydric soil and wetland hydrology must		
5 .			$\Box$					
Company   Com						Definition of Vegetation Strata:		
Tree stratum - Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.   Common			$\Box$			_		
Note								
Sapling/shrub stratum — Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.  1.	•		 _ <b>T</b> .					
1	Herb Stratum (Plot size:)		= 10	otal Cover				
Herb stratum — Consists of all herbaceous (non-woody)   Plants, regardless of size, and all other plants less than 3.28   ft tall.   Woody vines — Consists of all woody vines greater than 3.28   ft tall.   Woody vines — Consists of all woody vines greater than 3.28   ft tall.   Woody vines — Consists of all woody vines greater than 3.28   ft tall.   Woody vines — Consists of all woody vines greater than 3.28   ft tall.   Woody vines — Consists of all woody vines greater than 3.28   ft tall.   Five Vegetation Strata:   Tree — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).   Sanging stratum — Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.   Shrub stratum — Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.   Shrub stratum — Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.   Herb stratum — Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody species, except woody vines, approximately 3 ft (1 m) in height.   Woody vines — Consists of all woody vines, regardless of height.   Hydrophytic vegetation Present?   Yes   No   No   Present?   Yes   No   No   Present?   Yes   Yes   No   Present?   Yes   Yes   No   Present?   Yes	1			0.0%				
3.	2		Ш	0.0%		Herh stratum - Consists of all herhaceous (non-woody)		
4.	3			0.0%		plants, regardless of size, and all other plants less than 3.28		
5 0	4		Ш	0.0%		10 1011		
7.	5			0.0%				
7.	6			0.0%		Five Vegetation Strata:		
8.	7			0.0%				
9.				0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in		
0.	9	0		0.0%		j , ,		
1	10			0.0%				
2.				0.0%				
Woody Vine Stratum (Plot size:)  0 = Total Cover  1	12			0.0%				
1		0 :	= To	otal Cover		, , , , ,		
2.		0		0.0%				
3.								
4			$\vdash$					
4								
6. O O.0% Hydrophytic Vegetation Present? Yes No •								
6	5					Hydrophytic		
= Total Cover	6		Ш	0.0%		Vegetation		
temarks: (Include photo numbers here or on a separate sheet.)		0	= T	otal Cover		Present? 165 C NO C		
	Remarks: (Include photo numbers here or on a separat	e sheet.)						

Soil Sampling Point: 13-1 up

Profile Descri	iption: (Describe	to the depth	needed to documen	t the indic	ator or co	nfirm the	absence of indicators.)		
Depth Matrix Redox Features									
(inches)	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc2	Texture	Remarks	
0-5	2.5Y 4/3	100					Silt Loam		
5-13	2.5Y 6/4	100					Silt Loam		
1 Tymou C Cone	contration D Donle	tion DM_Dad	used Matrix CC Cover	od or Coots	- Cand Cr	nina 21 aa	entions DI — Doro Lining M—N	Antuis	
		etion. KM=Kea	uced Matrix, CS=Cover	ed or Coate	a Sana Gr	ains ²Loc	cation: PL=Pore Lining. M=N		
Hydric Soil I							Indicators for Proble	matic Hydric Soils <sup>3</sup> :	
Histosol (A	•		☐ Dark Surface (	•			2 cm Muck (A10) (I	MLRA 147)	
	pedon (A2)		Polyvalue Belov				Coast Prairie Redox	(A16)	
Black Histi			☐ Thin Dark Surfa		LRA 147, 1	.48)	(MLRA 147,148)	,	
	Sulfide (A4)		Loamy Gleyed				Piedmont Floodplai	n Soils (F19)	
	Layers (A5)		Depleted Matrix				(MLRA 136, 147)		
	k (A10) (LRR N)		Redox Dark Su	. ,	_		☐ Very Shallow Dark		
	Below Dark Surface	(A11)	Depleted Dark		)		Other (Explain in R	emarks)	
Thick Dark	k Surface (A12)		Redox Depress	` '					
Sandy Mu MLRA 147	ck Mineral (S1) (LR ', 148)	R N,	Iron-Manganes MLRA 136)						
Sandy Gle	eyed Matrix (S4)		Umbric Surface	(F13) (ML	RA 136, 12	2)	2		
Sandy Red	dox (S5)		Piedmont Floor	lplain Soils	(F19) (MLF	RA 148)	<sup>3</sup> Indicators of h	ydrophytic vegetation and rology must be present,	
Stripped M	Matrix (S6)		Red Parent Ma	terial (F21)	(MLRA 12	7, 147)		turbed or problematic.	
Restrictive La	ayer (if observed)	):							
Type:		<i>-</i>							
Depth (inch							Hydric Soil Present?	Yes 🔾 No 💿	
	103)								
Remarks:									



Photo File: IN	IG_3397.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°31'13.416"	Lat/Northing: 38°43'11.903"N
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

	Section, Township, Range: S	0.0% / 0.0 atum: NAD 83  No
Addrom (hillslope, terrace, etc.): Flat	Indiform (hillslope, terrace, etc.): Flat	atum: NAD 83  No O
region (LRR or MLRA): MLRA 148 in LRR S Lat.: 38°43'30.864"N Long.: 77°31'23.974"W Datum: MAD I Map Unit Name: Urban land udorthents  climatic/hydrologic conditions on the site typical for this time of year? Yes No No (If no, explain in Remarks.)  Vegetation , or Hydrology   significantly disturbed? Are "Normal Circumstances" present? Yes No Vegetation   , so il   , or Hydrology   naturally problematic? (If needed, explain any answers in Remarks.)  Immary of Findings - Attach site map showing sampling point locations, transects, important features, drophytic Vegetation Present? Yes No within a Wetland? Indicators (minimum of none required; check all that apply) Source Water (A1)	region (LRR or MLRA): MLRA 148 in LRR S	atum: NAD 83  No O
Map Unit Name: Urban land udorthents	Map Unit Name: Urban land udorthents	● No ○
Map Unit Name: Urban land udorthents	Map Unit Name: Urban land udorthents	● No ○
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   Vegetation	climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation  , Soil  , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  Vegetation  , Soil  , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)  mmary of Findings - Attach site map showing sampling point locations, transects, important drophytic Vegetation Present? Yes  No    dric Soil Present? Yes  No    setland Hydrology Present? Yes  No    within a Wetland? Yes  No    ydrology  Vetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface Water (A1)  Sparsely Vegetated Concave Surface Soil Cracks (B6)	
Vegetation	Vegetation	
Vegetation	Vegetation	
Immary of Findings - Attach site map showing sampling point locations, transects, important features, indrophytic Vegetation Present? Yes \ No \( \circ \) No \( \circ \) Is the Sampled Area within a Wetland? Yes \ No \( \circ \) No \( \circ \) Is the Sampled Area within a Wetland? Yes \ No \( \circ \) No \( \circ \) Attach dydrology Present? Yes \ No \( \circ \) No \( \circ \) Is the Sampled Area within a Wetland? Yes \( \circ \) No \( \circ \) Attach dydrology Indicators:    Vegetiand Hydrology Indicators:   Secondary Indicators (minimum of two required)   Surface Voltage Soil Cracks (B6)   Surface Voltage (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Dr	Immary of Findings - Attach site map showing sampling point locations, transects, important vdrophytic Vegetation Present? Yes No variety No vdric Soil Present? Yes No variety No vdric Soil Present? Yes No variety No vdric Soil Present? Yes No vdric Soil Present?	features, etc
Is the Sampled Area within a Wetland?  Ves No   No   Is the Sampled Area within a Wetland?  Ves No   No   No   No   Is the Sampled Area within a Wetland?  Ves No   No   No   No   No   No   No   No	Addrophytic Vegetation Present? Yes No vegetation Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  Is the Sampled Area within a Wetland?  Yes No vegetation Present? Yes No vegetation Present? Yes No vegetation Present? Yes No vegetated Concave Surface Soil Cracks (B6)  Is the Sampled Area within a Wetland?  Yes No vegetation Present? Yes No vegetated Concave Surface Soil Cracks (B6)  Is the Sampled Area within a Wetland?  Yes No vegetation Present? Yes No vegetated Concave Surface Soil Cracks (B6)  Is the Sampled Area within a Wetland?	features, etc
Is the Sampled Area within a Wetland?    Ves   No   Is the Sampled Area within a Wetland?   Ves   No   Is the Sample Area within a Wetland?   Ves   No   Is the Sample Area within a Wetland?   Ves   No   Is the Sample Area within a Wetland?   Ves   No   Is the Sample Area within a Wetland?   Ves   No   Is the Sample Area within a Wetland?   Ves   No   Is the Sample Area within a Wetland?   Ves   No   Is the Sample Area within a Wetland?   Ves   No   Is the Sampl	Additional Present?  Additiona	
Addic Soil Present?  Yes No	rdric Soil Present?  Yes No	
Internation   Present	within a Wetland?  Wetland Hydrology  No   No   No   No   No   No   No   No	
Secondary Indicators   Secondary Indicators (minimum of two required)	Remarks:  Secondary Indicators (minimum of Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  True Aquatic Plants (B14)  Secondary Indicators (minimum of one special concave Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface Surfac	
Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Water (A1)	Secondary Indicators (minimum of Primary Indicators (minimum of one required; check all that apply) Surface Soil Cracks (B6)  Surface Water (A1) True Aquatic Plants (B14) Sparsely Vegetated Concave Surface	
Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Drainage Patterns (B10)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B3)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  True Aquatic Plants (B14)  Sparsely Vegetated Concave Su	
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  True Aquatic Plants (B14)  Sparsely Vegetated Concave Surface (B8)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Other (Explain in Remarks)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Mater-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  True Aquatic Plants (B14)  Sparsely Vegetated Concave Su	two required)
High Water Table (A2)		
Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Depth (inches):  Water Table Present?  Ves No  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Wetland Hydrology Present?  Wetland Hydrology Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):	☐ High Water Table (A2) ☐ Hydrogen Sulfide Odor (C1) ☐ Drainage Patterns (B10)	rface (B8)
Water Marks (B1)		
Sediment Deposits (B2)		
Drift deposits (B3)		
Algal Mat or Crust (B4)		(00)
☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Water Table Present? Yes ○ No ② Depth (inches): ☐ Water Table Present? Yes ○ No ③ Depth (inches): ☐ Wetland Hydrology Present? Yes ○ No ④ Depth (inches): ☐ Wetland Hydrology Present? Yes ○ No ④ Depth (inches): ☐ Wetland Hydrology Present? Yes ○ No ④ Depth (inches): ☐ Wetland Hydrology Present? Yes ○ No ④ Depth (inches): ☐ Wetland Hydrology Present? Yes ○ No ④ Depth (inches): ☐ Yes ○ No ④ Depth (inc		- , . ,
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No ● Depth (inches):  Saturation Present?  Ves No ● Depth (inches):  Wetland Hydrology Present? Yes No ● No ● Depth (inches):	- Otter (Explain in Tentano)	
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Ves No Depth (inches):  Saturation Present?  Ves No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):  Wetland Hydrology Present?		
Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Ves No Depth (inches):  Saturation Present?  Ves No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):		
Surface Water Present? Yes No Depth (inches):	Aquatic Fauna (B13)	
Water Table Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches):		
Saturation Present? Ves No Penth (inches): Wetland Hydrology Present? Yes No Penth (inches):	· · · · · · · · · · · · · · · · · · ·	
battifation Present: Ves ( ) No ( ) Depth (inches):	West and the Province Management of the Province	•
	Description Present:	0 ©
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		

			ominant		Sampling Point: <u>14-1 up</u>
	Absolute	Re		icator	Dominance Test worksheet:
Tree Stratum (Plot size:)	% Cover	Co	over Stat	tus	Number of Dominant Species
1		Ц	0.0%		That are OBL, FACW, or FAC: (A)
2		Н	0.0%		Total Number of Dominant
3		Н	0.0%		Species Across All Strata:1(B)
4		Н	0.0%		Devent of devices Consider
5		Ц			Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)
6		Н			
7					Prevalence Index worksheet:
8		$\Box$	0.0%		Total % Cover of: Multiply by:
Sapling-Sapling/Shrub Stratum (Plot size:)		= TC	otal Cover		0BL species 0 x 1 = 0
1	_		0.0%		FACW species 0 x 2 = 0
2	0		0.0%		FAC species $0 \times 3 = 0$
3	0		0.0%		FACU speciles $\frac{10}{2}$ x 4 = $\frac{40}{2}$
4	0		0.0%		UPL speci es $\frac{0}{x}$ $x = \frac{0}{x}$
5	0		0.0%		Column Totals: 10 (A) 40 (B)
6	0		0.0%		Prevalence Index = $B/A = 4.000$
7	0		0.0%		Hydrophytic Vegetation Indicators:
8	0		0.0%		Rapid Test for Hydrophytic Vegetation
9	0		0.0%		Dominance Test is > 50%
10	0		0.0%		Prevalence Index is ≤3.0 ¹
Shrub Stratum (Plot size:)	:	= To	otal Cover		Morphological Adaptations <sup>1</sup> (Provide supporting
1	0		0.0%		data in Remarks or on a separate sheet)
2.	0		0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
3	0		0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4	0		0.0%		be present, unless disturbed or problematic.
5			0.0%		Definition of Vegetation Strata:
6			0.0%		Four Vegetation Strata:
7.	0		0.0%		Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH),
Herb Stratum (Plot size:)	0	= To	otal Cover		regardless of height.
1. Andropogon virginicus	10	<b>~</b>	100.0% FAC	CU	Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2			0.0%		
3.			0.0%		Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28
4	0		0.0%		ft tall.
5	0		0.0%		Woody vines – Consists of all woody vines greater than 3.28 ft in height.
6	0		0.0%		Five Vegetation Strata:
7	0		0.0%		Tree - Woody plants, excluding woody vines, approximately
8	0		0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9	0		0.0%		diameter at breast height (DBH).
10	0		0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
11	0		0.0%		less than 3 in. (7.6 cm) DBH.
12	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size:)	10	= To	otal Cover		Herb stratum – Consists of all herbaceous (non-woody)
1	0		0.0%		plants, including herbaceous vines, regardless of size, and
2.	0		0.0%		woody species, except woody vines, less than approximately 3 ft (1 m) in height.
3	0		0.0%		Woody vines – Consists of all woody vines, regardless of
4	_		0.0%		height.
5	_		0.0%		H. dan abadia
6			0.0%		Hydrophytic Vegetation
-		= T	otal Cover		Present? Yes No   No
Remarks: (Include photo numbers here or on a separate she	et.)				·
This area is a mowed/maintained lot adjacent to hangar space assoc	-	he a	irport		

Soil Sampling Point: 14-1 up

Profile Descr	iption: (Describe to	the depth nee	ded to documen	t the indic	ator or co	nfirm the	absence of indicators.)		
Depth	Matrix			dox Featu					
(inches)	Color (moist)		Color (moist)	%	Type 1	Loc2	Texture	Remarks	
							-		
				-			-		
				-			-		
<sup>1</sup> Type: C=Cond	centration. D=Depletion	n. RM=Reduced	Matrix, CS=Cover	ed or Coate	ed Sand Gr	ains <sup>2</sup> Loc	ation: PL=Pore Lining. M=N	Matrix	
Hydric Soil I	ndicators:		_	_			Indicators for Proble	ematic Hydric Soils <sup>3</sup> :	
Histosol (A	A1)		Dark Surface (	•			2 cm Muck (A10) (	MLRA 147)	
Histic Epip	pedon (A2)		Polyvalue Belov	w Surface (	S8) (MLRA	147,148)	Coast Prairie Redox		
☐ Black Hist	ic (A3)		Thin Dark Surfa	ace (S9) (M	ILRA 147, 1	.48)	(MLRA 147,148)	(A10)	
Hydrogen	Sulfide (A4)		Loamy Gleyed	Matrix (F2)			Piedmont Floodplai	in Soils (F19)	
Stratified	Layers (A5)		Depleted Matri	x (F3)			(MLRA 136, 147)	,	
2 cm Mucl	k (A10) (LRR N)		Redox Dark Su	rface (F6)			Very Shallow Dark	Surface (TF12)	
☐ Depleted	Below Dark Surface (A:	11)	Depleted Dark	Surface (F7	7)		Other (Explain in R	temarks)	
☐ Thick Darl	k Surface (A12)		Redox Depress	ions (F8)					
Sandy Mu MLRA 147	ck Mineral (S1) (LRR N ', 148)	,	Iron-Manganes MLRA 136)	se Masses (	F12) (LRR	Ν,			
Sandy Gle	yed Matrix (S4)		Umbric Surface	e (F13) (ML	RA 136, 12	2)	2		
Sandy Red	dox (S5)		Piedmont Floor	dplain Soils	(F19) (MLI	RA 148)	Indicators of h	nydrophytic vegetation rology must be present	and -
Stripped N	Matrix (S6)		Red Parent Ma	iterial (F21)	(MLRA 12	7, 147)		turbed or problematic.	-1
	ayer (if observed):								
Type:							Hydric Soil Present?	Yes O No •	
Depth (incl	nes):						,	103 0 110 0	
Remarks:									
Fill material o	f mulitple colors and	textures. No	consistent meas	surable wit	th the clay	/ fill mate	rial.		



Photo File: IN	IG_3399.JPG	Orientation:		-facing
Lat/Long or UTM :	Long/Easting	: 77°31'23.974"	Lat/Northing:	38°43'30.864"
Description:				

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

Datum:   NAD   Datu	Section, Township, Range: S	Matt Neely   Section, Township, Range: S   T   R	westigator(s): Matt Neely   Section, Township, Range: S   T   R
Addrorm (hillslope, terrace, etc.): Hillside Local relief (concave, convex, none): fiat Slope: 5,0% / pregion (LRR or MLRA): MLRA 148 in LRR S Lat.: 38°43'38.068"N Long.: 77°30'38.264"W Datum: NAD I Map Unit Name: Dulles silt loam NWI classification: verification of the site typical for this time of year? Yes No (If no, explain in Remarks.)    Map Unit Name: Dulles silt loam NWI classification: verification of the site typical for this time of year? Yes No (If no, explain in Remarks.)   Vegetation	adform (hillslope, terrace, etc.): Hillside   Local relief (concave, convex, none): filat   Slope:   5,0%   / 2, 2 pregion (LRR or MLRA):   MLRA 148 in LRR S   Lat.: 38°43'38.068'N   Long.:   77°30'38.264"W   Datum:   NAD 83   May Unit Name:   Dulles sit! Ioam   NWI classification:	Addrorm (hillslope, terrace, etc.): Hillside	Addrorm (hilstope, terrace, etc.): Hillside
Map Unit Name   Dulles silt loam   Datum:   NAD	region (LRR or MLRA): MLRA 148 in LRR S	Map Unit Name   Dulles silt loam	region (LRR or MLRA): MLRA 148 in LRR S
Map Unit Name: Dulles silt loam	Map Unit Name: Dulles Silt loam	Map Unit Name: Dulles silt loam	Map Unit Name: Dulles silt loam
Map Unit Name: Dulles slit loam	Map Unit Name: Dulles Silt loam	Map Unit Name: Dulles Silt loam	Map Unit Name: Dulles silt loam
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)	climatic/hydrologic conditions on the site typical for this time of year? Yes No Itino, explain in Remarks.)  Vegetation	climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation  , Soil  , or Hydrology  significantly disturbed?  Are "Normal Circumstances" present?  Yes  No  Vegetation   , Soil  , or Hydrology	Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   No  (If needed, explain any answers in Remarks.)   No  (If needed, explain any answers in Remarks.)
Vegetation	Vegetation	Vegetation	Vegetation
Vegetation	Vegetation	Vegetation	Vegetation
Immary of Findings - Attach site map showing sampling point locations, transects, important features, proposition of the property of the posits (B1)	Immary of Findings - Attach site map showing sampling point locations, transects, important features, et vidrophytic Vegetation Present? Yes	Immary of Findings - Attach site map showing sampling point locations, transects, important features, vidrophytic Vegetation Present? Yes \ No \ vertice \ N	Immary of Findings - Attach site map showing sampling point locations, transects, important features, proposition of the property of the prope
Addrophytic Vegetation Present? Yes No Proposition (C1)	Is the Sampled Area within a Wetland?    Ves	Is the Sampled Area within a Wetland?  Ves No No No Saturation (A3)	Advice Soil Present?  Yes No   No   Is the Sampled Area within a Wetland?  Yes No   No   No   Is the Sampled Area within a Wetland?  Yes No   No   No   No   Is the Sampled Area within a Wetland?  Yes No   No   No   No   No   No   No   No
Is the Sampled Area within a Wetland?   Yes   No	Is the Sampled Area within a Wetland?  Ves No	Addic Soil Present?  Yes No  No  Is the Sampled Area within a Wetland?  No  No  No  No  No  No  No  No  No  N	Is the Sampled Area within a Wetland?  Yes No   No   No   Is the Sampled Area within a Wetland?  Yes No   No   No   No   No   No   No   No
Address of Present?  Yes No   No   No   No   No   No   No   No	retaind Hydrology Present?    Ves   No   Is the Sampled Area within a Wetland?   Ves   No   Is the Sampled	Is the Sampled Area within a Wetland?  Yes No No No Saturation (Area)  No Saturation (Area)  No Saturation (Area)  No Saturation (Area)  No N	retand Hydrology Present?  Yes No ●
Veriand Hydrology Present?   Ves   No   Within a Wetland?   Ves   No   Wetland Hydrology Indicators:   Within a Wetland?   Wetla	temarks:    Vydrology   Vetland Hydrology Indicators:	Vetland Hydrology Present?   Yes   No   No   Within a Wetland?   Yes   No   Within a Wetland?   Yes   No   Wetland Hydrology Present?   Yes   No   Depth (inches):   Depth (inches):   Depth (inches):   Depth (inches):   Depth (inches):   Depth (in	etland Hydrology Present? Yes No No No Within a Wetland?    Vydrology   Netland Hydrology Indicators:   Secondary Indicators (minimum of two required)
Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface (Mark (Mark (B1))   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Inundation Visible on Aerial Imagery (B7)   Mater Table (D2)   Shallow Aquitard (D3)   Microtopographic Relief (D4)   FAC-neutral Test (D5)   Feld Observations:  Surface Water Present? Yes   No  Depth (inches):   Water Table Present? Yes   No  Depth (inches):   Water Table Present? Yes   No  Power Page (C2)   Mater Markel Authors (Mark	Interpretation   Inte	Interest	Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Drainage Patterns (B10)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Sutration Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stuntator (D3)   Stuntator (D3)   Sedimonation Visible on Aerial Imagery (B7)   Shallow Aquitard (D3)   Mater Shallow Aquatic Fauna (B13)   Depth (inches):
Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Drainage Patterns (B10)   Drainage Patterns (B10)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Geomorphic Position (D2)   Inundation Visible on Aerial Imagery (B7)   Mater-Stained Leaves (B9)   Microtopographic Relief (D4)   Aquatic Fauna (B13)   Depth (inches):   Water Table Present?   Yes   No	Secondary Indicators (minimum of two required)   Surface Soil Cracks (86)	Secondary Indicators (minimum of two required)   Surface Soil Cracks (86)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Water Marks (B1)   Presence of Reduced Iron (C4)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   FaC-neutral Test (D5)   Inundation Visible on Aerial Imagery (B7)   Microtopographic Relief (D4)   Aquatic Fauna (B13)   FAC-neutral Test (D5)   Depth (inches):   Wetland Hydrology Present?   Yes   No  Depth (inches):   Yes   Y	Vectiand Hydrology Indicators:   Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Water Marks (B1)   Presence of Reduced Iron (C4)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Sturted or Stressed Plants (D1)   Inundation Visible on Aerial Imagery (B7)   Shallow Aquitard (D3)   Water-Stained Leaves (B9)   Microtopographic Relief (D4)   FAC-neutral Test (D5)   Significate Water Present?   Yes   No
Vetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Indudation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Water Table (Present?  Yes  No  Depth (inches):  Water Algal Hydrology Indicators (minimum of two required)  Secondary Indicators (minimum of two required)  Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Surface Soil Cracks (B6)  Surface Soil Cracks (B6)  Drianage Patterns (B10)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Drianage Patterns (B10)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Drianage Patterns (B10)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  To prianage Patterns (B10)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  To prianage Patterns (B10)  Surface Soil Cracks (B6)  Moss Trim Lines (B10)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  To prianage Patterns (B10)  Saturation (C4)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquatard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Water Alage Water Present?  Yes  No  Depth (inches):  Water Table Present?  Water Alage Water Present?  Water Al	Vetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	Vetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	Vetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Sediment Deposits (B2)  Presence of Reduced Iron (C4)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inon Deposits (B5)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)  Drainage Patterns (B10)  Drainage Patterns (B10)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  FAC-neutral Test (D5)
Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Prif deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Water Table Present?  Yes No  Depth (inches):  Depth (inches):  Water Table Present?  Water Marks (B1)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)	Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Uron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Teld Observations:  Surface Valter Present?  Yes  No  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)
Surface Water (A1)	Surface Water (A1)	Surface Water (A1)	Surface Water (A1)
High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Sediment Deposits (B2)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Water Table (A2)  Hydrogen Sulfide Odor (C1)  Drightogoto (C1)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  FAC-neutral Test (D5)  Water Table Present?  Yes  No  Depth (inches):  Water Hydrology Present?  Water Hydrology Present?  Water Burden Hydrology Present?  Water Burden Hydrology Present?	High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Pesh No  Depth (inches):  Depth (inches):  Drainage Patterns (B10)  Noidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Depth (inches):	High Water Table (A2)	High Water Table (A2)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Sediment Deposits (B2)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Hydrogen Sulfide Odor (C1)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Sield Observations:  Surface Water Present?  Yes  No  Depth (inches):
Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Test Observations:  Urface Water Present?  Water Table Present?  Ves No  Oxidized Rhizospheres along Living Roots (C3)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitand (D1)  Shallow Aquitand (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Water Table Present?  Yes No  Depth (inches):  Water Table Present?  Water Table Present?  Water Bresent?  Water Present?  Water Bresent?  Water	Saturation (A3)	Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Aquatic Fauna (B13)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Depth (inches):  Water Table Present?  Yes  No  Depth (inches):	Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Droposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Saturation Visible on Aerial Imagery (D4)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)
Water Marks (B1)	Water Marks (B1)	Water Marks (B1)	Water Marks (B1)
Sediment Deposits (B2)	Sediment Deposits (B2)	Sediment Deposits (B2)	Sediment Deposits (B2)
Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	Algal Mat or Crust (B4)
☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Sield Observations:  Surface Water Present? Yes ○ No ● Depth (inches): ☐ Water Table Present? Yes ○ No ● Depth (inches): ☐ Depth (in	☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5)	Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Fact-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?	☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Shallow Aquitard (D3) ☐ FAC-neutral Test (D5) ☐ FA
☐ Inundation Visible on Aerial Imagery (B7) ☐ Water-Stained Leaves (B9) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Water Table Present? ☐ Ves  No  Depth (inches): ☐ Water Table Present? ☐ Water Table	☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Steld Observations:  Surface Water Present? Yes ○ No ○ Depth (inches):  Water Table Present? Yes ○ No ○ Depth (inches):  Saturation Present? Yes ○ No ○ Depth (inches):  Saturation Present? Yes ○ No ○ Depth (inches):  Saturation Present? Yes ○ No ○ Depth (inches):	Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Factor of the present of	☐ Inundation Visible on Aerial Imagery (B7) ☐ Water-Stained Leaves (B9) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Water-Stained Leaves (B9) ☐ Depth (inches):
Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Water Table Present?	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Present?	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Surface Water Present?  Microtopographic Relief (D4)  FAC-neutral Test (D5)
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Depth (inches):  Depth (inches):  Water Table Present?  Water Table Present?  Water Table Present?  Water Table Present?	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Seturation Present?  Yes No Depth (inches):  Seturation Present?  Yes No Depth (inches):	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Seturation Present?  Yes No Depth (inches):  Seturation Present?  Yes No Depth (inches):	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Yes No Depth (inches):
Field Observations: Surface Water Present?  Yes No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Depth (inches):  Watland Hydrology Present?  Westland Hydrology Present?	Field Observations: Surface Water Present?  Ves No Depth (inches):  Vater Table Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Field Observations:  Gurface Water Present? Yes No Depth (inches):  Vater Table Present? Yes No Depth (inches):  Gutration Present? Yes No Depth (inches):	Field Observations: Surface Water Present?  Yes No Depth (inches):
Vater Table Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Westland Hydrology Present? Yes No Depth (inches):	Surface Water Present? Yes No Depth (inches):	Furface Water Present?  Yes No Depth (inches):  Vater Table Present?  Yes No Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present? Yes No O	Surface Water Present? Yes No Depth (inches):
Westland Hydrology Procent? Yes ( ) No ( •)	Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No logology No logology Present?	Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No logology No logology Present? Yes No logology Present? Yes No logology Present? Yes No logology Present?	Visit T.H. D. 1992
Westland Hydrology Procent? Yes ( ) No ( •)	Saturation Present?  (includes capillary fringe)  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Saturation Present? (includes capillary fringe)  Yes No Depth (inches):  Wetland Hydrology Present? Yes No O	Water Table Present? Yes V NO V Denth (inches):
	includes capillary frilinger	includes capillary fringe)	Wetland Hydrology Procent3 VSC ( ) NO ( ● )
includes capillary tringer	Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	Pescribe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	includes capillary fringe)

			ominant oecies? _		Sampling Point: <u>15-1 up</u>
	Absolute	Re	el.Strat.	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 30 )	% Cover	_		Status	Number of Dominant Species
1 Carya tomentosa	30	<b>✓</b>	100.0%	UPL	That are OBL, FACW, or FAC: (A)
2	0		0.0%		Total Number of Dominant
3	0	Ш	0.0%		Species Across All Strata: 3 (B)
4	0	Ш	0.0%		
5	0		0.0%		Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)
6	0		0.0%		That are obt., Facw, or Fac.
7	0		0.0%		Prevalence Index worksheet:
8	0		0.0%		Total % Cover of: Multiply by:
Diet size:	30 =	= T	otal Cove	r	0BL speci es0 x 1 =0
Sapling-Sapling/Shrub Stratum (Plot size:			75.00/	LIDI	FACW species x 2 =0
1 Carya tomentosa		<b>✓</b>	75.0%	UPL	FAC species0_ x 3 =0_
2. Cornus florida		<b>✓</b>	25.0%	FACU	FACU species $\frac{5}{}$ x 4 = $\frac{20}{}$
3			0.0%		45 225
4			0.0%		or L species
5	0		0.0%		Column Totals:
6			0.0%		Prevalence Index = $B/A = 4.900$
7	0		0.0%		Hydrophytic Vegetation Indicators:
8	0		0.0%		Rapid Test for Hydrophytic Vegetation
9	0		0.0%		Dominance Test is > 50%
10	0		0.0%		Prevalence Index is ≤3.0 ¹
Shrub Stratum (Plot size:)	20 :	= T	otal Cove	r	Morphological Adaptations <sup>1</sup> (Provide supporting
1	0		0.0%		data in Remarks or on a separate sheet)
2.			0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
3		$\Box$	0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4	_	$\overline{\Box}$	0.0%		be present, unless disturbed or problematic.
5.		$\overline{\Box}$	0.0%		Definition of Vegetation Strata:
-		П	0.0%		Four Vegetation Strata:
6		П	0.0%		Tree stratum – Consists of woody plants, excluding vines, 3
7		ш - т	otal Cove		in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Herb Stratum (Plot size:)				•	Sapling/shrub stratum – Consists of woody plants, excluding
1			0.0%		vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2			0.0%		Herb stratum – Consists of all herbaceous (non-woody)
3			0.0%		plants, regardless of size, and all other plants less than 3.28
4			0.0%		ft tall.   Woody vines – Consists of all woody vines greater than 3.28
5	0	$\sqcup$	0.0%		ft in height.
6	0	$\sqcup$	0.0%		Five Vegetation Strata:
7	0		0.0%		Tree - Woody plants, excluding woody vines, approximately
8	0		0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9	0		0.0%		diameter at breast height (DBH).
10	0		0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
11			0.0%		less than 3 in. (7.6 cm) DBH.
12	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody
Woody Vine Stratum (Plot size:)		= T	otal Cove	r	vines, approximately 3 to 20 ft (1 to 6 m) in height.
	0		0.0%		Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and
1		Н			woody species, except woody vines, less than approximately
2			0.0%		3 ft (1 m) in height.
3			0.0%		Woody vines – Consists of all woody vines, regardless of height.
4			0.0%		
5	0		0.0%		Hydrophytic
6.	0	Ш	0.0%		Vegetation
					Present? Yes V No V
	0	= T	otal Cove	IF.	Tresent.

Soil Sampling Point: 15-1 up

Profile Descr	ription: (De	escribe to	the depth	needed to documen	t the indic	cator or co	onfirm the	absence of indicators.)	•	
Depth		Matrix			dox Featu					
(inches)		(moist)	%	Color (moist)	%	Type 1	Loc2	Texture	Remarks	
0-5	10YR	4/6						Silt Loam		
5-12	7.5YR	4/6						Loam		
	-							-		
-										
	-				-			-		
								-		
<sup>1</sup> Type: C=Con	centration.	D=Depletio	n. RM=Red	uced Matrix, CS=Cover	ed or Coate	ed Sand Gr	ains <sup>2</sup> Loc	ation: PL=Pore Lining. M=I	Matrix	
Hydric Soil 1	Indicators:	ŀ						Indicators for Proble	ematic Hydric Soils <sup>3</sup> :	
Histosol (	(A1)			☐ Dark Surface (	S7)			2 cm Muck (A10) (	-	
Histic Epi	pedon (A2)			Polyvalue Belo	w Surface (	S8) (MLRA	147,148)			
☐ Black Hist	tic (A3)			☐ Thin Dark Surf	ace (S9) (M	ILRA 147, 1	148)	Coast Prairie Redox (MLRA 147,148)	x (A16)	
Hydrogen	n Sulfide (A4	1)		Loamy Gleyed	Matrix (F2)			Piedmont Floodpla	in Soils (F19)	
Stratified	Layers (A5)	)		Depleted Matri	x (F3)			(MLRA 136, 147)	11 3013 (1 13)	
2 cm Muc	k (A10) (LR	R N)		Redox Dark Su	rface (F6)			Very Shallow Dark	Surface (TF12)	
☐ Depleted	Below Dark	Surface (A	11)	Depleted Dark	Surface (F	7)		Other (Explain in F		
	rk Surface (A	-	•	Redox Depress	ions (F8)					
Sandy Mu	uck Mineral (	(S1) (LRR N	l,	☐ Iron-Manganes	se Masses (	F12) (LRR	N,			
MLRA 147		. , .	•	MLRA 136)						
Sandy Gle	eyed Matrix	(S4)		Umbric Surface	e (F13) (ML	.RA 136, 12	22)	3*	is also de les constantes and	
Sandy Re	edox (S5)			Piedmont Floo	dplain Soils	(F19) (MLI	RA 148)	wetiand nydrology must be present,		
Stripped I	Matrix (S6)			Red Parent Ma	iterial (F21)	) (MLRA 12	7, 147)		turbed or problematic.	
Restrictive L	aver (if oh	served):								
Type:	ayei (ii ob	serveu):								
Depth (inc	choc):							Hydric Soil Present?	Yes ○ No •	
	lies)							-		
Remarks:										



Photo File: IM	IG_3401.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°30'38.264"	Lat/Northing: 38°43'38.068"N
Description:			

Photo File: N	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

Section, Township, Range: S T R  If the striptor of the street of the st	bregion (LRR or MLRA): MLRA 148 in LR  oil Map Unit Name: Rowland silt loam  re climatic/hydrologic conditions on the site re Vegetation	typical for this time of year rology significantly prology naturally prology naturally prology No	Section, Township, Rang ocal relief (concave, conv 38°43'38.498"N  ar? Yes  No (2) disturbed? Are "No oblematic? (If nee ampling point local is the Sampled Al	ge: S T R  vex, none): concave Slope: 0.0% / Long.: 77°30'37.29"W Datum: NAD 8  NWI classification:  (If no, explain in Remarks.)  ormal Circumstances" present? Yes No Oeded, explain any answers in Remarks.)  ations, transects, important features,  area Yes No Oeded.
dform (hillslope, terrace, etc.): Floodplain   Local relief (concave, convex, none): Concave   Slope: 0,0% / 0,0   region (LRR or MLRA): MLRA 148 in LRR S	Indiform (hillslope, terrace, etc.): Floodplatoregion (LRR or MLRA): MLRA 148 in LR is Map Unit Name: Rowland silt loam  Is climatic/hydrologic conditions on the site is Vegetation , Soil , or Hydrology , soil , or Hydrology , or Hydrology , or Hydrology , or Hydrology	typical for this time of year rology significantly prology naturally prology naturally prology No	ocal relief (concave, convasted of the concave) are 'Yes No (1) oblematic? (If nee ampling point location is the Sampled A	Long.: 77°30'37.29"W Datum: NAD 8  NWI classification:  (If no, explain in Remarks.)  ormal Circumstances" present? Yes No Oadded, explain any answers in Remarks.)  ations, transects, important features,  Area Yes No O
region (LRR or MLRA): MLRA 148 in LRR S	region (LRR or MLRA): MLRA 148 in LR  Map Unit Name: Rowland silt loam  climatic/hydrologic conditions on the site  Vegetation , Soil , or Hydrologic conditions on the site  Vegetation , Soil , or Hydrologic conditions on the site  vegetation , Soil , or Hydrologic conditions on the site  vegetation , Soil , or Hydrologic conditions on the site  region (LRR or MLRA): A site of the site o	typical for this time of year rology significantly prology naturally prology naturally prology No	38°43'38.498"N  ar? Yes No (interpretation of the complete of	Long.: 77°30'37.29"W  NWI classification:  (If no, explain in Remarks.)  ormal Circumstances" present? Yes  No  eded, explain any answers in Remarks.)  ations, transects, important features,  Area Yes  No  No
Map Unit Name: Rowland slit loam	Map Unit Name: Rowland silt loam  climatic/hydrologic conditions on the site  Vegetation , Soil , or Hydrology  regetation , Soil , or Hydrology  regetation Present? Yes	typical for this time of year rology significantly rology naturally project map showing satisfies No	ar? Yes No (in disturbed? Are "No oblematic? (If nee ampling point located in the Sampled A	NWI classification:  (If no, explain in Remarks.)  ormal Circumstances" present? Yes No ormal Circumstances in Remarks.)  ations, transects, important features,  area Yes No ormal Circumstances in Remarks.)
Map Unit Name: Rowland slit loam	climatic/hydrologic conditions on the site  Vegetation	typical for this time of year rology significantly rology naturally project map showing satisfies No	ar? Yes No (in disturbed? Are "No oblematic? (If nee ampling point located in the Sampled A	NWI classification:  (If no, explain in Remarks.)  ormal Circumstances" present? Yes  No  eded, explain any answers in Remarks.)  ations, transects, important features,  Area Yes  No
Colimatic/hydrologic conditions on the site typical for this time of year? Yes	climatic/hydrologic conditions on the site  Vegetation	rology   significantly rology   naturally prology   naturally prology   significantly prology   site map showing satisfies   No   No   No   No   site map showing satisfies   No   site map showing satisfies   significantly prology   significantly significantly   significantly significantly   significantly significantly   significantly significantly   significantly significantly   significantly significantly   significantly significantl	oblematic? (If nee ampling point loca Is the Sampled A	If no, explain in Remarks.)  ormal Circumstances" present? Yes No ormal Circumstances present? Yes No ormal Circumstances in Remarks.)  ations, transects, important features,  Area Yes No ormalized
Vegetation       , Soll       , or Hydrology       significantly disturbed?       Are "Normal Circumstances" present?       Yes ● No ○         Vegetation       , Soil       , or Hydrology       naturally problematic?       (If needed, explain any answers in Remarks.)         Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc         drophytic Vegetation Present?       Yes ● No ○       Is the Sampled Area within a Wetland?       Yes ● No ○         dric Soil Present?       Yes ● No ○       Is the Sampled Area within a Wetland?       Yes ● No ○         Eland Hydrology Present?         Policy Present?         Policy Present?       Yes ● No ○         Is the Sampled Area within a Wetland?         Yes ● No ○         User Soil Cracks (Bis)         Yes ● No ○         Vegetation Present?         Yes ● No ○         Vegetation Present?         Yes ● No ○         Vegetation Present?         Yes ● No ○         Vegetation Present?       Yes ● No ○         Vegetation Present?       Yes ● No ○         Vegetation Present?       Yes ● No ○	Vegetation , Soil , or Hyde Vegetation , Soil , or Hyde Immary of Findings - Attach si Idrophytic Vegetation Present? Yes Idric Soil Present? Yes Idric Soil Present? Yes Idrand Hydrology Present? Idrand Hydrology Present? Idrand Hydrology Indicators: Idrand Hydrology Indicator	rology   significantly rology   naturally prology   naturally prology   significantly prology   site map showing satisfies   No   No   No   No   site map showing satisfies   No   site map showing satisfies   significantly prology   significantly significantly   significantly significantly   significantly significantly   significantly significantly   significantly significantly   significantly significantly   significantly significantl	oblematic? (If nee ampling point loca Is the Sampled A	ormal Circumstances" present? Yes No Oeded, explain any answers in Remarks.) ations, transects, important features, area Yes No O
Vegetation	Vegetation , Soil , or Hydromary of Findings - Attach signature of Findings - Attach signatur	red; check all that apply)	oblematic? (If nee ampling point loca Is the Sampled A	ations, transects, important features,  Area Yes No
Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc prophytic Vegetation Present? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Wetland Hydrology Present? Yes  No  No  Secondary Indicators:    Vemarks:	Attach si Adrophytic Vegetation Present? Yes Adric Soil Present?  Advic Soil Pres	ite map showing sa	ampling point loca	ations, transects, important features,
Is the Sampled Area within a Wetland?  Ves No No Is the Sampled Area within a Wetland?  Ves No No Is the Sampled Area within a Wetland?  Ves No No No Is the Sampled Area within a Wetland?  Ves No	Adrophytic Vegetation Present?  Adric Soil Present?  Adric Soil Present?  Adric Soil Present?  Adric Soil Present?  Yes  Yes  Yes  Yes  Yes  Yes  Yes  Ye	No N	Is the Sampled A	Area Yes  No
Is the Sampled Area within a Wetland?  Ves No	etland Hydrology Present?  Remarks:  Iydrology  Wetland Hydrology Indicators:  Primary Indicators (minimum of one requir  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Water Marks (B1)	No O No O	Is the Sampled A within a Wetland	1? TES © NO O
Is the Sampled Area within a Wetland?  Ves No	rdric Soil Present?  etland Hydrology Present?  temarks:  Aydrology  Vetland Hydrology Indicators:  Primary Indicators (minimum of one required in the second in the secon	No O	Is the Sampled A within a Wetland	1? TES © NO O
etland Hydrology    Netland Hydrology Indicators:   Secondary Indicators (minimum of two required)   Primary Indicators (minimum of one required; check all that apply)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Sediment Deposits (B3)   Presence of Reduced Iron (C4)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunded or Stressed Plants (D1)   FAC-neutral Test (D5)   Macer Table Present?   Yes   No   Depth (inches):   No   Depth (inches):   Wetland Hydrology Present?   Yes   No   Depth (inches):   Wetland Hydrol	etland Hydrology Present?  Remarks:  Iydrology  Wetland Hydrology Indicators:  Primary Indicators (minimum of one requir  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Water Marks (B1)	No O	within a Wetland	1? TES © NO O
Interest	Acemarks:  Iydrology  Wetland Hydrology Indicators:  Primary Indicators (minimum of one requir  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Water Marks (B1)	red; check all that apply)		
Secondary Indicators (minimum of two required)   Surface Soll Cracks (B6)	Vetland Hydrology Indicators:  Primary Indicators (minimum of one requir  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Water Marks (B1)			
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Water Stained Leaves (B9)  Aquatic Fauna (B13)  Feed Observations:  Furface Water Present?  Yes  No  Depth (inches):  Depth (inches):  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Mos Trim Lines (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Cra	Primary Indicators (minimum of one requirement of some sequence of some se			
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  True Aquatic Plants (B14)  Sparsely Vegetated Concave Surface (B8)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Depth (inches):  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drift deposits (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Dry Season Water Table (C2)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Wetland Hydrology Present?  Yes  No  Depth (inches):  Saturation Present?  Yes  No  Depth (inches):  Saturation Present?  Yes  No  Depth (inches):  De	Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1)			Secondary Indicators (minimum of two required)
High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Presence of Reduced Iron (C4)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Recent Iron Reduction in Tilled Soils (C6)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Hydrogen Sulfide Odor (C1)  Presence of Reduced Iron (C4)  Presence o	High Water Table (A2)  Saturation (A3)  Water Marks (B1)	True Aquatic Plant		
✓ Saturation (A3) Oxidized Rhizospheres along Living Roots (C3) Moss Trim Lines (B16)   Water Marks (B1) Presence of Reduced Iron (C4) Dry Season Water Table (C2)   Sediment Deposits (B2) Recent Iron Reduction in Tilled Soils (C6) ✓ Crayfish Burrows (C8)   Drift deposits (B3) Thin Muck Surface (C7) ✓ Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4) Other (Explain in Remarks) Stunted or Stressed Plants (D1)   Iron Deposits (B5) Geomorphic Position (D2)   Inundation Visible on Aerial Imagery (B7) Shallow Aquitard (D3)   ✓ Water-Stained Leaves (B9) Microtopographic Relief (D4)   Aquatic Fauna (B13) ✓ FAC-neutral Test (D5)   Field Observations: Depth (inches):   Vater Table Present? Yes No   No Depth (inches):   Depth (inches): Wetland Hydrology Present?   Yes No    Pepth (inches): 4   Wetland Hydrology Present?  Yes  No	Saturation (A3) Water Marks (B1)		s (B14)	
Water Marks (B1)	Water Marks (B1)		• ,	
Sediment Deposits (B2)	¬ ` ´			
Drift deposits (B3)	Sediment Deposits (BZ)		` '	
Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Fac-neutral Test (D5)  Depth (inches):  Vater Table Present?  Ves No  Depth (inches):  Sturface Water Present?  Yes No  Depth (inches):  Depth	Drift deposits (B3)		` ,	
☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Shallow Aquitard (D3) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ FAC-neutral Tes	_ ` ` ` ´		• •	
Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Yes No Depth (inches):  A Wetland Hydrology Present?  Yes No Depth (inches):  Wetland Hydrology Present?	Iron Deposits (B5)		,	✓ Geomorphic Position (D2)
Aquatic Fauna (B13)  Field Observations: Surface Water Present?  Water Table Present?  Yes No Depth (inches): Saturation Present? Includes capillary fringe)  Yes No Depth (inches):  Yes No Depth (inches):  Depth (inches):  Yes No Depth (inches):	_			Shallow Aquitard (D3)
Field Observations: Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Yes No Depth (inches):  Depth (inches):  Yes No Depth (inches):	_			
urface Water Present? Yes No Depth (inches):				FAC-neutral Test (D5)
Vater Table Present? Yes No Depth (inches):	\ \ \	Depth (inches):		
Saturation Present?  Yes No Depth (inches): 4  Wetland Hydrology Present? Yes No Depth (inches): 4				
includes capillary fringe)  Yes No Depth (inches): 4		- op ().	Wetlan	nd Hydrology Present? Yes   No
	includes capillary fringe) Yes No			

Shrub Stratum   (Plot size:				ominant		Sampling Point: <u>15-2 wet</u>
1. Asar rubrum			Re	el.Strat.		Dominance Test worksheet:
1. Asec robrown    4	Tree Stratum (Plot size: 30 )	% Cover	Co	over :	Status	Number of Dominant Species
1	1 Acer rubrum	40	✓	100.0%	FAC	<u>'</u>
3	2	0		0.0%		Total North of Devices in
4	3	0		0.0%		
Section	4	0		0.0%		
6.				0.0%		
Sapiling-Sapiling/Shrub Stratum   (Plot size: 15   15   10   10   10   10   10   10		_		0.0%		That Are OBL, FACW, or FAC: 100.0% (A/B)
8				0.0%		Prevalence Index worksheet:
Sapiling-Sapiling/Shrub Stratum   (Plot size: 15   )   40   = Total Cover				0.0%		Total % Cover of: Multiply by:
		40	= T	otal Cover		OBL species 50 x 1 = 50
1. Vascintum commbosum 2. 0 0 0.0% 3. 0 0.0% 4. 0 0 0.0% 5. 0 0.0% 6. 0 0 0.0% 6. 0 0 0.0% 6. 0 0 0.0% 6. 0 0 0.0% 6. 0 0 0.0% 7. 0 0 0.0% 8. 0 0 0.0% 8. 0 0 0.0% 9. 0 0.0% 9. 0 0 0.0% 9. 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 1. Indicators of hydric coll and wetland hydrology muse be present, unless disturbed or problematic. 5. 0 0 0.0% 6. 0 0 0.0% 1. Indicators of hydric coll and wetland hydrology muse be present, unless disturbed or problematic. 9. 0 0.0% 1. Indicators of hydric coll and wetland hydrology muse be present, unless disturbed or problematic. 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus	Sapling-Sapling/Shrub Stratum (Plot size: 15	)				
2.	1 Vaccinium corymbosum	5	<b>V</b>	100.0%	FACW	· · · · · · · · · · · · · · · · · · ·
1	2			0.0%		•
1	3		Ш	0.0%		l ·
0	4			0.0%		
7.	5			0.0%		Column Totals: 95 (A) 180 (B)
8	6			0.0%		Prevalence Index = B/A = 1.895
8	7			0.0%		Hydrophytic Vegetation Indicators:
9	8	0		0.0%		
10.     0   0.0%		_		0.0%		1
Shrub Stratum   (Plot size:     )	10.	0		0.0%		
			= T	otal Cover		
2				0.0%		
3			$\Box$			I —
4.			П			
Definition of Vegetation Strata:   Four Vegetation Strata:   Four Vegetation Strata:   Four Vegetation Strata:   Four Vegetation Strata:   Tree stratum Consists of woody plants, excluding vines in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.   Tree stratum Consists of woody plants, excluding vines in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.   Tree stratum Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) ta   Herb stratum Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3. ft tall.   Woody vines Consists of all woody vines greater than 3.   Woody vines Consists of all woody vines greater than 3.   Tree Stratum Consists of all woody vines greater than 3.   Tree Stratum Consists of all woody vines greater than 3.   Tree Stratum Consists of woody plants, excluding woody vines Consists of all woody vines Greater than 3.   Tree Stratum Consists of woody plants, excluding woody vines Consists of all woody vines Greater than 3.   Tree Stratum Consists of woody plants, excluding woody vines Greater theight (DBH).   Sapling stratum Consists of woody plants, excluding woody vines greater than 3.   Tree Stratum Consists of woody plants, excluding woody vines greater than 3.   Tree Stratum Consists of woody plants, excluding woody vines greater than 3.   Tree Stratum Consists of woody plants, excluding woody vines greater than 3.   Tree Stratum Consists of woody plants, excluding woody vines greater than 3.   Tree Stratum Consists of woody plants, excluding woody vines greater than 3.   Tree Stratum Consists of all woody vines, less than approximate young the stratum Consists of all woody vines, regardless of size, and the stratum Consists of all woody vines, regardless of size, and the stratum Consists of all woody vines, regardless of height.   Tree Stratum Consists of all woody vines woody species, except woody vines, regardless of size, and the stratum Consist			Н			
Company   Com			Н			Definition of Vegetation Strata:
Tree stratum Consists of woody plants, excluding vines in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.  1. Saururus cernuus  1. Saururus cernuus consists of all herbaceous (non-woody) plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height and 3 in. (7.6 cm) DBH.  1. Saurus cernuus consists of all herbaceous (non-woody) plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height and 2 in. (7.6 cm) DBH.  1. Saurus cernuus ce			Н			_
Herb Stratum						
Sapting/shrub stratum	7		Ш			in. (7.6 cm) or more in diameter at breast height (DBH),
1. Saururus cernuus 2.	Herb Stratum (Plot size: 15 )					1 -
3.	1. Saururus cernuus	50	✓	100.0%	OBL	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
3.	2			0.0%		Horb stratum - Consists of all borbassous (non woody)
4				0.0%		plants, regardless of size, and all other plants less than 3.28
5.				0.0%		14 44
7.	5			0.0%		
7	6			0.0%		Five Vegetation Strata:
8.	7	0		0.0%		
9.				0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
10		0		0.0%		1
11.	10.	0		0.0%		
12.				0.0%		
Moody Vine Stratum   (Plot size:)   50	12			0.0%		Shrub stratum – Consists of woody plants, excluding woody
1.			= T	otal Cover		, , ,
2.				0.00%		plants, including herbaceous vines, regardless of size, and
3.			Н			woody species, except woody vines, less than approximately
4	•					
4.						
6. Hydrophytic Vegetation Vegetation Ves						ļ
6	5			0.0%		Hydrophytic
0 = Total Cover   Present? 165 C NO C	6		Ш	0.0%		Vegetation
		0	= T	otal Cover		Present? 165 C NO C
Remarks: (Include photo numbers here or on a separate sheet.)	Remarks: (Include photo numbers here or on a separate	e sheet.)				

Soil Sampling Point: 15-2 wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)											
Depth											
(inches)	Color (moist)	%	Color (moist)	%	Type 1	Loc <sup>2</sup>	Texture	Rem	arks		
0-2	10YR 2/1						Silt Loam				
2-12	N 4/						Silt Loam	gley indic	ates prolonged		
				-			-				
				-		-					
				-			-				
<sup>1</sup> Type: C=Cond	centration, D=Depletion, I	RM=Reduced	Matrix, CS=Cover	ed or Coate	ed Sand Gra	ains <sup>2</sup> Loc	ation: PL=Pore Lining. M=	Matrix			
Hydric Soil I			Hadrix, CS-COVCI	ca or coate	a Sana Gr	JIII3 LOC			3		
Histosol (A		Γ	Dark Surface (	S7)			Indicators for Probl	=	c Soils':		
·	pedon (A2)		Polyvalue Belov	,	SR) (MI DA	147 148)	2 cm Muck (A10)	(MLRA 147)			
Black Hist			Thin Dark Surfa				Coast Prairie Redo	x (A16)			
	Sulfide (A4)		Loamy Gleyed		LNA 177, 1	<del>1</del> 0)	(MLRA 147,148)				
	Layers (A5)		Depleted Matri				Piedmont Floodpla (MLRA 136, 147)	ain Soils (F19)			
			Redox Dark Su	. ,			_ ` ' '	C ( TE1			
2 cm Muck (A10) (LRR N)  Depleted Below Dark Surface (A11)			Depleted Dark		7)		☐ Very Shallow Dark		2)		
	` ,	)	Redox Depress		)		Other (Explain in	Remarks)			
	k Surface (A12)		Iron-Manganes		=12\ /I DD 1	J					
□□ Sandy Mu MLRA 147	ick Mineral (S1) (LRR N, 7, 148)		MLRA 136)	ic iriasses (i	12) (LIKK I	٧,					
	eyed Matrix (S4)		Umbric Surface	e (F13) (ML	RA 136, 12	2)					
Sandy Redox (S5)			Piedmont Floor				<sup>3</sup> Indicators of	ors of hydrophytic vegetation and			
Stripped Matrix (S6)			Red Parent Material (F21) (MLRA 127, 147)				wetland hydrology must be present, unless disturbed or problematic.				
				iceriai (i 21)	(11210112	,, 117,	unicos un	starbea or pro	Diciriadei		
Restrictive La	ayer (if observed):										
Туре:								(2)			
Depth (incl	hes):						Hydric Soil Present?	Yes 💿	No O		
Remarks:											



Photo File: IM	IG_3400.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°30'37.29"W	Lat/Northing: 38°43'38.498"N
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

State: VA   Sampling Point:   16-1 up   Vestigator(s):   Main Neely   Section, Township, Range: S   T   R   R   Main Neely   Section, Township, Range: S   T   R   Main Neely   Section, T	oject/Site: Manassas Regional A	Airport	City/County:	Manassas	Sampling	<b>Date:</b> 25-Oct-16
Are from (hillslope, terrace, etc.): Hillside   Local relief (concave, convex, none): convex   Slope: 7,0% / 4,0 bregion (LRR or MLRA): MLRA 148 in LRR S   Lat.: 38°43′42.946′N   Long.: 77°30′41.291′W   Datum: NAD 83   If Nap Unit Name: Panorama slit loam   NWI classification: set climatic/hydrologic conditions on the site typical for this time of year? Yes • No	plicant/Owner: Manassas Regio	onal Airport		State: VA	Sampling Point:	16-1 up
region (LRR or MLRA): MLRA 148 in LRR S	estigator(s): Matt Neely		Section, Towns	hip, Range: S	т	R
Map Unit Name: Panorama silt loam	dform (hillslope, terrace, etc.)	: Hillside	Local relief (cond	cave, convex, none)	: convex SI	lope: 7.0% / 4.0
Map Unit Name: Panorama silt loam	region (LRR or MLRA): MLF	RA 148 in LRR S	 Lat.: 38°43'42.946"N	Long.: 7	77°30'41.291"W	Datum: NAD 83
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   Vegetation	Map Unit Name: Panorama	silt loam				
Vegetation	climatic/hydrologic condition	s on the site tynical for	this time of year? Yes • N	O (If no expl:	ain in Remarks \	
Vegetation			1		•	Yes   No
Immary of Findings - Attach site map showing sampling point locations, transects, important features, et vidrophytic Vegetation Present? Yes \ No \ vidro soil Present? Yes \ No \ vidro within a Wetland? Yes \ No \ vidro within a Wetland? Yes \ No \ vidro soil Present? Yes \ No \ vidro within a Wetland? Yes \ No \ vidro soil Present? Yes \					-	
Itydrology  Wetland Hydrology Present? Yes No ●  Wetland Hydrology Indicators:  Permarks:    Is the Sampled Area within a Wetland?   Yes No ●  Wetland Hydrology Indicators:    Is the Sampled Area within a Wetland?   Yes No ●	Vegetation ☐ , Soil ☐	, or Hydrology	naturally problematic?	(If needed, explai	in any answers in Rem	arks.)
Is the Sampled Area within a Wetland?  Ves No	ımmary of Findings -	Attach site map	showing sampling poi	nt locations, t	ransects, impor	tant features, etc
within a Wetland?  Ves No   within a Wetland Pydrology Present?  Ves No   wetland Hydrology Present?  Ves No   wetland Hydrology Present?  Ves No   wetland Hydrology Present?  Ves No   pepth (inches):	drophytic Vegetation Present	? Yes O No 💿		-	•	•
Very a company   Ves   No   No   Within a Wetland?   Ves   No   Within a Wetland?   Ves   No   Wetland Hydrology Present?   Ves   No   Depth (inches):   Depth (inches):   Depth (inches):   Depth (inches):   Depth (inches):   Depth (inches):   Dep	dric Soil Present?	Yes O No 💿	Is the S	ampled Area	○ N-	
Netland Hydrology   Netland Hydrology Indicators:		Yes O No 💿			O NO O	
ydrology  Vetland Hydrology Indicators:  Secondary Indicators (minimum of two required)  Surface Water (A1)						
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Teled Observations:  Surface Water Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Wetland Hydrology Present?  Yes  No  Depth (inches):	ydrology					
Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  Hydrogen Sulfide Odor (C1)  Drainage Patterns (B10)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Teld Observations:  Surface Water Present?  Yes  No  Depth (inches):				Sec	condary Indicators (minim	num of two required)
Surface Water (A1)			all that apply)			
Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Find Observations:  Find Observations:  Find Observation Present?  Yes No  Depth (inches):	$\overline{}$					
Water Marks (B1)	High Water Table (A2)	□н	ydrogen Sulfide Odor (C1)		Drainage Patterns (B10)	
Sediment Deposits (B2)	Saturation (A3)	_ o	xidized Rhizospheres along Living I	` '	` '	
Drift deposits (B3)	_ ` ` `		` ,			(C2)
Algal Mat or Crust (B4)	_ ' ' '					
Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No   Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Saturation Present?	_ ` ` ` ′		` ,			• , . ,
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Factor of the present of			ther (Explain in Remarks)			` '
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):		nagery (B7)				.,
Field Observations:  Surface Water Present?  Yes No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Water-Stained Leaves (B9)					(D4)
Surface Water Present? Yes No Depth (inches):	Aquatic Fauna (B13)				FAC-neutral Test (D5)	
Water Table Present? Yes No Depth (inches):		O O				
Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No logology No logology Present? Yes No logology Present? Yes No logology Present? Yes No logology Present?			Depth (inches):			
includes capillary fringe)  Yes No Depth (inches):			Depth (inches):	Wotland Hydrolog	ny Brosont? Vec	No (e)
	VA	s O No 💿	Depth (inches):	wetiand nydrolog	jy Present? 165 C	) <b>110</b> ©
		m gauge, monitoring w	ell, aerial photos, previous insp	ections), if available	2:	

	Sampling Point: 16-1 up			
Tree Stratum (Plot size: 30 )	Absolute % Cover	Re	pecies? el.Strat. Indicat over Status	Dominance rese worksheeti
1 Carya tomentosa	40	<b>V</b>		Number of Dominant Species That are OBL, FACW, or FAC:  (A)
2 Acer rubrum	10		16.7% FAC	
3. Quercus alba	10		16.7% FACU	Total Number of Dominant Species Across All Strata: 2 (B)
4			0.0%	
5			0.0%	Percent of dominant Species
6			0.0%	That Are OBL, FACW, or FAC: 0.0% (A/B)
7	_		0.0%	Prevalence Index worksheet:
8			0.0%	Total % Cover of: Multiply by:
(Diet size) 45	60	= To	otal Cover	0BL species x 1 =0
Sapling-Sapling/Shrub Stratum (Plot size: 15	, -	<b>✓</b>	100.00/	FACW species x 2 =
1 Juniperus virginiana	5			FAC speciles 10 x 3 = 30
2			0.0%	FACU speciles $\frac{15}{10}$ x 4 = $\frac{60}{10}$
3			0.0%	UPL species $\frac{40}{3}$ x 5 = $\frac{200}{3}$
4			0.0%	Column Totals: 65 (A) 290 (B)
5	_		0.0%	
6			0.0%	Prevalence Index = B/A = 4.462
7			0.0%	Hydrophytic Vegetation Indicators:
8			0.0%	Rapid Test for Hydrophytic Vegetation
9				─ Dominance Test is > 50%
10			0.0%	Prevalence Index is ≤3.0 $^1$
Shrub Stratum (Plot size:)		= 10	otal Cover	Morphological Adaptations <sup>1</sup> (Provide supporting
1	0	Ц	0.0%	data in Remarks or on a separate sheet)
2		Ц		Problematic Hydrophytic Vegetation 1 (Explain)
3			0.0%	Indicators of hydric soil and wetland hydrology must
4				be present, unless disturbed or problematic.
5	0		0.0%	Definition of Vegetation Strata:
6	0		0.0%	Four Vegetation Strata:
7	0		0.0%	Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH),
Herb Stratum (Plot size:)	0	= To	otal Cover	regardless of height.
1	0		0.0%	Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2.	_		0.0%	1
3			0.0%	Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28
Δ	0		0.0%	ft tall.
5	0		0.0%	Woody vines – Consists of all woody vines greater than 3.28   ft in height.
6	0		0.0%	Five Vegetation Strata:
7			0.0%	
8			0.0%	Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9.	0		0.0%	diameter at breast height (DBH).
10	0		0.0%	Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
11			0.0%	less than 3 in. (7.6 cm) DBH.
12	0		0.0%	Shrub stratum – Consists of woody plants, excluding woody
Woody Vine Stratum (Plot size:)	0	= To	otal Cover	vines, approximately 3 to 20 ft (1 to 6 m) in height.  Herb stratum – Consists of all herbaceous (non-woody)
	0		0.0%	plants, including herbaceous vines, regardless of size, and
1			0.0%	woody species, except woody vines, less than approximately 3 ft (1 m) in height.
2			0.0%	-  ` ' · ·
3			0.0%	Woody vines – Consists of all woody vines, regardless of height.
4				_
5			0.0%	Hydrophytic
6			0.0%	Vegetation Present? Yes ○ No ●
	0	= 1	otal Cover	Troone.
Remarks: (Include photo numbers here or on a separate she	eet.)			

Soil Sampling Point: 16-1 up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)											
Depth	Depth Matrix Redox Features							_			
(inches)	Color (	(moist)	%_	Color (moist)	%	Type 1	Loc2	Texture	Remarks		
0-5	2.5Y	4/3	100					Silt Loam			
5-13	2.5Y	6/4	100					Silt Loam			
								-			
			-								
	-				-			-			
<sup>1</sup> Type: C=Cond	centration. [	)=Depleti	on. RM=Re	duced Matrix, CS=Cover	ed or Coato	ed Sand Gr	ains ²Loc	ation: PL=Pore Lining. M=1	Matrix		
Hydric Soil I											
Histosol (A				☐ Dark Surface (	S7)			Indicators for Proble	•		
Histic Epip	,			Polyvalue Belov	•	S8) (MLRA	147.148)	2 cm Muck (A10) (	MLRA 147)		
☐ Black Histi				Thin Dark Surf	,	, ,	. ,	Coast Prairie Redox	(A16)		
	Sulfide (A4)	)		Loamy Gleyed			- /	(MLRA 147,148)			
	Layers (A5)	,		Depleted Matri				Piedmont Floodpla (MLRA 136, 147)	in Solis (F19)		
	k (A10) (LRF	R N)		Redox Dark Su	` '			Very Shallow Dark	Surface (TF12)		
	Below Dark		A11)	Depleted Dark		7)		Other (Explain in R	` '		
_ `	k Surface (A	•	/	Redox Depress		•			cinario)		
Sandy Mu	ck Mineral (		N,	Iron-Manganes MLRA 136)	e Masses (	F12) (LRR	N,				
MLRA 147		(C4)		Umbric Surface	(F13) (MI	RA 136, 12	22)				
	yed Matrix (	(54)						<sup>3</sup> Indicators of h	nydrophytic vegetation and		
Sandy Redox (S5) Stripped Matrix (S6)				☐ Piedmont Floodplain Soils (F19) (MLRA 148) ☐ Red Parent Material (F21) (MLRA 127, 147)				rology must be present, turbed or problematic.			
Suipped i	riatrix (30)			Red Parent Ma	iteriai (FZI	) (MLRA 12	7, 147)	uniess dis	turbed or problematic.		
Restrictive La	ayer (if obs	served):									
Type:									v		
Depth (inch	hes):							Hydric Soil Present?	Yes ○ No ●		
Remarks:											



Photo File: IN	IG_3402.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°30'41.291"	Lat/Northing: 38°43'42.946"N
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

Mail New   Manuscase Regional Airport   State   Mail New   Section, Township, Range: S T   R   Mail New   Section, Township, Range: S T   R   Mail New   Section, Township, Range: S T   R   Mail New   Mail Ne	pject/Site: Manassas Regional /	Airport	City/County:	Manassas	Sampling	Date: 25-Oct-16
Addrom (hillslope, terrace, etc.): Hillside   Local relief (concave, convex, none): flat   Slope:   5,0%   / 2,0	plicant/Owner: Manassas Region	onal Airport		State: VA	Sampling Point:	17-2 up
region (LRR or MLRA): MLRA 148 in LRR S	estigator(s): Matt Neely		Section, Towns	hip, Range: S	т	R
Map Unit Name: Arcola slit loam	dform (hillslope, terrace, etc.)	): Hillside	Local relief (cond	cave, convex, none)	: flat <b>S</b>	Slope: 5.0% / 2.9
Map Unit Name: Arcola Silt loam	region (LRR or MLRA): MLF	RA 148 in LRR S	 Lat.: 38°43'42.946"N	Long.: 7	77°30'41.291"W	Datum: NAD 83
climatic/hydrologic conditions on the site typical for this time of year? Yes ● No ○ (If no, explain in Remarks.)  Vegetation						
Vegetation	· —		this time of year? Yes 💿 N	O (If no eynl	_	
Vegetation					•	Yes   No
Immary of Findings - Attach site map showing sampling point locations, transects, important features, et vidrophytic Vegetation Present? Yes			significantly disturbed?		•	
Is the Sampled Area within a Wetland?   Yes	Vegetation, Soil	, or Hydrology $lacksquare$	naturally problematic?	(If needed, expla	in any answers in Ren	narks.)
Is the Sampled Area within a Wetland?    Ves	ımmary of Findings -	Attach site map	showing sampling poi	nt locations, t	ransects, impoi	rtant features, etc
within a Wetland?  Wetland Hydrology Present? Yes No   within a Wetland?  Wetland Hydrology Indicators:  Primary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Surface Water (A1)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Table (A2)  Hydrogen Sulfide Odor (C1)  Sediment Deposits (B2)  Diff deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  In nundation Visible on Aerial Imagery (B7)  Water Table Leaves (B9)  Aquatic Fauna (B13)  Water Table Present?  Water Table Present?  Yes No   Depth (inches):  Wetland Hydrology Present?  Yes No   Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):	drophytic Vegetation Present	? Yes O No 💿				
Within a Wetland?   Yes   No   Wetland Hydrology Present?   Yes   No   Depth (inches):   Wetlan	rdric Soil Present?	Yes O No 💿	Is the S	ampled Area	O N - (a)	
Interpretation   Inte		Yes ○ No ●			∪ No ⊎	
Vetland Hydrology Indicators:    Secondary Indicators (minimum of two required)						
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Torayfish Burrows (C8)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Trough Aquatic Fauna (B13)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):	 lydrology					
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Trink Aquatice (C7)  Algal Mat or Crust (B4)  Trink Deposits (B5)  Unimidation Visible on Aerial Imagery (B7)  Mater-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Wetland Hydrology Present?  Wetland Hydrology Present?  Yes  No  Depth (inches):	Wetland Hydrology Indicators:			Sec	ondary Indicators (minin	num of two required)
Surface Water (A1)			all that apply)			
Saturation (A3)	Surface Water (A1)	Tr	rue Aquatic Plants (B14)			
Water Marks (B1)	High Water Table (A2)	☐ H	ydrogen Sulfide Odor (C1)		Drainage Patterns (B10)	)
Sediment Deposits (B2)	Saturation (A3)	o:	xidized Rhizospheres along Living (	Roots (C3)	` '	
Drift deposits (B3)	_ ` ` `	Pr	esence of Reduced Iron (C4)			: (C2)
Algal Mat or Crust (B4)	_ ` ` ` /			(C6)		
□ Iron Deposits (B5) □ Geomorphic Position (D2) □ Inundation Visible on Aerial Imagery (B7) □ Shallow Aquitard (D3) □ Water-Stained Leaves (B9) □ Microtopographic Relief (D4) □ Aquatic Fauna (B13) □ FAC-neutral Test (D5)  Field Observations: Surface Water Present? Yes □ No □ Depth (inches): Water Table Present? Yes □ No □ Depth (inches): Saturation Present? Yes □ No □ Depth (inches): Saturation Present? Yes □ No □ Depth (inches): Concludes capillary fringe)	_ ` ` ` `		` '			• , , ,
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):		☐ O	ther (Explain in Remarks)			` '
Water-Stained Leaves (B9) Aquatic Fauna (B13)  No Depth (inches): Surface Water Present? Water Table Present?  Water Table Present?  Yes No Depth (inches): Saturation Present? Yes No Depth (inches): Saturation Present? Yes No Depth (inches): Settleration Present? Yes No Settleration Present?		nagery (B7)				<del>-</del> )
Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Water-Stained Leaves (B9)	. , ,			, , ,	(D4)
Surface Water Present? Yes No Depth (inches):	Aquatic Fauna (B13)				FAC-neutral Test (D5)	
Water Table Present? Yes No Depth (inches):		0 0				
Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No o	Surface Water Present? Ye		Depth (inches):			
includes capillary fringe)  Yes No Depth (inches):	Water Table Present? Ye	s O No 💿	Depth (inches):		•	) (A)
includes capillary fringe)	VA	s O No 💿	Depth (inches):	Wetland Hydrolog	y Present? Yes	J No ♥
resolute recorded Bata (stream gauge, monitoring well, deltar protos), previous inspections), il dvalable.	includes capillary minge)			ections) if available	٥٠	
	7000.100 .1000.404 2444 (04.04.	gaage,eeg	3, dea. potoo, p. oousop		•	
	cinario.					
Citation.						
Citatios.						
Citation.						
CHAINS.						
Remarks:						

Tree Stratum (Plot size: 30 )	Absolute % Cover	Re		Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 30	0/a Cover				Dominance rest worksheet.
	70 COVE		over	Status	Number of Dominant Species
1 Juniperus virginiana	40	✓	61.5%	FACU	That are OBL, FACW, or FAC:1(A)
2. Pinus virginiana	20	<b>✓</b>	30.8%	UPL	Total Number of Dominant
3 Nyssa sylvatica	5		7.7%	FAC	Species Across All Strata: 3 (B)
4	0		0.0%		
5	0		0.0%		Percent of dominant Species That Are OBL FACW or FAC: 33.3% (A/B)
6	0		0.0%		That Are OBL, FACW, or FAC: 33.3% (A/B)
7	0		0.0%		Prevalence Index worksheet:
8	0		0.0%		Total % Cover of: Multiply by:
	CE.	= To	otal Cover	•	0BL speci es0 x 1 =0
Sapling-Sapling/Shrub Stratum (Plot size:	_				FACW species x 2 =
1		$\vdash$	0.0%		FAC species 30 x 3 = 90
2		$\perp$	0.0%		FACU species $\frac{40}{3}$ x 4 = $\frac{160}{3}$
3		Ц	0.0%		20 100
4		Ц	0.0%		' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '
5	0	$\sqcup$	0.0%		Column Totals: 90 (A) 350 (B)
6	0	Ш	0.0%		Prevalence Index = $B/A = 3.889$
7	0	Ш	0.0%		Hydrophytic Vegetation Indicators:
8	0		0.0%		Rapid Test for Hydrophytic Vegetation
9	0		0.0%		Dominance Test is > 50%
10	0		0.0%		Prevalence Index is ≤3.0 ¹
Shrub Stratum (Plot size:)		= To	otal Cover	•	Morphological Adaptations <sup>1</sup> (Provide supporting
1	0		0.0%		data in Remarks or on a separate sheet)
2.		$\overline{\Box}$	0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
3		$\bar{\Box}$	0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
	_		0.0%		be present, unless disturbed or problematic.
4			0.0%		Definition of Vegetation Strata:
5		Н	0.0%		Four Vegetation Strata:
6		$\Box$			Tree stratum – Consists of woody plants, excluding vines, 3
7	0_	_	0.0%		in. (7.6 cm) or more in diameter at breast height (DBH),
Herb Stratum (Plot size: 15	:		otal Cover		regardless of height. Sapling/shrub stratum – Consists of woody plants, excluding
1_Microstegium vimineum	25	<b>✓</b>	100.0%	FAC	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2	0		0.0%		Herb stratum – Consists of all herbaceous (non-woody)
3			0.0%		plants, regardless of size, and all other plants less than 3.28
4	0		0.0%		ft tall. Woody vines – Consists of all woody vines greater than 3.28
5	0		0.0%		ft in height.
6	0		0.0%		Five Vegetation Strata:
7	0		0.0%		Tree - Woody plants, excluding woody vines, approximately
8	0		0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9.	0		0.0%		diameter at breast height (DBH).
10	0		0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
11			0.0%		less than 3 in. (7.6 cm) DBH.
12	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody
		= To	otal Cover		vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size:)	0		0.0%		Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and
1					woody species, except woody vines, less than approximately
2	0_	$\vdash$	0.0%		3 ft (1 m) in height.
3		$\perp$	0.0%		Woody vines – Consists of all woody vines, regardless of height.
4			0.0%		
5	0		0.0%		Hydrophytic
6	0		0.0%		Vegetation Vac O Na O
	0	= T	otal Cove	r	Present? Yes O NO O
					•

Soil Sampling Point: 17-2 up

Profile Descr	iption: (Describe to	the depth i	needed to documen	t the indic	cator or co	onfirm the	absence of indicators.)		
Depth	Matrix			lox Featu					
(inches)	Color (moist)		Color (moist)	%	Type 1	Loc2	Texture	Rem	arks
0-12	5YR 4/6	100					Clay Loam		
				-			-		
						-	,		
							-		
<sup>1</sup> Type: C=Cond	rentration D=Denletic	n RM=Redu	ced Matrix CS=Cover	ed or Coate	ed Sand Gr	ains 21 oc	ation: PL=Pore Lining. M=I	Matrix	
Hydric Soil I		on. Ki-i-kedu	ced Matrix, CS=Cover	ed of coats	a Sana Gi	airis Loc			2
Histosol (A			Dark Surface (	57)			Indicators for Proble	_	c Soils <sup>3</sup> :
· ·	pedon (A2)		Polyvalue Belov	•	CO) (MI DA	147 140)	2 cm Muck (A10) (	MLRA 147)	
Black Histi			Thin Dark Surfa				Coast Prairie Redox	x (A16)	
	Sulfide (A4)					.40)	(MLRA 147,148)		
	Layers (A5)		Loamy Gleyed				Piedmont Floodpla	in Soils (F19)	
	k (A10) (LRR N)		Depleted Matri:  Redox Dark Su				(MLRA 136, 147)	o ( (TE4)	.,
			Depleted Dark	` ,	7)		☐ Very Shallow Dark		2)
	Below Dark Surface (A	A11)	Redox Depress		′)		Other (Explain in F	Remarks)	
	k Surface (A12)		☐ Iron-Manganes		F12\ (I RR I	N			
MLRA 147	ck Mineral (S1) (LRR i , 148)	N,	MLRA 136)	c masses (	1 12) (LICI	ν,			
☐ Sandy Gle	yed Matrix (S4)		Umbric Surface	e (F13) (ML	.RA 136, 12	.2)	2		
Sandy Red	dox (S5)		☐ Piedmont Floor	dplain Soils	(F19) (MLI	RA 148)	<sup>3</sup> Indicators of I	nydrophytic ve rology must b	getation and
Stripped N	latrix (S6)		Red Parent Ma	terial (F21)	(MLRA 12	7, 147)		turbed or prol	
Postrictive I	ayer (if observed):								
Type:	ayer (ii observeu).								
Depth (incl							Hydric Soil Present?	Yes 🔾	No 💿
	165)								
Remarks:									



Photo File: IN	IG_3403.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting:	77°30'41.291"	Lat/Northing: 38°43'42.946"N
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

ibregion (LRR or MLRA): MLRA 148  ill Map Unit Name: Hatboro silt loam  re climatic/hydrologic conditions on the re Vegetation , Soil , or re Vegetation , Soil , or  summary of Findings - Attace  Hydrophytic Vegetation Present? Ye  Hydric Soil Present?	Illside in LRR S Lat e site typical for this time o r Hydrology Significa r Hydrology naturall ch site map showing es No	f year? Yes No (If no antly disturbed? Are "Norma y problematic? (If needed,	S T R	/
Indform (hillslope, terrace, etc.): Hill bregion (LRR or MLRA): MLRA 148 If Map Unit Name: Hatboro silt loam e climatic/hydrologic conditions on the e Vegetation , Soil , or e Vegetation , Soil , or ummary of Findings - Attacydrophytic Vegetation Present?	e site typical for this time or Hydrology anaturall ch site map showing so No	Local relief (concave, convex,  t.: 38°43'51.898"N Lo  f year? Yes No (If no antly disturbed? Are "Norma y problematic? (If needed,	none): flat  Slope: 0.0%  NWI classification:  o, explain in Remarks.)  al Circumstances" present?  Yes  No  No  No  No  No  No  No  No  No  N	AD 83
region (LRR or MLRA): MLRA 148  Map Unit Name: Hatboro silt loam  climatic/hydrologic conditions on the  Vegetation , Soil , on  Vegetation , Soil , on  Immary of Findings - Attact  drophytic Vegetation Present? Year  ydric Soil Present?	e site typical for this time or Hydrology anaturall ch site map showing so No	t.: 38°43'51.898"N Lo  f year? Yes No (If no ently disturbed? Are "Norma y problematic? (If needed,	ong.: 77°30'47.144"W  NWI classification:  o, explain in Remarks.)  al Circumstances" present?  Yes  No , explain any answers in Remarks.)	AD 83
Map Unit Name: Hatboro silt loam  climatic/hydrologic conditions on the  Vegetation , Soil , on  Vegetation , Soil , on  mmary of Findings - Attace  drophytic Vegetation Present? Year  dric Soil Present?	e site typical for this time or Hydrology Significar Hydrology naturall ch site map showing so No	f year? Yes No (If no nntly disturbed? Are "Normay problematic? (If needed,	NWI classification:  o, explain in Remarks.)  al Circumstances" present? Yes No , explain any answers in Remarks.)	0
Map Unit Name: Hatboro silt loam  climatic/hydrologic conditions on the  Vegetation , Soil , or  Vegetation , Soil , or  mmary of Findings - Attace  drophytic Vegetation Present? Ye  dric Soil Present?	e site typical for this time or Hydrology Significar Hydrology naturall ch site map showing so No	f year? Yes No (If no nntly disturbed? Are "Normay problematic? (If needed,	NWI classification:  o, explain in Remarks.)  al Circumstances" present? Yes No , explain any answers in Remarks.)	0
climatic/hydrologic conditions on the Vegetation , Soil , on Vegetation , Soil , on Immary of Findings - Attace Idrophytic Vegetation Present? Yes	r Hydrology    significar r Hydrology    naturall ch site map showing es    No    o	antly disturbed? Are "Norma y problematic? (If needed,	o, explain in Remarks.)  al Circumstances" present? Yes   No , explain any answers in Remarks.)	
Vegetation , Soil , on Vegetation , Soil , on Vegetation , Soil , on Immary of Findings - Attacked Att	r Hydrology    significar r Hydrology    naturall ch site map showing es    No    o	antly disturbed? Are "Norma y problematic? (If needed,	al Circumstances" present? Yes No , explain any answers in Remarks.)	
Vegetation , Soil , on , on , soil , on , o	r Hydrology	y problematic? (If needed,	, explain any answers in Remarks.)	
ummary of Findings - Attac ydrophytic Vegetation Present? Ye ydric Soil Present? Ye	ch site map showing			
ydrophytic Vegetation Present? Ye ydric Soil Present? Ye	es O No 💿	g sampling point locatio	ons, transects, important feature	
ydric Soil Present?				es, etc
rdric Soil Present?	O O			
V	es 🔾 No 🖲	Is the Sampled Area		
etialiu riyurology Presentr	es O No 💿	within a Wetland?	Yes ○ No •	
lemarks:				
lydrology				
Vetland Hydrology Indicators:				
Primary Indicators (minimum of one	required: check all that ann	ulv)	Secondary Indicators (minimum of two required	<u>d)</u>
Surface Water (A1)	True Aquatic I		☐ Surface Soil Cracks (B6) ☐ Sparsely Vegetated Concave Surface (B8)	
☐ High Water Table (A2)	Hydrogen Sulf	` '	Drainage Patterns (B10)	
Saturation (A3)		ospheres along Living Roots (C3)	Moss Trim Lines (B16)	
Water Marks (B1)	Presence of R	educed Iron (C4)	Dry Season Water Table (C2)	
Sediment Deposits (B2)	Recent Iron R	eduction in Tilled Soils (C6)	Crayfish Burrows (C8)	
Drift deposits (B3)	☐ Thin Muck Sui	• ,	Saturation Visible on Aerial Imagery (C9)	
Algal Mat or Crust (B4) Iron Deposits (B5)	U Other (Explain	n in Remarks)	☐ Stunted or Stressed Plants (D1) ☐ Geomorphic Position (D2)	
Inundation Visible on Aerial Imagery (	(B7)		Shallow Aquitard (D3)	
Water-Stained Leaves (B9)			Microtopographic Relief (D4)	
Aquatic Fauna (B13)			FAC-neutral Test (D5)	
Field Observations:	(2)			
Surface Water Present? Yes	No Depth (inche	es):		
Water Table Present? Yes	No   Depth (inche	es):	vidralasis Brasanta Ves No 🔍	
VAC	No   Depth (inche	es):	ydrology Present? Tes O NO O	
	ge, monitoring well, aerial p	hotos, previous inspections), if av	vailable:	
	No Depth (inche	Wetland Hy	,	No •

			ominant oecies? _		Sampling Point: <u>18-1 up</u>
	Absolute	Re	el.Strat.	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 30 )	% Cover		over	Status	Number of Dominant Species
1_ Juglans nigra	10	<b>✓</b>	50.0%	FACU	That are OBL, FACW, or FAC:1(A)
2 Ailanthus altissima	10	<b>V</b>	50.0%	FACU	Total Number of Dominant
3	0		0.0%		Species Across All Strata:6(B)
4	0		0.0%		
5	0		0.0%		Percent of dominant Species That Are OBL FACW or FAC: 16.7% (A/B)
6	0		0.0%		That Are OBL, FACW, or FAC: 16.7% (A/B)
7	0		0.0%		Prevalence Index worksheet:
8	0		0.0%		Total % Cover of: Multiply by:
Sanling-Sanling/Shrub Stratum (Plot size: 15	20:	= T	otal Cove	r	0BL species0 x 1 =0
			<b>50.00</b> /	E4.011	FACW species 0 x 2 = 0
1 Juglans nigra		<b>✓</b>	50.0%	FACU	FAC species
2. Quercus velutina		<b>✓</b>	50.0%	UPL	FACU species $35 \times 4 = 140$
3			0.0%		10 50
4			0.0%		or species X 5 -
5			0.0%		Column Totals: 120 (A) 415 (B)
6			0.0%		Prevalence Index = $B/A = \underline{3.458}$
7		Ц	0.0%		Hydrophytic Vegetation Indicators:
8	0	Ш	0.0%		Rapid Test for Hydrophytic Vegetation
9	0		0.0%		Dominance Test is > 50%
0	0		0.0%		Prevalence Index is ≤3.0 ¹
Shrub Stratum (Plot size:)		= T	otal Cove	r	Morphological Adaptations <sup>1</sup> (Provide supporting
1	0		0.0%		data in Remarks or on a separate sheet)
2.	0		0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
3			0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4	_	$\overline{\Box}$	0.0%		be present, unless disturbed or problematic.
5.		$\Box$	0.0%		Definition of Vegetation Strata:
		П	0.0%		Four Vegetation Strata:
6	0	$\Box$	0.0%		Tree stratum – Consists of woody plants, excluding vines, 3
7		 _ T/	otal Cove		in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Herb Stratum (Plot size: 15 )					Sapling/shrub stratum – Consists of woody plants, excluding
1. Microstegium vimineum		$\checkmark$	100.0%	FAC	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2			0.0%		Herb stratum – Consists of all herbaceous (non-woody)
3		$\sqcup$	0.0%		plants, regardless of size, and all other plants less than 3.28
4			0.0%		ft tall.   Woody vines – Consists of all woody vines greater than 3.28
5	0		0.0%		ft in height.
6	0		0.0%		Five Vegetation Strata:
7	0	$\sqcup$	0.0%		Tree - Woody plants, excluding woody vines, approximately
8	0	Ш	0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9	0		0.0%		diameter at breast height (DBH).
0	0		0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
1	0		0.0%		less than 3 in. (7.6 cm) DBH.
2	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size: 15 )	75:	= To	otal Cove	r	Herb stratum – Consists of all herbaceous (non-woody)
1 Lonicera japonica	5	<b>v</b>	100.0%	FACU	plants, including herbaceous vines, regardless of size, and
	0	$\overline{\Box}$	0.0%	77.00	woody species, except woody vines, less than approximately 3 ft (1 m) in height.
2			0.0%		` '
3			-		Woody vines – Consists of all woody vines, regardless of height.
4			0.0%		
5			0.0%		Hydrophytic
	0	Ш	0.0%		Vegetation Present? Yes ○ No ●
6	5		otal Cove		Present? Yes UNO U

Soil Sampling Point: 18-1 up

Profile Description: (Describe to the de	epth needed to documer	t the indicator or o	onfirm the	absence of indicators.)	•
Depth <u>Matrix</u>		dox Features			
(inches) Color (moist) %	Color (moist)		Loc2	Texture	Remarks
0-12 10YR 4/6				Clay Loam	
				-	
				P	
		-		•	
				-	
				-	
<sup>1</sup> Type: C=Concentration. D=Depletion. RM=	=Reduced Matrix CS=Cove	red or Coated Sand G	rains 21 oc	ation: PI =Pore Lining M=I	Matrix
	-Reduced Matrix, CS-Cove	rea or coatea sana c	rairis Loc		
Hydric Soil Indicators:	Dark Surface (	(C7)		Indicators for Proble	ematic Hydric Soils <sup>3</sup> :
Histosol (A1) Histic Epipedon (A2)		,57) w Surface (S8) (MLR.	\ 147 140\	2 cm Muck (A10) (	(MLRA 147)
Black Histic (A3)	_ ′	ace (S9) (MLRA 147,	, ,	Coast Prairie Redox	x (A16)
Hydrogen Sulfide (A4)			140)	(MLRA 147,148)	
Stratified Layers (A5)	Loamy Gleyed Depleted Matr			Piedmont Floodpla	in Soils (F19)
2 cm Muck (A10) (LRR N)	Redox Dark Su	` '		(MLRA 136, 147)	0.5 (7740)
	Depleted Dark	` '		☐ Very Shallow Dark	, ,
Depleted Below Dark Surface (A11)	Redox Depress			Other (Explain in F	Remarks)
Thick Dark Surface (A12)		se Masses (F12) (LRF	N		
Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)	MLRA 136)	se 1103363 (1 12) (LIV	IV,		
Sandy Gleyed Matrix (S4)	Umbric Surfac	e (F13) (MLRA 136, 1	22)		
Sandy Redox (S5)	☐ Piedmont Floo	dplain Soils (F19) (M	RA 148)	<sup>3</sup> Indicators of I	hydrophytic vegetation and
Stripped Matrix (S6)		aterial (F21) (MLRA 1			rology must be present, sturbed or problematic.
			. ,		
Restrictive Layer (if observed):					
Type:				Hydric Soil Present?	Yes ○ No •
Depth (inches):				nyuric son Present?	Yes ○ No ●
Remarks:					
soils in this area consist of heavily com	pacted coarse fill materi	als most likely due	to constru	ction fill for the sewer lin	e right of way.



Photo File: IN	IG_3405.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting:	77°30'47.144"	Lat/Northing: 38°43'51.898
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

region (LRR or MLRA): MLRA 148 in LRR S	plicant/Owner: Manassas Regionerstigator(s): Matt Neely			Sampling Date: 26-Oct-16
dform (hillslope, terrace, etc.): Swale	restigator(s): Matt Neely	nal Airport	State: V	Sampling Point: 18-2 wet
region (LRR or MLRA): MLRA 148 in LRR S			Section, Township, Range:	S T R
Map Unit Name: Hatboro silt loam	dform (hillslope, terrace, etc.):	: Swale	Local relief (concave, convex,	<b>none):</b> concave <b>Slope:</b> 0.0% /0.0
Map Unit Name:   Hatboro silt loam	region (LRR or MLRA): MLR	Lat.	: 38°43'51.898"N <b>L</b> o	ong.: 77°30'47.144"W
Colimatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)   Vegetation   , Soil   , or Hydrology   significantly disturbed?	-			
Vegetation			voor? Vec ( No ( /tf.n.	
Vegetation				
Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc drophytic Vegetation Present? Yes No Is the Sampled Area within a Wetland? Yes No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No	vegetation, Soil	, or Hydrology   significan	itly disturbed? Are "Norma	al Circumstances" present?
Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   No   No   No   No   No   N	Vegetation, Soil	, or Hydrology 🔲 naturally	problematic? (If needed	, explain any answers in Remarks.)
Advaprophytic Vegetation Present? Yes No No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No No No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No	ımmarv of Findings - /	Attach site map showing	sampling point location	ons, transects, important features, etc
Is the Sampled Area within a Wetland?  Ves No				, , ,
within a Wetland?  Yes No within a Wetland?  Yes No within a Wetland?  Wetland Hydrology Present?  Yes No within a Wetland?  Yes No within a Wetland?  Wetland Hydrology Indicators:  Primary Indicators (minimum of one required: check all that apply)  Surface Soil Cracks (B6)  Surface Soil Cracks (B6)  Surface Soil Cracks (B6)  Would Surface Soil Cracks (B6)  Surface Soil Cracks (B6)			T. 11. C	
Interest			Is the Sampled Area within a Wetland?	Yes   No
Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)	etland Hydrology Present?			
Wetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Water Marks (B1)  Presence of Reduced Iron (C4)  Drift deposits (B2)  Algal Mat or Crust (B4)  Drin Deposits (B5)  Innudation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Water-Stained Leaves (B9)  Water-Stained Leaves (B9)  Water Present?  Yes  No  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Surface Soil Cracks (B6)  Surface Soil Cracks (B8)  Surface Soil Cracks (B8)  Surface (C7)  Drianage Patterns (B10)  Moss Trim Lines (B16)  Drin Spason Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Version Versent?  Yes  No  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  O  Wetland Hydrology Present?  Yes  No  No  Depth (inches):  Depth (inches				
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Drainage Patterns (B10)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Yes No  Depth (inches):	lydrology			
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  True Aquatic Plants (B14)  Sparsely Vegetated Concave Surface (B8)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Teled Observations:  Surface Water Present?  Yes  No  Depth (inches):  Depth (inche	Vetland Hydrology Indicators:			Secondary Indicators (minimum of two required)
High Water Table (A2)	Primary Indicators (minimum c	of one required; check all that apply	/)	Surface Soil Cracks (B6)
Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Presence of Reduced Iron (C4)  Presence of Reduced Iron (C4)  Recent Iron Reduction in Tilled Soils (C6)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Aquatic Fauna (B13)  Depth (inches):  Depth (	Surface Water (A1)	True Aquatic Pl	ants (B14)	
Water Marks (B1)	_ ` ` /		` '	
Sediment Deposits (B2)	¬ ` ´			
Drift deposits (B3)	_ ' '		` ,	
Algal Mat or Crust (B4)	_		` ,	
☐ Iron Deposits (B5) ☐ Shallow Aquitard (D3) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Water-Stained Leaves (B9) ☐ Depth (inches): ☐ Depth (inches): ☐ Depth (inches): ☐ Water Table Present? Yes No Depth (inches): ☐ Depth (inches): ☐ Wetland Hydrology Present? Yes No Depth (inches): ☐ O	_ ` ` ` ´		• •	
Inundation Visible on Aerial Imagery (B7)  ✓ Water-Stained Leaves (B9)  Aquatic Fauna (B13)  ✓ FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches): 2  Water Table Present?  Yes No Depth (inches): 2  Staturation Present?  Yes No Depth (inches): 0  Wetland Hydrology Present?  Yes No Depth (inches): 0		Other (Explain	iii Keiliaiks)	
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches): 2  Water Table Present?  Yes No Depth (inches): 2  Saturation Present?  Yes No Depth (inches): 0  Wetland Hydrology Present? Yes No Depth (inches): 0	Inundation Visible on Aerial Im	nagery (B7)		
Field Observations:  Sourface Water Present? Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):  Solutration Present? Yes No Depth (inches):  Includes capillary fringe) Yes No Depth (inches):	✓ Water-Stained Leaves (B9)			
urface Water Present?  Yes No Depth (inches): 2  Vater Table Present?  Atturation Present?  Yes No Depth (inches):	Aquatic Fauna (B13)			FAC-neutral Test (D5)
Vater Table Present? Yes No Depth (inches):		<b>A</b> O		
iaturation Present?  Yes No Depth (inches): 0  Wetland Hydrology Present? Yes No No Depth (inches): 0	Vac		s): <u>2</u>	
includes capillary fringe)  Yes No Depth (inches): 0		5 O No 🕙 Depth (inches	s):	Vec ( No )
			Wetland H	ydrology Present? Tes 🙂 NO 🔾
	Vater Table Present? Yes Saturation Present?	; • No O Depth (inches	s): 0	
	Water Table Present? Yes Saturation Present? Yes includes capillary fringe)			vailable:
emarks:	Water Table Present? Saturation Present? (includes capillary fringe) Describe Recorded Data (stream			vailable:
emarks:	Water Table Present? Saturation Present? includes capillary fringe) Describe Recorded Data (stream			vailable:
emarks:	Vater Table Present? Yes Caturation Present? Yes includes capillary fringe) Describe Recorded Data (stream			vailable:
emarks:	Water Table Present? Saturation Present? includes capillary fringe) Pescribe Recorded Data (stream			vailable:
emarks:	Water Table Present? Saturation Present? includes capillary fringe) Describe Recorded Data (stream			vailable:
emarks:	Water Table Present? Saturation Present? includes capillary fringe) Pescribe Recorded Data (stream			vailable:
emarks:	Water Table Present? Saturation Present? (includes capillary fringe) Describe Recorded Data (stream			vailable:
emarks:	Water Table Present? Saturation Present? (includes capillary fringe) Describe Recorded Data (stream			vailable:
emarks:	Water Table Present? Saturation Present? (includes capillary fringe)  Yes			vailable:
emarks:	Water Table Present? Saturation Present? (includes capillary fringe) Describe Recorded Data (stream			vailable:
emarks:	Water Table Present? Saturation Present? (includes capillary fringe) Describe Recorded Data (stream			vailable:

			ominant oecies? —		Sampling Point: 18-2 wet
Tree Stratum (Plot size:)	Absolute % Cover	Re	el.Strat. 1	Indicator Status	Dominance Test worksheet:
1	0		0.0%		Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)
2			0.0%		
3			0.0%		Total Number of Dominant Species Across All Strata: 3 (B)
4			0.0%		Species Across Air Strata.
5.			0.0%		Percent of dominant Species
6		$\overline{\Box}$	0.0%		That Are OBL, FACW, or FAC: 100.0% (A/B)
7			0.0%		Prevalence Index worksheet:
8		$\overline{\Box}$	0.0%		Total % Cover of: Multiply by:
• •		 = To	otal Cover		0BL species 15 x 1 = 15
Sapling-Sapling/Shrub Stratum (Plot size: 15	)	_			FACW species $15 \times 2 = 30$
1 Salix nigra	15	<b>✓</b>	100.0%	OBL	
2			0.0%		
3	0		0.0%		FACU speci es $0 \times 4 = 0$
4	0		0.0%		UPL species $0 \times 5 = 0$
5	0		0.0%		Column Totals: <u>55</u> (A) <u>120</u> (B)
6	0		0.0%		Prevalence Index = $B/A = 2.182$
7	0		0.0%		Hydrophytic Vegetation Indicators:
8	0		0.0%		Rapid Test for Hydrophytic Vegetation
9	0		0.0%		✓ Dominance Test is > 50%
10	0		0.0%		✓ Prevalence Index is ≤3.0 <sup>1</sup>
		= To	otal Cover		
Shrub Stratum (Plot size:)	0		0.0%		Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
1		П	0.0%		Problematic Hydrophytic Vegetation 1 (Explain)
2		$\Box$	0.0%		
3		Н	0.0%		Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
4		$\vdash$			Definition of Vegetation Strata:
5		Н	0.0%		Four Vegetation Strata:
6			0.0%		Tree stratum – Consists of woody plants, excluding vines, 3
7		Ш	0.0%		in. (7.6 cm) or more in diameter at breast height (DBH),
Herb Stratum (Plot size: 15 )	:	= To	otal Cover		regardless of height.
1. Microstegium vimineum	25	✓	62.5%	FAC	Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2. Boehmeria cylindrica	15	✓	37.5%	FACW	Herb stratum – Consists of all herbaceous (non-woody)
3			0.0%		plants, regardless of size, and all other plants less than 3.28
4			0.0%		ft tall.
5			0.0%		Woody vines – Consists of all woody vines greater than 3.28 ft in height.
6			0.0%		Five Vegetation Strata:
7	0		0.0%		I -
8	0		0.0%		Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9	0		0.0%		diameter at breast height (DBH).
10			0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
11			0.0%		less than 3 in. (7.6 cm) DBH.
12			0.0%		Shrub stratum – Consists of woody plants, excluding woody
	40 :	= To	otal Cover		vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size:)	0	$\Box$	0.00/		Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and
1			0.0%		woody species, except woody vines, less than approximately
2		Н			3 ft (1 m) in height.
3		Н	0.0%		Woody vines – Consists of all woody vines, regardless of height.
4			0.0%		
5			0.0%		Hydrophytic
6			0.0%		Vegetation Veg (A) No (
	0	= T	otal Cover		Present? Yes S NO C
Remarks: (Include photo numbers here or on a separat	te sheet.)				

Soil Sampling Point: 18-2 wet

Profile Descri	iption: (Describe to	the depth r	eeded to documen	t the indic	cator or co	onfirm the	absence of indicators.)		
Depth	Matrix			lox Featu					
(inches)	Color (moist)		Color (moist)	%	Type 1	Loc2	Texture	Ren	narks
0-10	10YR 4/1	100					Silt Loam		
							-		
							-		
						-	,		
							-		
<sup>1</sup> Type: C=Cond	rentration D=Denletic	n RM=Redu	red Matrix CS=Cover	ed or Coate	ed Sand Gr	ains 21 oc	ation: PL=Pore Lining. M=I	Matrix	
Hydric Soil I		on. Ki-i-Kedu	ced Matrix, CS=Cover	ed of coats	a Sana Gi	airis Loc			2
Histosol (A			Dark Surface (	57)			Indicators for Proble	_	c Soils <sup>3</sup> :
`	pedon (A2)		Polyvalue Belov	•	CO) (MI DA	147 140)	2 cm Muck (A10) (	MLRA 147)	
Black Histi			Thin Dark Surfa				Coast Prairie Redox	x (A16)	
	Sulfide (A4)		Loamy Gleyed			.40)	(MLRA 147,148)		
	Layers (A5)		✓ Depleted Matri				Piedmont Floodpla	in Soils (F19)	
	k (A10) (LRR N)		Redox Dark Su				(MLRA 136, 147)	o ( (TE4	• •
		445	Depleted Dark		7)		☐ Very Shallow Dark		2)
	Below Dark Surface (A	(11)	Redox Depress		′)		Other (Explain in F	Remarks)	
	k Surface (A12)	.,	☐ Iron-Manganes		F12\ (I RR I	N			
MLRA 147	ck Mineral (S1) (LRR i , 148)	N,	MLRA 136)	C 11033C3 (	1 12) (LIKK	Ν,			
☐ Sandy Gle	yed Matrix (S4)		Umbric Surface	e (F13) (ML	.RA 136, 12	.2)	2		
☐ Sandy Red	dox (S5)		Piedmont Floor	dplain Soils	(F19) (MLI	RA 148)	<sup>3</sup> Indicators of I	nydrophytic ve rology must b	egetation and
Stripped M	latrix (S6)		Red Parent Ma	terial (F21)	(MLRA 12	7, 147)		turbed or pro	
Restrictive La	ayer (if observed):								
Type:									
Depth (inch							Hydric Soil Present?	Yes 💿	No O
	103)								
Remarks:									



Photo File: IN	IG_3404.JPG	Orientation:		-facing
Lat/Long or UTM :	Long/Easting	: 77°30'47.144"	Lat/Northing: 3	8°43'51.898
Description:				
	İ			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

oject/Site: Manassas Regional Ai	irport	City/County: Manassas	Sampling Date: 26-	Oct-16
plicant/Owner: Manassas Region	nal Airport	State: VA	Sampling Point: 1	9-1 up
vestigator(s): Matt Neely		Section, Township, Range:	S T R	
dform (hillslope, terrace, etc.):	Terrace	Local relief (concave, convex,	, none): rolling Slope: 2.0	0%_ / 1.1 °
oregion (LRR or MLRA): MLRA	A 148 in LRR S L	— at.: 38°43'51.898"N	ong.: 77°30'47.144"W Datur	m: NAD 83
I Map Unit Name: Rowland silt		30 13 321030 11	NWI classification:	
climatic/hydrologic conditions		of years Ves (No. ) (Tf. m.	o, explain in Remarks.)	
				No O
• Vegetation, Soil	, or Hydrology  signific	cantly disturbed? Are "Norma	al Circumstances" present? Yes	140 ©
Vegetation, Soil	, or Hydrology natura	illy problematic? (If needed	, explain any answers in Remarks.)	
ummary of Findings - A	Attach site map showir	ng sampling point locatio	ons, transects, important fea	atures, etc
ydrophytic Vegetation Present?	Yes No O			
ydric Soil Present?	Yes O No •	Is the Campled Area		
-	Yes O No •	Is the Sampled Area within a Wetland?	Yes ○ No •	
/etland Hydrology Present?				
Remarks:				
lydrology				
Wetland Hydrology Indicators:			Secondary Indicators (minimum of two	reauired)
Primary Indicators (minimum of	f one required; check all that ar	(ylad	Surface Soil Cracks (B6)	
Surface Water (A1)		Plants (B14)	Sparsely Vegetated Concave Surface	e (B8)
High Water Table (A2)		ulfide Odor (C1)	Drainage Patterns (B10)	
Saturation (A3)		izospheres along Living Roots (C3)	Moss Trim Lines (B16)	
<ul><li>Water Marks (B1)</li><li>☐ Sediment Deposits (B2)</li></ul>		Reduced Iron (C4) Reduction in Tilled Soils (C6)	☐ Dry Season Water Table (C2) ☐ Crayfish Burrows (C8)	
Drift deposits (B3)	☐ Thin Muck S	* *	Saturation Visible on Aerial Imagery	(C9)
Algal Mat or Crust (B4)		ain in Remarks)	Stunted or Stressed Plants (D1)	(05)
Iron Deposits (B5)		······································	Geomorphic Position (D2)	
Inundation Visible on Aerial Ima	agery (B7)		Shallow Aquitard (D3)	
Water-Stained Leaves (B9)			Microtopographic Relief (D4)	
Aquatic Fauna (B13)			FAC-neutral Test (D5)	
Field Observations:	No O Depth (inc	has).		
		, <u> </u>		
Water Table Present? Yes Saturation Present?	· · · · · · · · · · · · · · · ·	hes): Wetland H	ydrology Present? Yes O No 🖲	)
(includes capillary fringe) Yes	No O Depth (inc	hes):	, and long , i recent in the same in the s	
Describe Recorded Data (stream	n gauge, monitoring well, aerial	photos, previous inspections), if a	vailable:	
temarks:				

			ominant oecies? _		Sampling Point: <u>19-1 up</u>
	Absolute	Re	el.Strat.	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 30	% Cover		over	Status	Number of Dominant Species
1 Ouercus montana	20	<b>V</b>	50.0%	UPL	That are OBL, FACW, or FAC:3(A)
2 Ouercus phellos	15	<b>✓</b>	37.5%	FAC	Total Number of Dominant
3. Ulmus americana	5		12.5%	FACW	Species Across All Strata:5(B)
4	0		0.0%		
5	0		0.0%		Percent of dominant Species That Are OBL FACW or FAC: 60.0% (A/B)
6	0		0.0%		That Are OBL, FACW, or FAC: 60.0% (A/B)
7	0		0.0%		Prevalence Index worksheet:
8	0		0.0%		Total % Cover of: Multiply by:
Sapling-Sapling/Shrub Stratum (Plot size: 15	<u>40</u>	= T	otal Cover		0BL speci es0 x 1 =0
oupg oupg/oas ou atam.			<b>53</b> 40/		FACW species5 x 2 =10
1 Acer rubrum		<b>V</b>	57.1%	FAC	FAC species 115 x 3 = 345
2. Juniperus virginiana		<b>✓</b>	42.9%	FACU	FACU species $25 \times 4 = 100$
3			0.0%		100
4			0.0%		UPL Species X 5 =
5			0.0%		Column Totals: 165 (A) 555 (B)
6	0	Ц	0.0%		Prevalence Index = $B/A = 3.364$
7		Ц	0.0%		Hydrophytic Vegetation Indicators:
8	0	Ц	0.0%		Rapid Test for Hydrophytic Vegetation
9	0		0.0%		✓ Dominance Test is > 50%
10	0		0.0%		Prevalence Index is ≤3.0 ¹
Shrub Stratum (Plot size:)	35	= T	otal Cover	•	Morphological Adaptations <sup>1</sup> (Provide supporting
1	0		0.0%		data in Remarks or on a separate sheet)
2	0		0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
3			0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4	_	$\overline{\Box}$	0.0%		be present, unless disturbed or problematic.
5		$\Box$	0.0%		Definition of Vegetation Strata:
		$\Box$	0.0%		Four Vegetation Strata:
6	0	$\Box$	0.0%		Tree stratum – Consists of woody plants, excluding vines, 3
7		 _ T/	otal Cover		in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Herb Stratum (Plot size: 15 )					Sapling/shrub stratum – Consists of woody plants, excluding
1 _ Microstegium vimineum		<b>✓</b>	88.9%	FAC	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2. Lespedeza cuneata	10		11.1%	FACU	Herb stratum – Consists of all herbaceous (non-woody)
3		$\sqcup$	0.0%		plants, regardless of size, and all other plants less than 3.28
4			0.0%		ft tall.   Woody vines – Consists of all woody vines greater than 3.28
5	0		0.0%		ft in height.
6	0		0.0%		Five Vegetation Strata:
7	0	$\sqcup$	0.0%		Tree - Woody plants, excluding woody vines, approximately
8	0	Ш	0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9	0		0.0%		diameter at breast height (DBH).
10	0		0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
11	0		0.0%		less than 3 in. (7.6 cm) DBH.
12	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size:)	90	= To	otal Cover		Herb stratum – Consists of all herbaceous (non-woody)
1	0	П	0.0%		plants, including herbaceous vines, regardless of size, and
		$\Box$	0.0%		woody species, except woody vines, less than approximately
2			0.0%		3 ft (1 m) in height.
3		$\vdash$			Woody vines – Consists of all woody vines, regardless of height.
4			0.0%		-
5			0.0%		Hydrophytic
6	0	Ш	0.0%		Vegetation Present? Yes  No  No
U.,	0		otal Cove		

Soil Sampling Point: 19-1 up

Profile Descr	iption: (D	escribe to	the depth	needed to documen	t the indi	cator or c	onfirm the	absence of indicators.)		
Depth (inches)		Matrix			dox Featu					
(inches) 0-7	-	(moist)		Color (moist)	%	Type 1	Loc²	Texture	Remarks	
	10YR	4/4						Loam		
7-10	10YR	4/4	_ 80					Silt Loam		
	10YR	4/3						Silt Loam		
10.14	10YR	4/6						Silt Loam		
10-14	10YR	5/3						Loam		
-	10YR	4/6	_ 30					Loam		
					-			-		
								-		
			on. RM=Red	uced Matrix, CS=Cover	ed or Coat	ed Sand G	ains <sup>2</sup> Loc	ration: PL=Pore Lining. M=N	Matrix	
Hydric Soil I		:						Indicators for Proble	matic Hydric Soils <sup>3</sup> :	
Histosol (A	,			Dark Surface (	•	CO) (MI DA	147 140)	2 cm Muck (A10) (	MLRA 147)	
Black Hist	oedon (A2) ic (A3)			Polyvalue Belov				Coast Prairie Redox	(A16)	
	Sulfide (A	1)		Loamy Gleyed			- 107	(MLRA 147,148)  Piedmont Floodpla	in Soils (F19)	
	Layers (A5)			Depleted Matri				(MLRA 136, 147)	III 3013 (1 13)	
	k (A10) (LR	-		Redox Dark Su	. ,	<b>-</b> \		Very Shallow Dark	` '	
		elow Dark Surface (A11) Depleted Dark Surface (F7)					Uther (Explain in Remarks)			
	☐ Thick Dark Surface (A12) ☐ Redox Depressions (F8) ☐ Sandy Muck Mineral (S1) (LRR N, ☐ Iron-Manganese Masses (F12) (LRR N,					N,				
MLRA 147		(31) (LIXIX	Ιν,	MLRA 136)						
	eyed Matrix	(S4)		Umbric Surface			-	<sup>3</sup> Indicators of h	nydrophytic vegetation and	
Sandy Red	dox (S5) Matrix (S6)			☐ Piedmont Floor				wetland hydrology must be present, unless disturbed or problematic.		
запрреи г	Matrix (30)			Red Parent Ma	iteriai (FZ1	) (MLRA 12	.7, 147)	uniess dis	turbed or problematic.	
Restrictive La	ayer (if ob	served):								
Type:	hos).							Hydric Soil Present?	Yes ○ No •	
Depth (incl	nes):							-		
Remarks:										

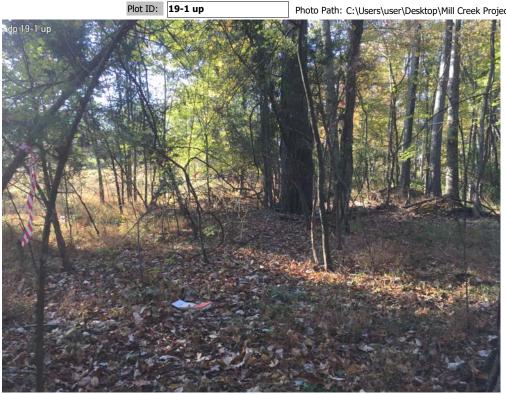


Photo File: IN	IG_3407.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°30'47.144"	Lat/Northing: 38°43'51.898"
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

State: VA   Sampling Point:   20.1 wet	Section, Township, Range: S  Local relief (concave, convex, none): concave  Slope: 5.0% / 2.9  t.: 38°43'51.898"N  Long.: 77°30'47.144"W  Datum: NAD 83  NWI classification:  of year? Yes No (If no, explain in Remarks.)  antly disturbed? Are "Normal Circumstances" present? Yes No yproblematic? (If needed, explain any answers in Remarks.)  g sampling point locations, transects, important features, etc.
dform (hillslope, terrace, etc.): Toeslope	Local relief (concave, convex, none): concave Slope: 5.0% / 2.9 t.: 38°43'51.898"N Long.: 77°30'47.144"W Datum: NAD 83  NWI classification: of year? Yes No (If no, explain in Remarks.) antly disturbed? Are "Normal Circumstances" present? Yes No (If needed, explain any answers in Remarks.) by problematic? (If needed, explain any answers in Remarks.)  g sampling point locations, transects, important features, etc.
region (LRR or MLRA): MLRA 148 in LRR S	t.: 38°43'51.898"N Long.: 77°30'47.144"W Datum: NAD 83  NWI classification:  of year? Yes No (If no, explain in Remarks.)  antly disturbed? Are "Normal Circumstances" present? Yes No yeroblematic? (If needed, explain any answers in Remarks.)  g sampling point locations, transects, important features, etc.
Map Unit Name: Dulles Silt loam	NWI classification:  If year? Yes No (If no, explain in Remarks.)  In year? Yes No No (If no, explain in Remarks.)  If year? Yes No No (If no, explain in Remarks.)  If year? Yes No No (If needed, explain any answers in Remarks.)  If year? Yes No No (If needed, explain any answers in Remarks.)  If year? Yes No No (If no, explain in Remarks.)  If year? Yes No (If no, explain in Remarks.)  If year? Yes No (If no, explain in Remarks.)
Map Unit Name: Dulles silt loam	NWI classification:  If year? Yes No (If no, explain in Remarks.)  In the sampled Area No. (If no explain any answers in Remarks.)  Is the Sampled Area No. (If needed, explain any answers in Remarks.)
Climatic/hydrologic conditions on the site typical for this time of year? Yes   No   (If no, explain in Remarks.)	Is the Sampled Area
Vegetation       , Soil       , or Hydrology       significantly disturbed?       Are "Normal Circumstances" present?       Yes       No       No         Vegetation       , Soil       , or Hydrology       naturally problematic?       (If needed, explain any answers in Remarks.)         mmary of Findings - Attach site map showing sampling point locations, transects, important features, etc.         drophytic Vegetation Present?       Yes       No       Is the Sampled Area within a Wetland?       Yes       No       No       Yes       No       No       Yes       No       No       No       Yes       No       No       No       Yes       No       No <th>Are "Normal Circumstances" present? Yes No Or No</th>	Are "Normal Circumstances" present? Yes No Or No
Vegetation	y problematic? (If needed, explain any answers in Remarks.)  g sampling point locations, transects, important features, etc
Immary of Findings - Attach site map showing sampling point locations, transects, important features, et ardrophytic Vegetation Present? Yes No Is the Sampled Area within a Wetland? Yes No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No	g sampling point locations, transects, important features, etc
Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Wetland Hydrology Present?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Wetland Hydrology Indicators:   No   No   No   No   No   No   No   N	Is the Sampled Area
Is the Sampled Area within a Wetland?  Ves No No within a Wetland?  Ves No	Is the Sampled Area within a Wetland? Yes  No
Is the Sampled Area within a Wetland?  Yes No	Is the Sampled Area within a Wetland? Yes  No  No
within a Wetland?  Wetland Hydrology Present?  Yes No within a Wetland?  Wetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Other (Explain in Remarks)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Wetland Hydrology Present?  Yes No Depth (inches):	within a Wetland? Yes No
Interest	
Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Geomorphic Position (D2)   Inundation Visible on Aerial Imagery (B7)   Shallow Aquatrd (D3)   Water-Stained Leaves (B9)   Microtopographic Relief (D4)   Aquatic Fauna (B13)   Depth (inches):   Wetland Hydrology Present?   Yes   No  Depth (inches):   Yes   Yes   Yes   Yes   Yes   Yes   Yes   Yes	
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Furface Water Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):	
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Trinh Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):	Cocondany Indicators (minimum of two required)
Surface Water (A1)	
High Water Table (A2)	
Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Aquatic Fauna (B13)  Depth (inches):  Vater Table Present?  Yes  No  Depth (inches):	
Sediment Deposits (B2)	
Drift deposits (B3)	educed Iron (C4) Dry Season Water Table (C2)
Algal Mat or Crust (B4)	
Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Sield Observations:  Furface Water Present?  Ves No   Depth (inches):  Facturation Present?  Yes No  Depth (inches):  Facturation Present?  Yes No  Depth (inches):  Facturation Present?  Yes No  Depth (inches):  Facturation Present?  Yes No  Depth (inches):  Facturation Present?  Yes No  Depth (inches):  Facturation Present?  Yes No  Depth (inches):  Facturation Present?  Yes No  Depth (inches):  Facturation Present?  Facturation Present?  Yes No  Depth (inches):  Facturation Present?  Factur	
Inundation Visible on Aerial Imagery (B7)  ✓ Water-Stained Leaves (B9)  ✓ Aquatic Fauna (B13)  ✓ FAC-neutral Test (D5)  Field Observations:  Furface Water Present?  Ves No Depth (inches):  Facturation Present?  Yes No Depth (inches):	
Water-Stained Leaves (B9) Aquatic Fauna (B13)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations: Furface Water Present?  Ves No Depth (inches): Facturation Present? Facturation Present	
Aquatic Fauna (B13)  Field Observations: Surface Water Present?  Ves No Depth (inches): Water Table Present?  Yes No Depth (inches): Saturation Present?  Yes No Depth (inches): Saturation Present? Includes capillary fringe)  Wetland Hydrology Present?  Yes No Depth (inches):	
urface Water Present? Yes No Depth (inches):	
Adater Table Present? Yes No Depth (inches): aturation Present? Yes No Depth (inches): No Depth (inches): Depth (inches):	
aturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No No	es):
includes capillary fringe)  Yes No Depth (inches):	es):
includes capillary fringe)	Wetland Hydrology Present? 🐧 165 🔍 NO 🔾
emarks:	
reserved bata (Stream gauge, monitoring well, dental pr	P fi o de le e

Note   Policy   Pol			Dominant Species?			Sampling Point: 20-1 wet		
1. Aser rubrum 20		Absolute			Indicator	Dominance Test worksheet:		
1. Aser photum	Tree Stratum (Plot size: 30 )	% Cover	Co	ver	Status			
2 Ulmus americane 2 0	1 Acer rubrum	20	<b>~</b>	50.0%	FAC	<u>'</u>		
3	••	20	<b>V</b>	50.0%	FACW			
1			П	0.0%				
Second	<b>V</b> .		$\overline{\Box}$			Species Across All Strata:		
That Are OBL_FACW, or FAC:   100.0%   New   Prevalence Index worksheet:   100.0%   New   Total 2% Copyer of: Multibly by:			$\overline{\Box}$			Percent of dominant Species		
8	***		$\vdash$					
8	~ **							
Sapling-Sapling /Shrub Stratum (Plot size:   0   0.0%   FACW species   0   0.7	7		Н					
Sapling/Shrub Stratum   (Plot size:   )	8		Ш					
1	Carling Carling (Church Church III) (Plot size:	, 40	= To	otal Cover		0BL speci es 0 x 1 = 0		
Company   Factor   Company		_		0.00%		FACW species <u>30</u> x 2 = <u>60</u>		
Action   Company   Comp			$\vdash$			FAC species 100 x 3 = 300		
1						FACIL species 0 v 4 - 0		
5	3					l ' o o		
6	4	0		0.0%				
7.	5	0		0.0%		Column Totals: 130 (A) 360 (B)		
8	6	0	Ш	0.0%		Prevalence Index = $B/A = 2.769$		
8	7	0		0.0%		Hydrophytic Vegetation Indicators:		
9   0				0.0%				
10		_		0.0%		1 = ' ' ' ' '		
Shrub Stratum			П	0.0%				
	•		_ - т					
2			,					
3	1	0	Ш			1 —		
4.	2	0		0.0%		Problematic Hydrophytic Vegetation (Explain)		
5.	3	0	Ш	0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must		
5.	4	0		0.0%		be present, unless disturbed or problematic.		
6.				0.0%		Definition of Vegetation Strata:		
Tree stratum - Consists of woody plants, excluding vines, especially consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.2 ft tall.    Value   Va				0.0%		Four Vegetation Strata:		
Herb Stratum (Plot size: 15   )				0.0%		Tree stratum - Consists of woody plants, excluding vines, 3		
Sapling/shrub stratum - Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall vines, less than 3 in. DBH and	• •		 = T/					
1. Microstegium vimineum 2. Boehmeria cylindrica 3.	Herb Stratum (Plot size: 15					-		
3.	1 Microstegium vimineum		$\checkmark$		FAC	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.		
3.	2. Boehmeria cylindrica		Ш	11.1%	FACW	Herb stratum – Consists of all berbaceous (non-woody)		
4	3	0	Ш	0.0%		plants, regardless of size, and all other plants less than 3.28		
5.	4	0		0.0%				
7.	5	0		0.0%				
7	6.	0		0.0%		Five Vegetation Strate:		
8	7.	0		0.0%				
9.				0.0%				
Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.  Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.  Woody Vine Stratum (Plot size: )  ———————————————————————————————————			$\overline{\Box}$	0.0%				
11			$\overline{\Box}$					
Shrub stratum - Consists of woody plants, excluding wood vines, approximately 3 to 20 ft (1 to 6 m) in height.    Woody Vine Stratum   (Plot size:)   90			H					
Woody Vine Stratum (Plot size:)  1	11		Н			1		
1	12		$\Box$					
1.	Woody Vine Stratum (Plot size:)	90	= To	otal Cover		Herb stratum – Consists of all herbaceous (non-woody)		
2.	1	0		0.0%		plants, including herbaceous vines, regardless of size, and		
3.				0.0%				
4			$\overline{\Box}$					
5			$\sqcap$					
6. Hydrophytic Vegetation Yes No								
Precent Yes No U	- ·							
0 = Total Cover Present?	6		Ш					
<u></u>		0	= T	otal Cover		Present 100 0 110 0		
Remarks: (Include photo numbers here or on a separate sheet.)	Remarks: (Include photo numbers here or on a separate s	heet.)						

Soil Sampling Point: 20-1 wet

	ription: (De		the depth	needed to				onfirm the	absence of indicators.)				
Depth (inches)	Color	Matrix	%	Color		lox Featu	res1	Loc2	Toyture	D	narke		
0-4	10YR	( <b>moist)</b> 3/3	100	Color (	moist)	%	iype_+	LOC	Texture Silt Loam	Ken	narks		
4-9	10YR	5/2	80	10YR	4/6	5	_ <u>C</u>	M	Silt Loam				
	10YR	4/3	15						Silt Loam				
9-14	10YR	6/2	80	10YR	4/6	20	C	M	Silt Loam				
	-			-					-	,			
	-	-		-						,			
							_						
-	-			-	-		_		-				
	-	-		-			_			-			
<sup>1</sup> Type: C=Con	centration. [	D=Depleti	on. RM=Red	duced Matrix,	CS=Cover	ed or Coa	ted Sand G	rains <sup>2</sup> Loc	cation: PL=Pore Lining. M=	Matrix			
Hydric Soil 1	Indicators:								Indicators for Probl	ematic Hydr	ic Soils <sup>3</sup> :		
Histosol (	A1)			☐ Darl	Surface (	S7)			2 cm Muck (A10)	-			
Histic Epi	pedon (A2)			Poly	value Belov	w Surface	(S8) (MLRA	4 147,148)	Coast Prairie Redo				
Black Hist	. ,			Thin	Dark Surfa	ace (S9) (I	MLRA 147,	148)	(MLRA 147,148)	X (A10)			
	Sulfide (A4				ny Gleyed	•	)		Piedmont Floodpla	ain Soils (F19)			
	Layers (A5)				eted Matri				(MLRA 136, 147)				
	k (A10) (LRI			_	Redox Dark Surface (F6)				☐ Very Shallow Dark Surface (TF12)				
_ `	Below Dark	•	A11)	_	Depleted Dark Surface (F7)  Redox Depressions (F8)				Uther (Explain in Remarks)				
	k Surface (A uck Mineral (	•	N						Iron-Manganese Masses (F12) (LRR N,				
MLRA 147		(SI) (LKK	IN,	MLRA 136)				,					
Sandy Gle	eyed Matrix	(S4)		Uml	oric Surface	e (F13) (M	LRA 136, 1	22)	3				
Sandy Re	dox (S5)			Pied	mont Floor	dplain Soil	s (F19) (MI	_RA 148)	<sup>3</sup> Indicators of hydrophytic vegetation and wetland hydrology must be present,				
Stripped I	Matrix (S6)			Red	Parent Ma	terial (F21	l) (MLRA 1	27, 147)		sturbed or pro			
Restrictive L	ayer (if ob	served):											
Туре:													
Depth (inc	hes):								Hydric Soil Present?	Yes 💿	No O		
Remarks:									1				



Photo File: IN	IG_3410.JPG	Orientation:	-facing
at/Long or UTM :	Long/Easting	: 77°30'47.144"	Lat/Northing: 38°43'51.898"
Description:			

Photo File: Non	ie.bmp	Orientation:		-facing
Lat/Long or UTM: Lo	ong/Easting: 0		Lat/Northing: 0	
Description:				

Description   Company   March   Marc	Matt Neely   Section, Township, Range: S   T   R	setigator(s): Matt Neely   Section, Township, Range: S   T   R    dform (hillslope, terrace, etc.): Hillside   Local relief (concave, convex, none): flat   Slope: 7,0% / 4,0    pregion (LRR or MLRA): MLRA 148 in LRR S   Lat: 38°43'40.159"N   Long:: 77°30'39.711"W   Datum: NAD 83    Map Unit Name: Dulles Silt loam   NWI classification: Climatic/hydrologic conditions on the site typical for this time of year? Yes   No   (If no, explain in Remarks.)    Wegetation   , soil   , or Hydrology   significantly disturbed?   Are "Normal Circumstances" present? Yes   No   No   (If needed, explain any answers in Remarks.)    Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc drophytic Vegetation Present? Yes   No   Is s the Sampled Area within a Wetland?    Welfor Soil Present? Yes   No   Is surface Soil Cracks (B6)   Surface Soil Cracks (B6)    Surface Water (A1)   True Aquatic Plants (B14)   Surface Soil Cracks (B6)    High Water Table (A2)   High Water Table (A2)   Drainage Patterns (B10)    Subscription (A3)   Oxidized Rhizospheres along Living Roots (C3)   Drainage Patterns (B10)    Subscription (A3)   Oxidized Rhizospheres along Living Roots (C3)   Drainage Patterns (B10)    Subscription (A3)   Oxidized Rhizospheres along Living Roots (C3)   Drainage Patterns (B10)    Subscription (A3)   Oxidized Rhizospheres along Living Roots (C3)   Drainage Patterns (B10)    Subscription (A3)   Oxidized Rhizospheres along Living Roots (C3)   Drainage Patterns (B10)    Subscription (A3)   Oxidized Rhizospheres along Living Roots (C3)   Drainage Patterns (B10)    Subscription (A3)   Oxidized Rhizospheres along Living Roots (C3)   Drainage Patterns (B10)    Subscription (A3)   Oxidized Rhizospheres along Living Roots (C3)   Drainage Patterns (B10)    Subscription (A3)   Oxidized Rhizospheres along Living Roots (C3)   Drainage Patterns (B10)    Subscription (A3)   Oxidized Rhizospheres A10   Drainage Patterns (B10)    Subscription (A3)   Oxidized Rhizospheres A10   Drainage Pattern	oject/Site: Manassas Regional A	irport	City/County: M	anassas	Sampling	Date: 26-Oct-16
and form (hillslope, terrace, etc.): Hillside   Local relief (concave, convex, none): flat   Slope: 7,0%   4,	And form (hillslope, terrace, etc.): Hillside   Local relief (concave, convex, none): filat   Slope: 7,0%   1 d., bregion (LRR or MLRA): MLRA 148 in LRR S   Lat.: 38°43'40.159"N   Long.: 77°30'39.711"W   Datum: NAD 83   If Map Unit Name: Dulles silt loam   NWI classification: set climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  ■ Vegetation   , Soil   , or Hydrology   significantly disturbed? Are "Normal Circumstances" present? Yes  No  vegetation   , or Hydrology   naturally problematic? (If needed, explain any answers in Remarks.)  ■ Vegetation   , Soil   , or Hydrology   naturally problematic? (If needed, explain any answers in Remarks.)  ■ Unit Soil Present? Yes  No  vegetation Present? Yes	drorm (hillslope, terrace, etc.): Hillside   Local relief (concave, convex, none): flat   Slope: 7,0% / 4,0   region (LRR or MLRA): MLRA 148 in LRR 5   Lat.: 38*43*40.159*N   Long.: 77*30*39.711*W   Datum: NAD 83 Map Unit Name: Dulles silt loam   NNY classification: culliantic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.) Vegetation   , soil   , or Hydrology   significantly disturbed? Are "Normal Circumstances" present? Yes  No    Vegetation   , soil   , or Hydrology   naturally problematic? (If needed, explain any answers in Remarks.)  Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc. through the site of year? Yes  No     Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc. through the site of year? Yes  No     Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc. through the site of years   Yes  No     Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc. through the site of years   Yes  No     Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc. through the site of years   Yes  No     Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc. through the site of	plicant/Owner: Manassas Regio	nal Airport		State: VA	Sampling Point:	20-2 up
region (LRR or MLRA): MLRA 148 in LRR S	region (LRR or MLRA): MLRA 148 in LRR S	region (LRR or MLRA): MLRA 148 in LRR S	estigator(s): Matt Neely		Section, Townsl	nip, Range: S	т	R
Map Unit Name: Dulles Silt loam	Map Unit Name: Dulles Silt loam	Map Unit Name:   Dulles silt loam	dform (hillslope, terrace, etc.):	: Hillside	Local relief (conc	ave, convex, none):	flat <b>S</b>	lope: 7.0% / 4.0
Map Unit Name: Dulles slit loam	Map Unit Name: Dulles Silt loam	Map Unit Name:   Dulles silt loam	region (LRR or MLRA): MLR	A 148 in LRR S	 Lat.: 38°43'40.159"N	Long.: 7	77°30'39.711"W	Datum: NAD 83
climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation  , Soil  , or Hydrology    significantly disturbed?	climatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)  Vegetation	Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   No  (If needed, explain any answers in Remarks.)   No  (If needed, explain any any any any any any any any any an						
Vegetation	Vegetation	Vegetation	climatic/hydrologic conditions	on the site typical for th	is time of year? Yes • No	(If no evol	- ain in Pomarks \	
Vegetation	Vegetation	Vegetation					•	Yes   No
Immary of Findings - Attach site map showing sampling point locations, transects, important features, exprint of the property of the present? Yes	Immary of Findings - Attach site map showing sampling point locations, transects, important features, et a complete the post of the present? Yes	Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc.  Idrophytic Vegetation Present? Yes No Image: Secondary Indicators (minimum of two required)  Is the Sampled Area within a Wetland? Yes No Image: Secondary Indicators (minimum of two required)  Indicators (minimum of one required): check all that apply)  Image: Secondary Indicators (minimum of two required)  Image: Secondary Indicator (secondary Indicators (minimum of two required)  Image: Secondary Indicator (secondary Indicators (minimum of two required)  Image: Secondary Indicator (secondary Indicators (secondary Indicators (secondary Indicators (secondary Indicators (secondary Indicator (secondary Indicat					•	
Is the Sampled Area within a Wetland?   Yes	Is the Sampled Area within a Wetland?   Yes	Is the Sampled Area within a Wetland?  Ves No   Is the Sampled Area within a Wetland?  Ves No  Is the Sampled Area within a Wetland?  Ves No  Is the Sampled Area within a Wetland?  Ves No  Is the Sampled Area within a Wetland?  Is the Sampled Area within a Wetland?  Ves No  Is the Sampled Area within a Wetland?  Is the Sampled Area within a Wetland?  Ves No  Is the Sampled Area within a Wetland?  Is the Sampled	Vegetation, Soil	, or Hydrology $\square$	naturally problematic?	(If needed, explain	in any answers in Ren	ıarks.)
Addric Soil Present?  Yes No	Is the Sampled Area within a Wetland?  Ves No	Is the Sampled Area within a Wetland?  Yes No   No   Is the Sampled Area within a Wetland?  Yes No   No   No   No   No   No   No   No	ımmary of Findings - <i>I</i>	Attach site map sh	owing sampling poi	nt locations, t	ransects, impoi	tant features, etc
retaind Hydrology Present?    Ves	Is the Sampled Area within a Wetland?  Yes ○ No ●  No ●  Vetland Hydrology Present?  Vetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Algal Mat or Crust (B4)  Drift deposits (B3)  Algal Mat or Crust (B4)  Water-Stained Leaves (B9)  Water-Stained Leaves (B9)  Water-Stained Leaves (B9)  Water-Stained Leaves (B9)  Water Fable (Passent?  Wetland Hydrology Present?  Yes ○ No ●  Depth (inches):  Wetland Hydrology Present?  Yes ○ No ●  Wetland Hydrology Present?  Yes ○ No ●  Depth (inches):  Wetland Hydrology Present?  Yes ○ No ●  Wetland Hydrology Present?  Yes ○ No ●  Depth (inches):  Wetland Hydrology Present?  Yes ○ No ●  Wetland Hydrology Present?  Yes ○ No ●  Wetland Hydrology Present?  Yes ○ No ●  Depth (inches):  Wetland Hydrology Present?  Yes ○ No ●  Wetland Hydrology Present?  Yes ○ No ●  Depth (inches):  Wetland Hydrology Present?  Yes ○ No ●  Depth (inches):  Wetland Hydrology Present?  Yes ○ No ●  Depth (inches):  Wetland Hydrology Present?  Yes ○ No ●  Depth (inches):	retaind Hydrology Present?    Yes	drophytic Vegetation Present?	Yes O No •				
Version   Vers	temarks:    Vydrology   Vetland Hydrology Indicators:	Agal Mat or Crust (B4)   Other (Explain in Remarks)   Secondary (B2)   S			Is the Sa	mpled Area	O O	
Agal Mat or Crust (B4)	Secondary Indicators (minimum of two required)   Secondary Indicators (minimum of two required)	Voltrology   Vectand Hydrology Indicators:		Yes ○ No ●			○ No ●	
Secondary Indicators (minimum of two required)   Surface (B6)	Secondary Indicators (minimum of two required)   Surface (RB)	Vection of the property of the prosits (B3)	, ,,					
Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	Wetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  High Water Marks (B1)  Sediment Deposits (B2)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Iron Deposits (B5)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Water Farsence Yes No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:						
Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  High Water Table (A2)  Water Marks (B1)  Presence of Reduced Iron (C4)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Selided Observations:  Surface Water Present?  Wetland Hydrology Present?  Yes  No  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Driv Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Uron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Ves  No  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  True Aquatic Plants (B14)  Sparsely Vegetated Concave Surface (B8)  High Water Table (A2)  High Water Table (A2)  Water Marks (B1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Sediment Deposits (B2)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Iron Deposits (B5)  Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Sturface Water Present?  Yes  No  Depth (inches):  Depth (inches):  Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:						
Surface Water (A1)	Surface Water (A1)	Surface Water (A1)		of one required; check all	that annly)			
High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Algal Mat or Crust (B4)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Pesh No  Depth (inches):  Drift hydrogen Sulfide Odor (C1)  Hydrogen Sulfide Odor (C1)  Drianage Patterns (B10)  Moss Trim Lines (B16)  Drift Leaves (C3)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Drift Leaves (C3)  Moss Trim Lines (B16)  Drift Leaves (C3)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Wetland Hydrology Present?  Yes  No  No  Depth (inches):  Depth (inches):  Depth (inches):	High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Pesh No  Depth (inches):  Depth (inches):  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Wetland Hydrology Present?  Yes  No  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):	High Water Table (A2)	$\overline{}$					
Saturation (A3) Oxidized Rhizospheres along Living Roots (C3) Moss Trim Lines (B16)  Water Marks (B1) Presence of Reduced Iron (C4) Dry Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Imagery (C9) Inundation Visible on Aerial Imagery (B7) Aquatic Fauna (B13)  Water Table Present? Yes No Depth (inches): Saturation Viving Roots (C3) Moss Trim Lines (B16) Dry Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Imagery (C9) Saturation Visible on Aerial Imagery (C9) Stunted or Stressed Plants (D1) Geomorphic Position (D2) Shallow Aquitard (D3) Microtopographic Relief (D4) FAC-neutral Test (D5)  Depth (inches): Depth (inches): Saturation Present? Wetland Hydrology Present? Yes No Depth (inches): Depth (inches): Depth (inches):	Saturation (A3)	Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Crayfish Burrows (C8)  Drift deposits (B3)  Thin Muck Surface (C7)  Saturation Visible on Aerial Imagery (C9)  Algal Mat or Crust (B4)  Other (Explain in Remarks)  Stunted or Stressed Plants (D1)  Iron Deposits (B5)  Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Shallow Aquitard (D3)  Water-Stained Leaves (B9)  Microtopographic Relief (D4)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  ield Observations:  urface Water Present? Yes No Depth (inches):  Wetland Hydrology Present? Yes No Depth (inches):  Motor Depth (inches):	_ ` ′		, , ,			
Sediment Deposits (B2)	Sediment Deposits (B2)	Sediment Deposits (B2)	Saturation (A3)		• , ,			
Drift deposits (B3)	Drift deposits (B3)	Drift deposits (B3)	Water Marks (B1)	Pres	ence of Reduced Iron (C4)		Dry Season Water Table	e (C2)
Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	Sediment Deposits (B2)	Rece	ent Iron Reduction in Tilled Soils	(C6)	Crayfish Burrows (C8)	
☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Water Present? Yes ☐ No ⑥ Depth (inches): ☐ Water Table Present? Yes ☐ No ⑥ Depth (inches): ☐ Water Table Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Yes ☐ Yes ☐ No ⑥ Depth (inches): ☐ Yes ☐ No ⑥ Depth (inches): ☐ Yes ☐ No ⑥ Depth (inches): ☐ Yes ☐ Yes ☐ No ⑥ Depth (inches): ☐ Yes	☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ FAC-neutral Test (D	☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Shallow Aquitard (D3) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Steld Observations:  Surface Water Present? Yes No Depth (inches): ☐ Wetland Hydrology Present? Yes No Depth (inches): ☐ Wetland Hydrology Present? Yes No Depth (inches): ☐ Wetland Hydrology Present? Yes No Pepth (inches): ☐ Wetland Hydrology Present? Yes No Pepth (inches): ☐ Wetland Hydrology Present? Yes No Pepth (inches): ☐ Yescribe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	_ ' ' '	Thin	Muck Surface (C7)			• , , ,
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Sield Observations:  Surface Water Present?  Water Table Present?  Yes ○ No ○ Depth (inches):  Saturation Present?  Yes ○ No ○ Depth (inches):	☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Steld Observations:  Surface Water Present? Yes ○ No ○ Depth (inches):  Water Table Present? Yes ○ No ○ Depth (inches):  Saturation Present? Yes ○ No ○ Depth (inches):  Saturation Present? Yes ○ No ○ Depth (inches):	Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Facturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Pepth (inches):  Saturation Present?  Yes No Pept		Othe	er (Explain in Remarks)			• •
Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Present?	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):	Water-Stained Leaves (B9) Aquatic Fauna (B13)  Selected Observations: Surface Water Present?  Water Table Present?  Yes No Depth (inches): Surface Water Present?  Water Table Present?  Yes No Depth (inches): Surface Water Present?  Water Table Present?  Yes No Depth (inches): Surface Water Present?  Wetland Hydrology Present?  Yes No Poepth (inches): Surface Water Present?  Yes No Depth (inches): Surface Water Present?  Yes No Poepth (inches): Surface Water		12gen/ (87)				2)
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Seturation Present?  Yes No Depth (inches):  Seturation Present?  Yes No Depth (inches):	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Secribe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	=	agery (b/)			,	(D4)
Surface Water Present?  Yes No Depth (inches):  Vater Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Furface Water Present?  Yes No Depth (inches):  Vater Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Autrace Water Present?  Yes No Depth (inches):  Vater Table Present?  Yes No Depth (inches):  Journal of the present of the pr	_					(64)
Vater Table Present? Yes No Depth (inches):	Vater Table Present? Yes No Depth (inches):	Vater Table Present? Yes No Depth (inches):	ield Observations:					
Saturation Present?  Includes capillary fringe)  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No logology No logology Present? Yes No logology Present?	Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches): Vescribe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	Surface Water Present? Yes	3 O No O De	pth (inches):			
includes capillary fringe)  Yes No Depth (inches):	includes capillary fringe)  Yes No Depth (inches):	Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	Water Table Present? Yes	s O No O De	pth (inches):			) (A)
includes capitally filinger	includes capillary frilinge)	Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	VAC	s ○ No ● De	pth (inches):	Wetland Hydrolog	y Present? Yes	⊃ No •
Acceribo Pocordod Data (etroam gaugo, monitoring well, acrial photos, provious inspections), if availables	rescribe Recorded Data (stream gauge, monitoring well, aerial priotos, previous inspections), il available.		includes capillary fringe)			octions) if available	\ <u>'</u>	
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			ominant oecies? _		Sampling Point: 20-2 up
(Dietrize: 20	Absolute % Cover	Re	el.Strat.	Indicator Status	Dominance Test worksheet:
Tree Stratum (Plot size: 30 )		<b>✓</b>			Number of Dominant Species
1 Quercus falcata	40	<b>V</b>	42.1%	FACU	That are OBL, FACW, or FAC: (A)
2 Carva tomentosa			42.1% 15.8%	FAC	Total Number of Dominant
3. Ouercus phellos		H	0.0%	FAC	Species Across All Strata:4(B)
4		Н	0.0%		Percent of dominant Species
5		H	0.0%		That Are OBL, FACW, or FAC: 50.0% (A/B)
6	_ —		-		
7		Н	0.0%		Prevalence Index worksheet:  Total % Cover of: Multiply by:
8		 	otal Cove		
Sapling-Sapling/Shrub Stratum (Plot size: _15	) — 33 .	- 10	otal Covel		0BL species
1 Asimina triloba	10	<b>✓</b>	100.0%	FAC	FACW species 0 x 2 = 0
2	0		0.0%		FAC species $40 \times 3 = 120$
3	0		0.0%		FACU speci es $\frac{40}{10}$ x 4 = $\frac{160}{200}$
4	0		0.0%		UPL species $\frac{40}{}$ x 5 = $\frac{200}{}$
5	_		0.0%		Column Totals: 120 (A) 480 (B)
6	_		0.0%		Prevalence Index = B/A = 4.000
7	_		0.0%		Hydrophytic Vegetation Indicators:
8			0.0%		Rapid Test for Hydrophytic Vegetation
9	_		0.0%		Dominance Test is > 50%
10	0		0.0%		Prevalence Index is ≤ 3.0 ¹
Shrub Stratum (Plot size:)	10:	= To	otal Cove	•	
1	0		0.0%		Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
2		П	0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
3		П	0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
	_	П	0.0%		be present, unless disturbed or problematic.
4 5			0.0%		Definition of Vegetation Strata:
		П	0.0%		Four Vegetation Strata:
6	0	Н	0.0%		Tree stratum – Consists of woody plants, excluding vines, 3
7		 _ T/	otal Cove		in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Herb Stratum (Plot size: 15					Sapling/shrub stratum – Consists of woody plants, excluding
1 _ Microstegium vimineum		<b>Y</b>	100.0%	FAC	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2			0.0%		Herb stratum – Consists of all herbaceous (non-woody)
3		$\sqcup$	0.0%		plants, regardless of size, and all other plants less than 3.28
4			0.0%		ft tall.   Woody vines – Consists of all woody vines greater than 3.28
5	0		0.0%		ft in height.
6			0.0%		Five Vegetation Strata:
7			0.0%		Tree - Woody plants, excluding woody vines, approximately
8	0		0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).
9	0		0.0%		Sapling stratum – Consists of woody plants, excluding
10			0.0%		woody vines, approximately 20 ft (6 m) or more in height and
11	0		0.0%		less than 3 in. (7.6 cm) DBH.
12	0	Ш	0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size:)	15 :	= To	otal Cove	•	Herb stratum – Consists of all herbaceous (non-woody)
1	0		0.0%		plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately
2	0		0.0%		3 ft (1 m) in height.
3	0		0.0%		Woody vines – Consists of all woody vines, regardless of
4			0.0%		height.
5			0.0%		- Under a bodie
6	0		0.0%		Hydrophytic Vegetation
0	0	= T	otal Cove	r	Present? Yes O NO O

Soil Sampling Point: 20-2 up

Profile Descr	iption: (Describe to	the depth	needed to document	the indica	tor or co	nfirm the	e absence of indicators.)	
Depth	Matrix			lox Feature			_	
(inches)	Color (moist)	%	Color (moist)		Type <sup>1</sup>	Loc <sup>2</sup>	Texture Remarks	—
0-5	10YR 4/4	100					Silt Loam	
5-9	10YR 5/6	100					Silt Loam	
9-14	7.5YR 5/6						Silt Loam	
								-
							·	_
							-	
		_					·	
1- 00	5 5 1							_
		on. RM=Red	uced Matrix, CS=Cover	ed or Coated	Sand Gra	ains <sup>2</sup> Loc	cation: PL=Pore Lining. M=Matrix	
Hydric Soil I							Indicators for Problematic Hydric Soils <sup>3</sup> :	
Histosol (A1)		Dark Surface (	•	)) (MI D A	147 140)	2 cm Muck (A10) (MLRA 147)		
	☐ Histic Epipedon (A2) ☐ Polyvalue Below Surface (S8) (MLF ☐ Black Histic (A3) ☐ Thin Dark Surface (S9) (MLRA 147				Coast Prairie Redox (A16)			
	Sulfide (A4)				KA 147, I	40)	(MLRA 147,148)	
	Layers (A5)		Loamy Gleyed I Depleted Matrix				Piedmont Floodplain Soils (F19) (MLRA 136, 147)	
	k (A10) (LRR N)		Redox Dark Sui					
	Below Dark Surface (	۸11)	Depleted Dark	` '			<ul><li>✓ Very Shallow Dark Surface (TF12)</li><li>✓ Other (Explain in Remarks)</li></ul>	
	k Surface (A12)	A11)	Redox Depressi					
☐ Sandy Mu	ck Mineral (S1) (LRR	N,	Iron-Manganes MLRA 136)	. ,	.2) (LRR N	١,		
MLRA 147	•		Umbric Surface	(E13) (MI D	۸ 136 13	2)		
	eyed Matrix (S4)						<sup>3</sup> Indicators of hydrophytic vegetation and	
Sandy Red			☐ Piedmont Floor				wetland hydrology must be present,	
Stripped is	Matrix (S6)		Red Parent Ma	teriai (F21) (	MLKA 12	, 147)	unless disturbed or problematic.	
Restrictive La	ayer (if observed):							
Type:							Hydric Soil Present? Yes ○ No ●	
Depth (incl	hes):						Hydric 3011 Fresent: 165 C NO S	
Remarks:								



Photo File: IM	IG_3411.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting:	77°30'39.711"	Lat/Northing: 38°43'40.159"N
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

Section, Township, Range: S T R  dform (hillslope, terrace, etc.): Hillside Local relief (concave, convex, none): flat Slope: 7,0% / 4,0  fregion (LRR or MLRA): MLRA 148 in LRR S Lat.: 38943'40.159"N Long.: 77°30'39.71!"W Datum: NAD 83  Map Unit Name: Dulles silt loam NWI classification: Unitarity of this time of year? Yes No (If no, explain in Remarks.)  Vegetation , soil , or Hydrology in aturally problematic? (If needed, explain any answers in Remarks.)  Wegetation , soil , or Hydrology in naturally problematic? (If needed, explain any answers in Remarks.)  Wegetation Present? Yes No   drir Soil Present? Yes No   within a Wetland?  Wetland Hydrology Indicators:  Vegetation Present? Yes No   wetland Hydrology Indicators:  Wetland Hydrology Indicators:  Wetland Hydrology Indicators:  Wetland Hydrology Indicators (minimum of one required; check all that apply) Surface Water (A1) Aguatic Plants (B14) Sparsely Vegetated Concave Surface (B8)  High Water Table (A2) Mose Recent from Reduction in Titled Soils (C6) Present (B16)  Saturation (A3) Oxidized Rhizospheres along Living Roots (C3) Moss Trim Lines (B16)  Water Marks (B1) Presence of Reduced Iron (C4) Sediment Deposits (B2) Agail Mat or Crust (B4) Startage (C7) Startage (C7)  Agail Mat or Crust (B4) Present? Yes No   Agail Mat or Crust (B4) Depth (inches):  Vater Table Present? Yes No   Depth (inches): Wetland Hydrology Present? Yes No   Depth (inches): Wetland Hydrology Present? Yes No   Depth (inches): Startage (C7) Present? Yes No   Depth	Matt Neely   Section, Township, Range: S   T   R	Matt Neely   Section, Township, Range: S   T   R	vestigator(s): Matt Neely Section, Township, Range: S T R R Indiform (hillslope, terrace, etc.): Hillside Local relief (concave, convex, none): flat Slope: 7.0 bregion (LRR or MLRA): MLRA 148 in LRR S Lat.: 38°43′40.159″N Long.: 77°30′39.711″W Datum il Map Unit Name: Dulles silt loam NWI classification: e climatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.) e Vegetation  , Soil  , or Hydrology	0% / 4.0 n: NAD 83
region (LRR or MLRA): MLRA 148 in LRR S	Addrom (hillslope, terrace, etc.): Hillside   Local relief (concave, convex, none): flat   Slope: 7,0%   1 4, bregion (LRR or MLRA): MLRA 148 in LRR S   Lat.: 38°43'40.159"N   Long.: 77°30'39.711"W   Datum: NAD 83	Addrorm (hillslope, terrace, etc.): Hillside	Adform (hillslope, terrace, etc.): Hillside	No O
region (LRR or MLRA): MLRA 148 in LRR S	region (LRR or MLRA): MLRA 148 in LRR	region (LRR or MLRA): MLRA 148 in LRR S	region (LRR or MLRA): MLRA 148 in LRR S	No O
Map Unit Name: Dulles silt loam	Map Unit Name: Dulles Silt loam	Map Unit Name: Dulles slit loam	Map Unit Name: Dulles silt loam	No O
Map Unit Name: Dulles Silt loam	Map Unit Name: Dulles Silt loam	Map Unit Name: Dulles silt loam	Map Unit Name: Dulles silt loam	No O
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   Vegetation	climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation  , Soil  , or Hydrology  significantly disturbed?  Are "Normal Circumstances" present?  Yes  No  No  No  No  No  No  No  No  No  N	Climatic/hydrologic conditions on the site typical for this time of year?   Yes	climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation  , Soil  , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes    Vegetation  , Soil  , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)  Immary of Findings - Attach site map showing sampling point locations, transects, important feature for the first sampled for the first samp	
Vegetation	Vegetation	Vegetation	Vegetation	
Vegetation	Vegetation	Vegetation	Vegetation	
mmary of Findings - Attach site map showing sampling point locations, transects, important features, etc drophytic Vegetation Present? Yes	Immary of Findings - Attach site map showing sampling point locations, transects, important features, endrophytic Vegetation Present? Yes  No   Is the Sampled Area within a Wetland Hydrology Present? Yes  No   Is the Sampled Area within a Wetland Hydrology Present? Yes  No   Is the Sampled Area within a Wetland? Yes  No   Is the Sampled Area within a Wetland? Yes  No   Is the Sampled Area within a Wetland? Yes  No   Is the Sampled Area within a Wetland? Yes  No   Is the Sampled Area within a Wetland? Yes  No   Is the Sampled Area within a Wetland? Yes	Immary of Findings - Attach site map showing sampling point locations, transects, important features, reproperties of the properties of th	Immary of Findings - Attach site map showing sampling point locations, transects, important feature of the production of	atures, etc
drophytic Vegetation Present? Yes No ● dric Soil Present? Yes No ●  Wetland Hydrology Present? Yes No ●  Wetland Hydrology Indicators:  Permarks:    Vestand Hydrology Indicators:	rdrophytic Vegetation Present? Yes	Is the Sampled Area within a Wetland?  Ves No No No Vestand Hydrology Present?  Ves No Vestand Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)	Addroic Soil Present?  Yes No	atures, etc
Is the Sampled Area within a Wetland?  Yes No No Vetrand Hydrology Present?  Vetrand Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)	Addric Soil Present?  Yes No	Addic Soil Present?  Yes No  No  Is the Sampled Area within a Wetland?  No  No  No  No  No  No  No  No  No  N	Avdric Soil Present?  Yes No	
Is the Sampled Area within a Wetland?  Yes No No Vetrand Hydrology Present?  Vetrand Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)	Is the Sampled Area within a Wetland?  Ves No   No   No   No  No  No  No  No  No	Is the Sampled Area within a Wetland?  Ves No   No   Is the Sampled Area within a Wetland?  No   No   No   No   No   No   No   No	Addric Soil Present?  Yes No	
etland Hydrology Present? Yes No  within a Wetland? Yes No  within a W	within a Wetland?  Ves No vithin a Wetland?  Wetland Hydrology Present? Yes No Depth (inches):  Wetland Hydrology Present? Yes No Petala Inagery (Parson Present? Yes No Depth (inches):  Wetland Hydrology Present? Yes No Petala Inagery (Parson Present? Yes No Depth (inches):  Wetland Hydrology Present? Yes No Petala Inagery (Parson Present? Yes No Depth (inches):  Wetland Hydrology Present? Yes No Petala Inagery (Parson Present? Parson Present? Yes No Depth (inches):  Wetland Hydrology Present? Parson Water Table (Parson Present? Parson Present? Parson Parson Present? Parson Present? Parson Present? Parson	Vetland Hydrology   Ves   No   No   Within a Wetland?   Ves   No   Wetland   Ves   Ves   Ves   No   Wetland   Ves   Ves   Ves   Ves   No   Wetland   Ves   Ve	Within a Wetland?   Yes   No   Within a Wetland?   No   Within a Wetland?   Yes   No   Wetland   Yes   No   Wetl	
ydrology  Vetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)	Interpretation   Inte	Interest	Secondary Indicators (minimum of two reprimery Indicators (minimum of two reprimery Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)    Moss Trim Lines (B16)	
Vetland Hydrology Indicators:  Secondary Indicators (minimum of two required)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Iron Deposits (B5)  Water Table (A2)  Sediment Deposits (B5)  Depth (inches):  Water Table Present?  Yes  No  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Wetland Hydrology Present?  Yes  No  Depth (inches):	Secondary Indicators (minimum of two required)	Secondary Indicators (minimum of two required)   Secondary Indicators (minimum of two required)	Secondary Indicators (minimum of two repaired; check all that apply)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)	
Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	Vetland Hydrology Indicators:    Secondary Indicators (minimum of one required; check all that apply)   Surface Soil Cracks (B6)	Vetland Hydrology Indicators:  Secondary Indicators (minimum of two required)  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Prim Muck Surface (C7)  Algal Mat or Crust (B4)  True Aquatic Plants (B14)  Sparsely Vegetated Concave Surface (B8)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Saturation Visible on Aerial Inagery (C9)  Saturation Visible on Aerial Imagery (C9)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Wetland Hydrology Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):  Wetland Hydrology Present?	Wetland Hydrology Indicators:       Secondary Indicators (minimum of two reprimary Indicators (minimum of two reprimary Indicators (minimum of one required; check all that apply)       Secondary Indicators (minimum of two reprimary Indicators (minimum of two	
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Water Marks (B1)  Sediment Deposits (B2)  Drift deposits (B3)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drift deyosits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (B7)  Shallow Aquitard (D3)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drift deyosits (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D1)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Steld Observations:  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Dry Drift deposits (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Saturation (A3)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Prifit deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water (A1)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Prival Aquatic Plants (B14)  Doxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Yes No   Depth (inches):  Wetland Hydrology Present? Yes No   Depth (inches):  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial	Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Soil Cracks (B6)  Surface Soil Cracks (B6)  Sprasely Vegetated Concave Surface (B8)  Prive Aquatic Plants (B14)  Dry Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Yes No Depth (inches):  Wetland Hydrology Present? Yes No Faculty (inches):  Saturation Present?  Yes No Depth (inches):  Surface Water Privation (C1)  Wetland Hydrology Present? Yes No Faculty (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  School True Aquatic Plants (B14)  Sparsely Vegetated Concave Surface  Variance Patterns (B10)  Moss Trim Lines (B16)	
Surface Water (A1)	Surface Water (A1)	Surface Water (A1)	Surface Water (A1)  High Water Table (A2)  Sparsely Vegetated Concave Surface  Hydrogen Sulfide Odor (C1)  Saturation (A3)  True Aquatic Plants (B14)  Hydrogen Sulfide Odor (C1)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)	eduired)
High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Recent Iron Reduction in Tilled Soils (C6)  Crayfish Burrows (C8)  Drift deposits (B3)  Thin Muck Surface (C7)  Saturation Visible on Aerial Imagery (C9)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Depth (inches):  Ves No  Depth (inches):	High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Saturation Visible on Aerial Imagery (C9)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Find Observations:  Find Observations  Find Observation (Described Present?  Yes No  Depth (inches):	High Water Table (A2)	High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Hydrogen Sulfide Odor (C1)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)	· (B8)
Saturation (A3)	Saturation (A3) Oxidized Rhizospheres along Living Roots (C3) Moss Trim Lines (B16)  Water Marks (B1) Presence of Reduced Iron (C4) Dry Season Water Table (C2) Recent Iron Reduction in Tilled Soils (C6) Crayfish Burrows (C8) Saturation Visible on Aerial Imagery (C9) Algal Mat or Crust (B4) Dtift deposits (B5) Inundation Visible on Aerial Imagery (B7) Aquatic Fauna (B13) Water-Stained Leaves (B9) Aquatic Fauna (B13) Depth (inches): Water Table Present? Yes No Depth (inches):	Saturation (A3)	Saturation (A3) Oxidized Rhizospheres along Living Roots (C3) Moss Trim Lines (B16)	(50)
Sediment Deposits (B2)	Sediment Deposits (B2)	Sediment Deposits (B2)	Water Marks (B1) Presence of Reduced Iron (C4) Dry Season Water Table (C2)	
Drift deposits (B3)	Drift deposits (B3)	Drift deposits (B3)		
Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	Sediment Deposits (B2) Recent Iron Reduction in Tilled Soils (C6) Crayfish Burrows (C8)	
Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Fac-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No ● Depth (inches):  Water Table Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):	☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Water Present? Yes ☐ No ⑥ Depth (inches): ☐ Water Table Present? Yes ☐ No ⑥ Depth (inches): ☐ Water Table Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Yes ☐	Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Peth (inches):  Saturation Present?		(C9)
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Vater Table Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):	☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Steld Observations:  Surface Water Present? Yes ○ No ○ Depth (inches):  Water Table Present? Yes ○ No ○ Depth (inches):  Gaturation Present? Yes ○ No ○ Depth (inches):	Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Steld Observations:  Surface Water Present?  Vater Table Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):	- Otter (Explain in Ternance)	
Water-Stained Leaves (B9) Aquatic Fauna (B13)  Microtopographic Relief (D4) FAC-neutral Test (D5)  Field Observations: Surface Water Present?  Water Table Present?  Ves No Depth (inches): Saturation Present? Facturation Present?  Yes No Depth (inches): Saturation Present?  Yes No Depth (inches): Saturation Present? Saturation Present?  Yes No Depth (inches): Saturation Present?  Yes No Saturation Present?  Yes No Saturation Present?	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Seturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Present?		
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Yes No Depth (inches):  Depth (inches):  Yes No Depth (inches):  Yes No Depth (inches):  Yes No Depth (inches):		
Field Observations:  Surface Water Present? Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):  Saturation Present? Yes No Depth (inches):  Saturation Present? Yes No Depth (inches):  Saturation Present? Yes No Depth (inches):	Field Observations: Surface Water Present?  Yes No Depth (inches):  Vater Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Field Observations:  Gurface Water Present? Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):  Gaturation Present? Yes No Depth (inches):  Gaturation Present? Yes No Depth (inches):  Gaturation Present? Yes No Depth (inches):		
Vater Table Present? Yes No Depth (inches):	Vater Table Present? Yes No Depth (inches):	Vater Table Present? Yes No Depth (inches): includes capillary fringe) Yes No Depth (inches): Depth (inches):		
Saturation Present?  Includes capillary fringe)  Yes No Depth (inches):  Wetland Hydrology Present? Yes No No Depth (inches):	Saturation Present? Includes capillary fringe)  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No location No location Present? Yes No location No	Surface Water Present? Yes No Depth (inches):	
includes capillary fringe)  Yes No Depth (inches): Wetland Hydrology Present? Tes No Depth (inches):	Saturation Present? Yes No Depth (inches):	Saturation Present? Yes No Depth (inches):	Water Table Present? Yes No Depth (inches):	
includes capillarly fillinge)	includes capillary fittinge)	includes capillary fininge)	Wotland Hydrology Procent2 YPS \ / NO \*	)
	rescribe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	includes capillary fillige)	

Tree Stratum	
ACE rubrum   30	ndicator Dominance Test worksheet:
2. Carva tomentosa 3.	Number of Dominant Species
3.	That are OBL, FACW, or FAC: 2 (A)  JPL
4.	Total Number of Dominant
5.	Species Across All Strata: 4 (B)
6.	Percent of dominant Species
7.	That Are OBL, FACW, or FAC: 50.0% (A/B)
Sapling-Sapling/Shrub Stratum	Prevalence Index worksheet:
Sapling-Sapling/Shrub Stratum         (Plot size: 15         )         55         = Total Cover           1. Carya tomentosa         10         ✓ 100.0%           2.         0         0.0%           3.         0         0.0%           4.         0         0.0%           5.         0         0.0%           6.         0         0.0%           7.         0         0.0%           8.         0         0.0%           9.         0         0.0%           10.         0         0.0%           8.         0         0.0%           9.         0         0.0%           10.         = Total Cover           1.         = Total Cover           2.         0         0.0%           3.         0         0.0%           4.         0         0.0%           5.         0         0.0%           6.         0         0.0%           7.         0         0.0%           8.         0         0.0%           9.         0         0.0%           1.         Microsteqium vimineum         20         ✓     <	Total % Cover of: Multiply by:
Sapling-Sapling/Shrub Stratum   Plot size: 15	0BL species 0 x 1 = 0
2.	FACW species $0 \times 2 = 0$
3.	JPL
4.	
5 0	FACU speciles $\frac{2}{25}$ x 4 = $\frac{8}{175}$
6.	UPL speciles — 35 x 5 = — 175
7.       0       0.0%         8.       0       0.0%         9.       0       0.0%         10.       0       0.0%         5hrub Stratum (Plot size:)       10       = Total Cover         1.       0       0.0%         2.       0       0.0%         3.       0       0.0%         5.       0       0.0%         6.       0       0.0%         7.       0       0.0%         4.       0       0.0%         7.       0       0.0%         4.       0       0.0%         5.       0       0.0%         4.       0       0.0%         5.       0       0.0%         4.       0       0.0%         5.       0       0.0%         4.       0       0.0%         5.       0       0.0%         4.       0       0.0%         5.       0       0.0%         6.       0       0.0%         7.       0       0.0%         8.       0       0.0%         9.       0       0.0%     <	Column Totals: <u>89</u> (A) <u>339</u> (B)
8.	Prevalence Index = B/A = 3.809
9.	Hydrophytic Vegetation Indicators:
10.	Rapid Test for Hydrophytic Vegetation
Shrub Stratum (Plot size:)       10 = Total Cover         1.       0	Dominance Test is > 50%
1	Prevalence Index is ≤3.0 ¹
1.	Morphological Adaptations <sup>1</sup> (Provide supporting
2.       0       0.0%         3.       0       0.0%         4.       0       0.0%         5.       0       0.0%         6.       0       0.0%         7.       0       0.0%         Herb Stratum (Plot size: 15 )       0       = Total Cover         1. Microstegium vimineum       20       ✓ 90.9%         2. Polystichum acrostichoides       2       9.1%         3.       0       0.0%         4.       0       0.0%         5.       0       0.0%         6.       0       0.0%         7.       0       0.0%         8.       0       0.0%         9.       0       0.0%         10.       0       0.0%         11.       0       0.0%         12.       0       0.0%         12.       0       0.0%         15.       0       0.0%         17.       0       0.0%         18.       0       0.0%         19.       0       0.0%         10.       0       0.0%         10.       0       0.0%	data in Remarks or on a separate sheet)
3.	Problematic Hydrophytic Vegetation 1 (Explain)
4.	<sup>1</sup> Indicators of hydric soil and wetland hydrology must
5.	be present, unless disturbed or problematic.
6.	Definition of Vegetation Strata:
7.	Four Vegetation Strata:
Herb Stratum       (Plot size: 15 )       0 = Total Cover         1. Microstegium vimineum       20	Tree stratum – Consists of woody plants, excluding vines, 3
Merb Stratum       (Plot size: 15)         1. Microstegium vimineum       20       ✓ 90.9%         2. Polystichum acrostichoides       2       9.1%         3.       0       0.0%         4.       0       0.0%         5.       0       0.0%         6.       0       0.0%         7.       0       0.0%         8.       0       0.0%         9.       0       0.0%         10.       0       0.0%         11.       0       0.0%         12.       0       0.0%         Woody Vine Stratum (Plot size: 15)       )       22       = Total Cover         1. Smilax rotundifolia       2       100.0%	in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
2. Polystichum acrostichoides  3.	Sapling/shrub stratum – Consists of woody plants, excluding
3.	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
4 0 □ 0.0% 5 0 □ 0.0% 6 0 □ 0.0% 7 0 □ 0.0% 8 0 □ 0.0% 9 0 □ 0.0% 10 0 □ 0.0% 11 0 □ 0.0% 12 0 □ 0.0% 12 0 □ 0.0% Woody Vine Stratum (Plot size: 15 ) 22 = Total Cover 1 Smilax rotundifolia 2 □ 100.0%	Herb stratum – Consists of all herbaceous (non-woody)
5.	plants, regardless of size, and all other plants less than 3.28 ft tall.
6.	Woody vines – Consists of all woody vines greater than 3.28
7.	ft in height.
8.	Five Vegetation Strata:
9	Tree - Woody plants, excluding woody vines, approximately
10.	20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).
11	Sapling stratum – Consists of woody plants, excluding
12	woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.
Woody Vine Stratum         (Plot size: 15 )         22 = Total Cover           1 _ Smilax rotundifolia         2 100.0%	Shrub stratum – Consists of woody plants, excluding woody
1 Smilax rotundifolia 2 100.0%	vines, approximately 3 to 20 ft (1 to 6 m) in height.
	Herb stratum – Consists of all herbaceous (non-woody)
20 0.0%	plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately
	3 ft (1 m) in height.
3	Woody vines – Consists of all woody vines, regardless of
4	height.
5	Hydrophytic
6	Vegetation
2 = Total Cover	Present? Yes No •
Remarks: (Include photo numbers here or on a separate sheet.)	<b>.</b>

Soil Sampling Point: 21-1 up

Profile Descr	iption: (De	escribe to	the depth	needed to documen	t the indic	ator or co	onfirm the	absence of indicators.)	
Depth		Matrix			lox Featu				
(inches)	-	(moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc2	Texture	Remarks
0-5	10YR	4/6	100					Silt Loam	
5-10	10YR	4/4	100					Silt Loam	
10-14	10YR	5/6	100					Silt Loam	
	-				-				
	-				-			-	
		-						-	
<sup>1</sup> Type: C=Cond	centration. I	D=Denleti	on. RM=Rec	luced Matrix, CS=Cover	ed or Coate	ed Sand Gr	ains 21 oc	ation: PL=Pore Lining. M=N	Matrix
Hydric Soil I		•	on. Ref-Rec	ideed Flactix, C5=Cover	ca or coat	ca Sana Gi	diris Loc		
Histosol (A				☐ Dark Surface (	57)			Indicators for Proble	•
l — `	pedon (A2)			Polyvalue Belov	•	S8) (MLRA	147.148)	2 cm Muck (A10) (I	MLRA 147)
Black Hist				☐ Thin Dark Surfa	•	, ,		Coast Prairie Redox (MLRA 147,148)	(A16)
	Sulfide (A4	+)		Loamy Gleyed			ŕ	Piedmont Floodplai	n Soils (E10)
Stratified	Layers (A5)	ı		Depleted Matrix				(MLRA 136, 147)	11 30115 (1 13)
2 cm Mucl	k (A10) (LR	R N)		Redox Dark Su	rface (F6)			Very Shallow Dark	Surface (TF12)
☐ Depleted	Below Dark	Surface (	A11)	Depleted Dark	Surface (F	7)		Other (Explain in R	emarks)
☐ Thick Darl	k Surface (A	A12)		Redox Depress	. ,				
Sandy Mu MLRA 147	ck Mineral ( ', 148)	(S1) (LRR	N,	☐ Iron-Manganes MLRA 136)	e Masses (	F12) (LRR	N,		
_	yed Matrix	(S4)		Umbric Surface	(F13) (ML	RA 136, 12	22)	2	
Sandy Red		. ,		Piedmont Floor	lplain Soils	(F19) (ML	RA 148)	<sup>3</sup> Indicators of h	ydrophytic vegetation and rology must be present,
Stripped N	Matrix (S6)			Red Parent Ma	terial (F21)	(MLRA 12	7, 147)	unless dis	turbed or problematic.
Restrictive La	ayer (if ob	served):							
Туре:									
Depth (incl	hes):							Hydric Soil Present?	Yes O No 🗨
Remarks:								,	



Photo File: IN	IG_3412.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting:	77°30'39.711"	Lat/Northing: 38°43'40.159"N
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

ibregion (LRR or MLRA): MLRA 148  il Map Unit Name: Dulles silt loam  re climatic/hydrologic conditions on the Vegetation , Soil , of ve Vegetation , Soil , of the Vegetation Present?	illside B in LRR S Lat ne site typical for this time of or Hydrology  significa or Hydrology  naturally	ryear? Yes No (If no ntly disturbed? Are "Norma y problematic? (If needed,	S T R  none): flat Slope: 8.0% /  ong.: 77°30'41.203"W Datum: NAD  NWI classification:  o, explain in Remarks.)  al Circumstances" present? Yes No  ons, transects, important feature	7 4.6 D 83
ndform (hillslope, terrace, etc.): Hibregion (LRR or MLRA): MLRA 148 il Map Unit Name: Dulles silt loam e climatic/hydrologic conditions on the Vegetation , Soil , one vegetation , one vegetation , Soil , one vegetation , one vegetation , Soil , one vegetation ,	in LRR S  Late the site typical for this time of the present of the site typical for this time of the present of the site of t	Local relief (concave, convex,  :: 38°43'40.958"N Lo  i year? Yes No (If no ntly disturbed? Are "Norma ntly disturbed? (If needed, sampling point location  Is the Sampled Area	none): flat Slope: 8.0% /  ong.: 77°30'41.203"W Datum: NAI  NWI classification:  o, explain in Remarks.)  al Circumstances" present? Yes No  n, explain any answers in Remarks.)  ons, transects, important feature	D 83
region (LRR or MLRA): MLRA 148  Map Unit Name: Dulles silt loam  climatic/hydrologic conditions on th  Vegetation , Soil , o  Vegetation , Soil , o  Immary of Findings - Attace  drophytic Vegetation Present? Y  dric Soil Present? Y  etland Hydrology Present?	in LRR S  Late the site typical for this time of the present of the site typical for this time of the present of the site of t	i: 38°43'40.958"N Lo  Fyear? Yes No (If no ntly disturbed? Are "Norma y problematic? (If needed, y sampling point location  Is the Sampled Area	ng.: 77°30'41.203"W Datum: NAL NWI classification:  o, explain in Remarks.)  al Circumstances" present? Yes No ( , explain any answers in Remarks.)  ons, transects, important feature	D 83
Map Unit Name: Dulles silt loam  climatic/hydrologic conditions on th  Vegetation , Soil , o  Vegetation , Soil , o  Immary of Findings - Attace  rdrophytic Vegetation Present? Y  rdric Soil Present? Y  etland Hydrology Present?	ne site typical for this time of or Hydrology significator Hydrology naturally ch site map showing ses No o	i year? Yes No (If no ntly disturbed? Are "Norma problematic? (If needed, sampling point location Is the Sampled Area	NWI classification:  o, explain in Remarks.)  al Circumstances" present? Yes No  , explain any answers in Remarks.)  ons, transects, important feature	)
Map Unit Name: Dulles silt loam  climatic/hydrologic conditions on th  Vegetation , Soil , o  Vegetation , Soil , o  Immary of Findings - Attace  rdrophytic Vegetation Present? Y  rdric Soil Present? Y  etland Hydrology Present?	ne site typical for this time of or Hydrology significator Hydrology naturally ch site map showing ses No o	i year? Yes No (If no ntly disturbed? Are "Norma problematic? (If needed, sampling point location Is the Sampled Area	NWI classification:  o, explain in Remarks.)  al Circumstances" present? Yes No  , explain any answers in Remarks.)  ons, transects, important feature	)
climatic/hydrologic conditions on the Vegetation , Soil , o Vegetation , Soil , o Immary of Findings - Attacked and the Attacked of the Vegetation Present? Yes a vegetation Present?	or Hydrology  significator Hydrology  naturally  naturally  steep showing  see  No	ntly disturbed? Are "Norma , problematic? (If needed,  sampling point location  Is the Sampled Area	o, explain in Remarks.) al Circumstances" present? Yes No ( , explain any answers in Remarks.) ons, transects, important feature	
Vegetation , Soil , o  Vegetation , Soil , o  Immary of Findings - Attace  Addrophytic Vegetation Present? Y  Addric Soil Present? Y  etland Hydrology Present? Y	or Hydrology  significator Hydrology  naturally  naturally  steep showing  see  No	ntly disturbed? Are "Norma , problematic? (If needed,  sampling point location  Is the Sampled Area	al Circumstances" present? Yes No ( , explain any answers in Remarks.)  ons, transects, important feature	
Vegetation , Soil , o  Immary of Findings - Attace  Addrophytic Vegetation Present? Y  Addroic Soil Present? Y  etland Hydrology Present?	ch site map showing  Yes No	y problematic? (If needed, y sampling point location Is the Sampled Area	, explain any answers in Remarks.) ons, transects, important feature	
ummary of Findings - Attac ydrophytic Vegetation Present? Y ydric Soil Present? Y etland Hydrology Present? Y	ch site map showing  'es O No O  'es O No O	sampling point location	ons, transects, important feature	s, etc
ydrophytic Vegetation Present? Y ydric Soil Present? Y etland Hydrology Present? Y	'es ○ No ● 'es ○ No ●	Is the Sampled Area		s, etc
ydric Soil Present?  etland Hydrology Present?	′es O No 🗨		Yes ○ No ●	
rdric Soil Present?  Yetland Hydrology Present?			Yes ○ No •	
etland Hydrology Present?			Yes ∪ No ♥	
ctiana rryarology r resent.	- 1.0			
temarks:				
lydrology				
Vetland Hydrology Indicators:			Cocondan, Indicators (minimum of this required	
Primary Indicators (minimum of one	required: check all that appl	(v)	Secondary Indicators (minimum of two required  Surface Soil Cracks (B6)	<u>.)                                    </u>
Surface Water (A1)	True Aquatic P		Sparsely Vegetated Concave Surface (B8)	
High Water Table (A2)	Hydrogen Sulf	ide Odor (C1)	✓ Drainage Patterns (B10)	
Saturation (A3)	Oxidized Rhizo	spheres along Living Roots (C3)	Moss Trim Lines (B16)	
Water Marks (B1)	Presence of Re	educed Iron (C4)	Dry Season Water Table (C2)	
Sediment Deposits (B2)	Recent Iron Re	eduction in Tilled Soils (C6)	Crayfish Burrows (C8)	
☐ Drift deposits (B3) ☐ Algal Mat or Crust (B4)	☐ Thin Muck Sur	. ,	Saturation Visible on Aerial Imagery (C9)	
Iron Deposits (B5)	U Other (Explain	in Remarks)	☐ Stunted or Stressed Plants (D1) ☐ Geomorphic Position (D2)	
Inundation Visible on Aerial Imagery	(B7)		Shallow Aquitard (D3)	
Water-Stained Leaves (B9)			Microtopographic Relief (D4)	
Aquatic Fauna (B13)			FAC-neutral Test (D5)	
Field Observations:	(2)			
Surface Water Present? Yes	No Depth (inche	s):		
Water Table Present? Yes	No O Depth (inche	S):	vdrology Present? Yes O No 💿	
VAC	No Depth (inche	s):	ydrology Present? 165 C NO C	
	ge, monitoring well, aerial ph	notos, previous inspections), if a	vailable:	
	No Depth (inche	wetland Hy	, e.e.g,	○ No ●

			ominant ecies? _		Sampling Point: 22-1 up
Tree Stratum (Plot size: <u>30</u> )	Absolute % Cover	Re	l.Strat.	Indicator Status	Dominance Test worksheet:
1 Carya tomentosa	25	<b>V</b>	50.0%	UPL	Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)
2 Acer rubrum	25	<b>~</b>	50.0%	FAC	
3			0.0%		Total Number of Dominant Species Across All Strata: 6 (B)
4			0.0%		Species Across Air Strata.
5	_		0.0%		Percent of dominant Species
6			0.0%		That Are OBL, FACW, or FAC: 50.0% (A/B)
7			0.0%		Prevalence Index worksheet:
8.	0		0.0%		Total % Cover of: Multiply by:
(8)	50	= To	tal Cove	r	0BL species 0 x 1 = 0
Sapling-Sapling/Shrub Stratum (Plot size: 15					FACW species 10 x 2 = 20
1 Carya tomentosa		<b>V</b>	33.3%	UPL	FAC species 42 x 3 = 126
2. Ulmus americana		<b>✓</b>	66.7%	FACW	FACU species $\frac{5}{}$ x 4 = $\frac{20}{}$
3			0.0%		UPL species $\frac{30}{30}$ x 5 = $\frac{150}{30}$
4			0.0%		of Lapecies A 5 -
5	_	$\vdash$	0.0%		Column Totals: <u>87</u> (A) <u>316</u> (B)
6	_	$\vdash$	0.0%		Prevalence Index = $B/A = 3.632$
7		Н	0.0%		Hydrophytic Vegetation Indicators:
8	_	Н	0.0%		Rapid Test for Hydrophytic Vegetation
9.		Н	0.0%		☐ Dominance Test is > 50%
10		Ш	0.0%		Prevalence Index is ≤3.0 <sup>1</sup>
Shrub Stratum (Plot size:)	15	= To	otal Cove	r	☐ Morphological Adaptations ¹ (Provide supporting
1	0		0.0%		data in Remarks or on a separate sheet)
2	0		0.0%		Problematic Hydrophytic Vegetation 1 (Explain)
3	0		0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4	0		0.0%		be present, unless disturbed or problematic.
5	0		0.0%		Definition of Vegetation Strata:
6	0		0.0%		Four Vegetation Strata:
7	0		0.0%		Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH),
Herb Stratum (Plot size:)	0	= To	otal Cove	r	regardless of height.
1	0		0.0%		Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2.	_		0.0%		
3			0.0%		Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28
4			0.0%		ft tall.
5	0		0.0%		Woody vines - Consists of all woody vines greater than 3.28   ft in height.
6	0		0.0%		Five Vegetation Strata:
7	0		0.0%		
8	0		0.0%		Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9	0		0.0%		diameter at breast height (DBH).
10	0		0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
11			0.0%		less than 3 in. (7.6 cm) DBH.
12	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody
Woody Vine Stratum (Plot size: 15 )	0	= To	otal Cove	r	vines, approximately 3 to 20 ft (1 to 6 m) in height.  Herb stratum – Consists of all herbaceous (non-woody)
1 Lonicera japonica	5	<b>v</b>	22.7%	FACU	plants, including herbaceous vines, regardless of size, and
2. Smilax rotundifolia	15	✓	68.2%	FAC	woody species, except woody vines, less than approximately   3 ft (1 m) in height.
O Comments weatherns			9.1%	FAC	Woody vines – Consists of all woody vines, regardless of
3. Campsis radicans 4		$\exists$	0.0%		height.
5			0.0%		
56.			0.0%		Hydrophytic
U.,			o.o% otal Cove		Vegetation   Present?   Yes ○ No ●

Soil Sampling Point: 22-1 up

Profile Descr	iption: (De	escribe to	the depth	needed to documen	t the indic	ator or co	onfirm the	absence of indicators.)	•	
Depth Matrix Redox Features										
(inches)	-	(moist)		Color (moist)	%	Type <sup>1</sup>	Loc2	Texture	Remarks	
0-5	5YR	3/4	100					Loam		
5-8	10YR	5/4	100					Coarse Sandy Loam		
8-14	10YR	5/3	50					Silt Loam		
	10YR	5/6	_50					Silt Loam		
			-							
	-							,		
	-							-		
	-	-			-			-		
<sup>1</sup> Type: C=Con	centration.	D=Depletio	on. RM=Red	luced Matrix, CS=Cover	ed or Coate	ed Sand Gr	ains <sup>2</sup> Loc	ation: PL=Pore Lining. M=1	Matrix	
Hydric Soil 1								Indicators for Proble	ematic Hydric Soils <sup>3</sup> :	
Histosol (	,			☐ Dark Surface (	•	50\ (M.D.	4.47.4.40)	2 cm Muck (A10) (	MLRA 147)	
☐ Histic Epip☐ Black Hist	bedon (A2)			Polyvalue Belov	•	, ,		Coast Prairie Redox	x (A16)	
	Sulfide (A4	1)		☐ Thin Dark Surfa			140)	(MLRA 147,148)		
	Layers (A5)	•		Depleted Matrix				Piedmont Floodpla (MLRA 136, 147)	in Soils (F19)	
2 cm Muc	k (A10) (LR	R N)		Redox Dark Su	. ,			Very Shallow Dark	Surface (TF12)	
☐ Depleted	Below Dark	Surface (A	A11)	Depleted Dark	Surface (F	7)		Other (Explain in R	` '	
☐ Thick Dar	k Surface (A	A12)		Redox Depress	. ,				·	
Sandy Mu MLRA 147	ck Mineral ( 7, 148)	(S1) (LRR	N,	Iron-Manganes MLRA 136)	e Masses (	F12) (LRR	N,			
Sandy Gle	eyed Matrix	(S4)		Umbric Surface	(F13) (ML	RA 136, 12	22)	3		
Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 148)								Indicators of by wetland hyd	hydrophytic vegetation and rology must be present,	
Stripped I	Matrix (S6)			Red Parent Ma	terial (F21)	(MLRA 12	7, 147)		sturbed or problematic.	
Restrictive L	ayer (if ob	served):								
Туре:								Hydric Soil Present?	Yes O No •	
Depth (inc	hes):							Tryunc 3011 Fresent:		
Remarks:									he survey area. A data point	
was taken he	re to confi	rm the w	ater move	s through the area af	ter storm	events a	nd does no	ot sit long saturating the	profile.	

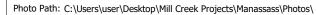




Photo File: IMG\_3413.JPG Orientation: -facing

Lat/Long or UTM: Long/Easting: 77°30'41.203" Lat/Northing: 38°43'40.958"N

Description:



Photo File: IMG\_3415.JPG Orientation: -facing

Lat/Long or UTM: Long/Easting: 0 Lat/Northing: 0

Description:

Abregion (LRR or MLRA): MLRA 148 in LRR S  Lat.: 38°43′51.811″N  Long.: 77°30′47.894″W  NWI classification:  re climatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)  re Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstances on the site typical for this time of year? Yes No Cercumstance on the year? Yes No Cercu	Matt Neely   Section, Township, Range: S   T   R   I   I   I   I   I   I   I   I   I	oject/Site: Manassas Regional A	Airport	City/County: M	anassas	Sampling	Date: 26-Oct-16
ndform (hilslope, terrace, etc.): Hillside	Addrom (hillslope, terrace, etc.): Hillside: Local relief (concave, convex, none): flat	plicant/Owner: Manassas Regio	onal Airport		State: VA	Sampling Point:	23-1 up
Datum: MAD 83   Map Unit Name:   Hatboro silt loam	region (LRR or MLRA): MLRA 148 in LRR S	estigator(s): Matt Neely		Section, Townsh	nip, Range: S	т	R
Map Unit Name: Hatboro silt loam	Map Unit Name: Hatboro silt loam	dform (hillslope, terrace, etc.)	: Hillside	Local relief (conc	ave, convex, none):	flat <b>S</b>	lope: 7.0% / 4.0
Map Unit Name: Hatboro silt loam	Map Unit Name: Hatboro silt loam	region (LRR or MLRA): MLF		 <b>Lat.:</b> 38°43'51.811"N	Long.: 7	7°30'47.894"W	Datum: NAD 83
climatic/hydrologic conditions on the site typical for this time of year? Yes  No  Iff no, explain in Remarks.)  Vegetation  , Soil  , or Hydrology  significantly disturbed?  Are "Normal Circumstances" present? Yes  No  No  No  No  No  No  No  No  No  N	climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation  , Soil  , or Hydrology    significantly disturbed?						
Vegetation   , Soil   , or Hydrology   significantly disturbed?   Are "Normal Circumstances" present?   Yes   No   No	Vegetation	climatic/hydrologic condition	s on the site typical for this	time of year? Yes • No	(If no evol	in in Pemarks \	
Vegetation	Vegetation					•	Yes   No
Immary of Findings - Attach site map showing sampling point locations, transects, important features, exprophytic Vegetation Present? Yes	Immary of Findings - Attach site map showing sampling point locations, transects, important features, et proposition of the property of the pr					•	
Is the Sampled Area within a Wetland?   Yes   No   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   No   No   No   No   No   N	Is the Sampled Area within a Wetland?   Yes   No	Vegetation, Soil	, or Hydrology 🔲 n	aturally problematic?	(If needed, explai	n any answers in Rem	arks.)
Addric Soil Present?  Yes No  No  No  Is the Sampled Area within a Wetland?  Yes No	Is the Sampled Area within a Wetland?  Ves No No No No Within a Wetland?  Ves No No No No Within a Wetland?  Ves No	ımmary of Findings	Attach site map sho	owing sampling poi	nt locations, t	ransects, impor	tant features, etc
Addic Soil Present?  Yes No	retaind Hydrology Present?  Ves No	drophytic Vegetation Present	? Yes O No •				
within a Wetland?  Itemarks:  Indicators (minimum of two required)  Primary Indicators (minimum of two required)  Surface Water (A1)	Within a Wetland?   Wetland?   Wetland?   Wetland?   Wetland?   Wetland?   Wetland?   Wetland?   Wetland?   Wetland Hydrology Indicators:   Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Water Marks (B1)   Presence of Reduced Iron (C4)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Iron Deposits (B5)   Geomorphic Position (D2)   Shallow Aquitard (D3)   Water-Stained Leaves (B9)   Aquatic Fauna (B13)   FAC-neutral Test (D5)   FAC-neutral Test (D5)   Saturation Present? Yes   No  Depth (inches):   Wetland Hydrology Present? Yes   No  Seturation Present? Yes   No  Depth (inches):   Wetland Hydrology Present? Yes			Is the Sa	mpled Area	O O	
Secondary Indicators (minimum of two required)   Surface Soil Cracks (86)	Interpretation   Inte					∪ No ●	
Secondary Indicators:   Secondary Indicators:   Secondary Indicators (minimum of two required)	Secondary Indicators (minimum of two required)   Surface Water (A1)						
Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)						
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Teled Observations:  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drift deposits (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D1)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Steld Observations:  Surface Water Present?  Yes No Depth (inches):  Wetland Hydrology Present? Yes No Fault (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Stelled Observations:  Surface Water Present?  Yes  No  Depth (inches):						
Surface Water (A1)	Surface Water (A1)				Sec	ondarv Indicators (minim	ium of two required)
High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Drainage Patterns (B10)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Ves No   Depth (inches):  Drainage Patterns (B10)  Drainage Patterns (B10)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Ves No  Depth (inches):  Wetland Hydrology Present? Yes No  Depth (inches):  Wetland Hydrology Present? Yes No  Depth (inches):	High Water Table (A2)						
Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Tield Observations:  Urface Water Present?  Ves  No  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):	Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Factoreutral Test (D5)  Depth (inches):  Stutand Hydrology Present?  Wetland Hydrology Present?  Yes  No  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):	_ ` ´		, ,			
Water Marks (B1)	Water Marks (B1)	¬ • ` ′		• , ,			
Sediment Deposits (B2)	Sediment Deposits (B2)	¬ ` ´		, , ,	` '	` '	(C2)
Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	_ ` ` ′		* *			()
☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Water Table Present? Yes ○ No ② Depth (inches): ☐ Vater Table Present? Yes ○ No ③ Depth (inches): ☐ Saturation Present? Yes ○ No ④ Depth (inches): ☐ Water Table Present? Yes ○ No ④ Depth (inches):	Geomorphic Position (D2) Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9) Aquatic Fauna (B13) FAC-neutral Test (D5)  Field Observations: Surface Water Present? Ves No Depth (inches): Vater Table Present? Ves No Depth (inches): Saturation Present?	Drift deposits (B3)	☐ Thin N	1uck Surface (C7)		Saturation Visible on Aei	rial Imagery (C9)
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Sield Observations:  Surface Water Present?  Water Table Present?  Yes No   Depth (inches):  Saturation Present?  Yes No   Depth (inches):  Saturation Present?  Yes No   Depth (inches):  Wetland Hydrology Present?  Yes No   Depth (inches):	Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Factor of the present of		Other	(Explain in Remarks)		Stunted or Stressed Plan	its (D1)
Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Wetland Hydrology Present?  Wetland Hydrology Present?	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Present?		(07)				<u>'</u> )
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Ves No Depth (inches):  Saturation Present?  Ves No Depth (inches):  Wetland Hydrology Present?  Wetland Hydrology Present?  Yes No Depth (inches):  Wetland Hydrology Present?	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):	=	nagery (B7)			,	(D.4)
Field Observations: Surface Water Present?  Ves No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Wetland Hydrology Present?  Wetland Hydrology Present?	Field Observations: Surface Water Present? Yes No Depth (inches): Vater Table Present? Yes No Depth (inches): Saturation Present? Includes capillary fringe)  Depth (inches): Depth (inches): Wetland Hydrology Present? Yes No Depth (inches):	_					(D4)
Ver Company No Depth (inches):  Vater Table Present?  Ver Company No Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Wetland Hydrology Present?  Yes Company No Depth (inches):  Output (inches):  Wetland Hydrology Present?	Furface Water Present?  Yes No Depth (inches):  Vater Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):					TAC-fledital Test (D3)	
Water Table Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches):	Water Table Present? Yes No Depth (inches):		s O No O Dep	th (inches):			
Saturation Present? Ves No Penth (inches): Wetland Hydrology Present? Yes No Penth (inches):	Saturation Present? (includes capillary fringe)  Yes No Depth (inches):  Wetland Hydrology Present? Yes No O	Water Table Present? Ye	s O No O Den	th (inches):			_
includes capillary fringe) Tes V NO S Deput (inclies):	includes capillary fringe)			-	Wetland Hydrolog	y Present? Yes	⊃ No  ●
	Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	includes capillary fringe)					
emarks:							
emarks:							
emarks:							
emarks:							
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emarks:							
Remarks:							
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lemarks:							
Remarks:							
Remarks:							

			ominant oecies?		Sampling Point: 23-1 up
Tree Stratum         (Plot size: 30 )	Absolute % Cover	Re	el.Strat.	Indicator Status	Dominance Test worksheet:
1 B	20	<b>✓</b>	40.0%	FACU	Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)
1 Prunus serotina 2 Juniperus virginiana		<ul><li>✓</li></ul>	40.0%	FACU	That are OBL, FACW, or FAC: (A)
		<ul><li>✓</li></ul>	20.0%	FACU	Total Number of Dominant
		$\Box$	0.0%	TACO	Species Across All Strata: 4 (B)
4 5		П	0.0%		Percent of dominant Species
		$\Box$	0.0%		That Are OBL, FACW, or FAC: 25.0% (A/B)
6	_ —	П	0.0%		Prevalence Index worksheet:
8		П	0.0%		Total % Cover of: Multiply by:
		 = To	otal Cover		0BL species 0 x 1 = 0
Sapling-Sapling/Shrub Stratum (Plot size:	_)	_			FACW species $0 \times 2 = 0$
1	0		0.0%		
2	0		0.0%		· ·
3	0		0.0%		17.00 Species
4	0		0.0%		UPL species $0$ x 5 = $0$
5	0		0.0%		Column Totals:
6	0		0.0%		Prevalence Index = B/A = 3.714
7	0		0.0%		Hydrophytic Vegetation Indicators:
8	0		0.0%		Rapid Test for Hydrophytic Vegetation
9	0		0.0%		Dominance Test is > 50%
10	0		0.0%		Prevalence Index is ≤3.0 ¹
Shrub Stratum (Plot size:)	_	= To	otal Cover		Morphological Adaptations <sup>1</sup> (Provide supporting
1	0	П	0.0%		data in Remarks or on a separate sheet)
2.		$\overline{\Box}$	0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
3		$\overline{\Box}$	0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4	_	$\overline{\Box}$	0.0%		be present, unless disturbed or problematic.
5		$\overline{\Box}$	0.0%		Definition of Vegetation Strata:
		П	0.0%		Four Vegetation Strata:
6		П	0.0%		Tree stratum – Consists of woody plants, excluding vines, 3
7		 = Tr	otal Cover		in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Herb Stratum (Plot size: 15 )					Sapling/shrub stratum – Consists of woody plants, excluding
1 _ Microstegium vimineum			100.0%	FAC	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2			0.0%		Herb stratum – Consists of all herbaceous (non-woody)
3			0.0%		plants, regardless of size, and all other plants less than 3.28
4			0.0%		ft tall. Woody vines – Consists of all woody vines greater than 3.28
5	0		0.0%		ft in height.
6			0.0%		Five Vegetation Strata:
7			0.0%		Tree - Woody plants, excluding woody vines, approximately
8	0	Ш	0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).
9	0	Ш	0.0%		Sapling stratum – Consists of woody plants, excluding
10		Ш	0.0%		woody vines, approximately 20 ft (6 m) or more in height and
11		Н	0.0%		less than 3 in. (7.6 cm) DBH.
12	0	Ш	0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size: 15 )	= 20 =	= To	otal Cover		Herb stratum – Consists of all herbaceous (non-woody)
1 Lonicera japonica	0		0.0%	FACU	plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately
2	0		0.0%		3 ft (1 m) in height.
3	0		0.0%		Woody vines – Consists of all woody vines, regardless of
4			0.0%		height.
5			0.0%		Understoodie
6.	0		0.0%		Hydrophytic Vegetation
+ ·,		_			Present? Yes No •
	0	= T	otal Cover	•	1 resent:

Soil Sampling Point: 23-1 up

Profile Descr	iption: (Describe to	the depth r	eeded to documen	t the indic	cator or co	onfirm the	absence of indicators.)		
Depth	Matrix			lox Featu					
(inches)	Color (moist)		Color (moist)	%	Type 1	Loc2	Texture	Rem	arks
0-10	5YR 4/6	100					Clay Loam		
							-		
							,		
							-		
<sup>1</sup> Type: C=Cond	centration D=Depletic	on RM=Redu	red Matrix CS=Cover	ed or Coate	ed Sand Gr	ains 21 oc	ation: PL=Pore Lining. M=I	Matriy	
Hydric Soil I		on. Kin-Kedu	ced Matrix, CS=Cover	ed of coats	a Sana Gi	airis Loc			2
Histosol (A			Dark Surface (	57)			Indicators for Proble	_	: Soils <sup>3</sup> :
` `	pedon (A2)		Polyvalue Belov	,	CQ\ (MI DA	1/17 1/19)	2 cm Muck (A10) (	MLRA 147)	
Black Hist			Thin Dark Surfa				Coast Prairie Redox	x (A16)	
	Sulfide (A4)					.40)	(MLRA 147,148)		
	Layers (A5)		Loamy Gleyed Depleted Matri:				Piedmont Floodpla (MLRA 136, 147)	in Soils (F19)	
	(A10) (LRR N)		Redox Dark Su				_ `	C (TE12	
	R (A10) (LRR N) Below Dark Surface (A		Depleted Dark		7)		☐ Very Shallow Dark		.)
	k Surface (A12)	A11)	Redox Depress		, )		Other (Explain in F	(emarks)	
	• •		☐ Iron-Manganes		F12\ (I RR I	N			
□□ Sandy Mu MLRA 147	ck Mineral (S1) (LRR i , 148)	Ν,	MLRA 136)	c masses (	1 12) (LICI	ν,			
Sandy Gle	yed Matrix (S4)		Umbric Surface	e (F13) (ML	.RA 136, 12	.2)	2		
☐ Sandy Redox (S5) ☐ Piedmont Floodplain Soils (F19) (MLRA 148)							<sup>3</sup> Indicators of I	nydrophytic ve rology must be	getation and
Stripped Matrix (S6) Red Parent Material (F21) (MLRA 127, 147)								turbed or prob	
	ayer (if observed):								
Type:							Hydric Soil Present?	Yes 🔾	No 💿
Depth (incl	nes):						,		110
Remarks:									
soils are highl	y compacted. Very	difficult to g	jet auger into the g	round.					





Photo File: IMC	G_3416.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting:	77°30'47.894"	Lat/Northing: 38°43'51.811"N
Description:			

Photo File: N	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

Section, Township, Range: S T R   R	sestigator(s): Matt Neely	oject/Site: Manassas Regional Air	rport	City/County: Manassas	Sampling Da	ate: 26-Oct-16
dform (hillslope, terrace, etc.): Flat	dform (hillslope, terrace, etc.): Flat	Dlicant/Owner: Manassas Region	nal Airport	State: V	A Sampling Point:	24-1 wet
region (LRR or MLRA): MLRA 148 in LRR S	region (LRR or MLRA): MLRA 148 in LRR S	estigator(s): Matt Neely		Section, Township, Range:	s т	R
Map Unit Name: Aden Silt Loam	Map Unit Name: Aden Silt Loam	form (hillslope, terrace, etc.):	Flat	Local relief (concave, convex,	, none): concave Slop	e:0.0%//
Map Unit Name: Aden Silt Loam	Map Unit Name: Aden Silt Loam	region (LRR or MLRA): MLRA	A 148 in LRR S	— . <b>at.:</b> 38°43'7.092"N <b>L</b> o	ong.: 77°31'13.214"W	Datum: NAD 83
Colimatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   Vegetation	Climatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)   Vegetation	Map Unit Name: Aden Silt Loa				
Vegetation   , Soil   , or Hydrology   significantly disturbed?   Are "Normal Circumstances" present?   Yes   No   No   No   No   No   No   No   N	Vegetation			of year? Yes No No (If n		
Vegetation	Vegetation   , Soil   , or Hydrology   naturally problematic? (If needed, explain any answers in Remarks.)					/es  No
Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc drophytic Vegetation Present? Yes No Is the Sampled Area within a Wetland? Yes No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No	Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc.  Indicatoric Present? Yes No   No   Is the Sampled Area within a Wetland? Yes No   No   Is the Sampled Area within a Wetland? Yes No   No   Is the Sampled Area within a Wetland? Yes No   No   Is the Sampled Area within a Wetland? Yes No   No   Is the Sampled Area within a Wetland? Yes No   No   Is the Sampled Area within a Wetland? Yes No   No   Is the Sampled Area within a Wetland? Yes No   No   Is the Sampled Area within a Wetland? Yes No   No   No   No   No   No   No   No	Vegetation, Soil	, or Hydrology   signific	cantly disturbed? Are "Norm	ial Circumstances" present?	
drophytic Vegetation Present? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Saturation (As)  No  No  Saturation (As)  No  No  Notifized Rhizospheres along Living Roots (C3)  No  No  Notifized Recent Iron Reduction in Tilled Soils (C6)  No  No  Notifized Recent Iron Reduction in Remarks (B1)  No  Nother (Explain in Remarks)  Nother (C7)  Nother (Explain in Remarks)  No  Nother (B3)  Nother (B4)	drophytic Vegetation Present? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Saturation (Arg. Soil Present? Yes  No  No  No  No  No  No  No  No  No  N	Vegetation, Soil	, or Hydrology 🗌 natura	ally problematic? (If needed	d, explain any answers in Remar	cs.)
Is the Sampled Area within a Wetland?  Yes No	Is the Sampled Area within a Wetland?  Ves No	mmary of Findings - A	ttach site map showir	ng sampling point location	ons, transects, importa	nt features, etc
etland Hydrology Present? Yes No No within a Wetland? Yes No within a Wetland? Yes No within a Wetland? Yes No	etland Hydrology Present?  Wes No No within a Wetland?  Within a Wetland?  Within a Wetland?  Wetland Hydrology Present?  West No	drophytic Vegetation Present?	Yes ● No ○			
etland Hydrology Present?  Yes No within a Wetland?  Wetland Hydrology Present?  No Secondary Indicators:  Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Surface Water (A1) True Aquatic Plants (B14) Sparsely Vegetated Concave Surface (B8)  High Water Table (A2) Hydrogen Sulfide Odor (C1) Saturation (A3) Oxidized Rhizospheres along Living Roots (C3) Moss Trim Lines (B16)  Water Marks (B1) Presence of Reduced Iron (C4) Dry Season Water Table (C2)  Sediment Deposits (B2) Recent Iron Reduction in Tilled Soils (C6) Crayfish Burrows (C8)  Drift deposits (B3) Thin Muck Surface (C7) Saturation Visible on Aerial Imagery (C9)  Algal Mat or Crust (B4) Other (Explain in Remarks)  Water-Stained Leaves (B9) Microtopographic Relief (D4)  Water-Stained Leaves (B9) Depth (inches):  Water Table Present? Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):  Wetland Hydrology Present? Yes No Depth (inches):	tenarks: his area is a low area surrounded by hight topography on all sides with a drainage way connecting to the larger wetlan system to the south. Subtle on otice in the fall.    Vational Hydrology   Vetland Hydrology Indicators:	dric Soil Present?	Yes   No	Is the Sampled Area	V (A) N- (	
Interest	Interest		Yes   No	within a Wetland?	Yes ♥ No ∪	
his area is a low area surrounded by hight topography on all sides with a drainage way connecting to the larger wetlan system to the south. Subtle on ortice in the fall.    Indicators   I	Algal Mat or Crust (B4)  Defined To Deposits (B3)  Diff deposits (B4)  Diff deposits (B5)  Depth (inches):  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Wetland Hydrology Present?  Yes  No  Depth (inches):					
Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	ydrology				
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Water Marks (B1)  Sediment Deposits (B2)  Drift deposits (B3)  Drift deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Surface Water No  Depth (inches):  Pessent?  Ves  No  Depth (inches):  Drive Aquatic Plants (B14)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Prainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Steld Observations:  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Field Observations:  Field Observations  Ves No  Depth (inches):  Ves No  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Wetland Hydrology Present?  Ves No  Depth (inches):				Cocondon, Indicatore (minimum	of two required)
Surface Water (A1)	Surface Water (A1)		f one required: check all that ar	vlac		. or two reduired)
High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Wetland Hydrology Present?  Yes No  Depth (inches):	High Water Table (A2)					e Surface (B8)
Water Marks (B1)	Water Marks (B1)	High Water Table (A2)	Hydrogen S	ulfide Odor (C1)		,
Sediment Deposits (B2)	Sediment Deposits (B2)	Saturation (A3)	Oxidized Rh	izospheres along Living Roots (C3)	Moss Trim Lines (B16)	
Drift deposits (B3)	Drift deposits (B3)	Water Marks (B1)	Presence of	Reduced Iron (C4)	☐ Dry Season Water Table (C	2)
Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	_ ' ' '	Recent Iron	Reduction in Tilled Soils (C6)		
☐ Iron Deposits (B5) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Microtopographic Position (D2) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ Inundation Pesent (D4) ☐ Pepth (inches): ☐ Use Table Present? ☐ Ves	☐ Iron Deposits (B5) ☐ Shallow Aquitard (D3) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ Inundation Pesent?	_ · · · · ·		` '		• , , ,
☐ Inundation Visible on Aerial Imagery (B7) ☐ Water-Stained Leaves (B9) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Imagery (B7) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ Imagery (B7) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ Imagery (B7) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ Imagery (B7) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ Imagery (B7) ☐ FAC-neutral Test (D5) ☐ Imagery (B7) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ Imagery (B7) ☐ Ima	Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  ield Observations:  urface Water Present?  Ves No ● Depth (inches):  aturation Present?  rough (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Depth (inches):  Wetland Hydrology Present? Yes No ○ No ○ Depth (inches):		U Other (Expla	ain in Remarks)		.D1)
Water-Stained Leaves (B9)  Aquatic Fauna (B13)  ✓ FAC-neutral Test (D5)  ield Observations:  urface Water Present?  Ves No Depth (inches):  aturation Present?  yes No Depth (inches):  aturation Present?  yes No Depth (inches):  bepth (inches):  Depth (inches):  wetland Hydrology Present?  Yes No Depth (inches):	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  ield Observations:  urface Water Present?  Vater Table Present?  Yes ○ No ○ Depth (inches):  aturation Present?  yes ○ No ○ Depth (inches):	_	agery (B7)			
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Furface Water Present?  Ves No Depth (inches):  Vater Table Present?  Ves No Depth (inches):  FAC-neutral Test (D5)  Wetland Hydrology Present?  Yes No Depth (inches):  FAC-neutral Test (D5)  Wetland Hydrology Present?  Yes No Depth (inches):	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Furface Water Present?  Ves No Depth (inches):  Facturation Present?  Ves No Depth (inches):  Facturation Present?  Facturation Prese	_	·9c/ ( <i>b</i> / )			4)
ield Observations:  urface Water Present?  Yes No Depth (inches):  Journal of the present of the	ield Observations:  urface Water Present? Yes No Depth (inches):  Vater Table Present? Yes No Depth (inches):  aturation Present? Yes No Depth (inches):  beth (inches):  Depth (inches):	Aquatic Fauna (B13)				,
Vater Table Present? Yes No Depth (inches): aturation Present? Yes No Depth (inches): includes capillary fringe)	Water Table Present? Yes No Depth (inches): aturation Present? Yes No Depth (inches): includes capillary fringe)				. ,	
aturation Present?  Yes No Depth (inches): Wetland Hydrology Present? Yes No No Depth (inches):	aturation Present?  Yes No Depth (inches): Wetland Hydrology Present? Yes No No	urface Water Present? Yes		thes):		
includes capillary fringe)  Yes No Depth (inches):	iaturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No C	Vater Table Present? Yes	O No Depth (inc	hes):	(2)	
includes capillary fiftige)	includes capillally fiftige)	VAC		Wetland H	lydrology Present? Yes	No $\cup$
	rescribe Necorded Data (Stream gauge, monitoring well, denai priotos, previous inspections), il available.	includes capillary fringe)		· <del></del>	availahlo:	
emarks:						
emarks:						
emarks:						
emarks:						
emarks:						
emarks:						
emarks:						
emarks:						
emarks:						
emarks:						
emarks:						
emarks:						

# **VEGETATION** (Five/Four Strata)- Use scientific names of plants. Dominant

			ominant oecies? _		Sampling Point: 24-1 wet
(0)	Absolute	Re	el.Strat.	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 30 )	% Cover	_		Status	Number of Dominant Species
1 Ouercus palustris	30	<ul><li>✓</li><li>✓</li></ul>	50.0%	FACW	That are OBL, FACW, or FAC:4 (A)
2. Acer rubrum			0.0%	FAC	Total Number of Dominant
3		H	0.0%		Species Across All Strata: 4 (B)
4		Н	0.0%		Percent of dominant Species
5		H	0.0%		That Are OBL, FACW, or FAC: 100.0% (A/B)
6					
7		Н	0.0%		Prevalence Index worksheet:  Total % Cover of: Multiply by:
8		ш - т	0.0% otal Cover		
Sapling-Sapling/Shrub Stratum (Plot size: 15	_)	- 10	otal Covel		0BL species 2 x 1 = 2
1 Acer rubrum	15	<b>✓</b>	75.0%	FAC	FACW species $35 \times 2 = 70$
2. Ulmus americana	5	✓	25.0%	FACW	FAC speci es $\frac{47}{2}$ x 3 = $\frac{141}{2}$
3	0		0.0%		FACU species $0 \times 4 = 0$
4	0		0.0%		UPL species $\frac{0}{x}$ 5 = $\frac{0}{x}$
5	_		0.0%		Column Totals: <u>84</u> (A) <u>213</u> (B)
6			0.0%		Prevalence Index = B/A = 2.536
7	_		0.0%		Hydrophytic Vegetation Indicators:
8			0.0%		Rapid Test for Hydrophytic Vegetation
9,	_		0.0%		✓ Dominance Test is > 50%
10	0		0.0%		✓ Prevalence Index is ≤ 3.0 ¹
Shrub Stratum (Plot size:)	20	= To	otal Cover	•	
1	0		0.0%		Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
2		$\overline{\Box}$	0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
3		П	0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
		П	0.0%		be present, unless disturbed or problematic.
4 5			0.0%		Definition of Vegetation Strata:
		П	0.0%		Four Vegetation Strata:
6		Н	0.0%		Tree stratum – Consists of woody plants, excluding vines, 3
7		 _ T/	otal Cover		in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Herb Stratum (Plot size:)		- ''	Jtai Covei		Sapling/shrub stratum – Consists of woody plants, excluding
1			0.0%		vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2			0.0%		   Herb stratum – Consists of all herbaceous (non-woody)
3		$\sqcup$	0.0%		plants, regardless of size, and all other plants less than 3.28
4			0.0%		ft tall. Woody vines – Consists of all woody vines greater than 3.28
5	0		0.0%		ft in height.
6			0.0%		Five Vegetation Strata:
7			0.0%		Tree - Woody plants, excluding woody vines, approximately
8			0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).
9	0		0.0%		Sapling stratum – Consists of woody plants, excluding
10			0.0%		woody vines, approximately 20 ft (6 m) or more in height and
11			0.0%		less than 3 in. (7.6 cm) DBH.
12	0	Ш	0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size: 15 )		= To	otal Cover	•	Herb stratum – Consists of all herbaceous (non-woody)
1 Smilax rotundifolia	2		50.0%	FAC	plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately
2. Carex lurida	2		50.0%	OBL	3 ft (1 m) in height.
3	0		0.0%		Woody vines – Consists of all woody vines, regardless of
4			0.0%		height.
5			0.0%		Understoodie
6.	0		0.0%		Hydrophytic Vegetation
· · · · · · · · · · · · · · · · · · ·	4	= T	otal Cove	- — — ·	Present? Yes No
			oca. core		

Soil Sampling Point: 24-1 wet

	ription: (De		the depth	needed to				onfirm the	absence of indicators.)		
Depth (inches)	Color	Matrix (moist)	%	Color	Re (moist)	dox Featu %	res1	Loc2	Texture	Dom	marks
0-3	10YR	4/4	100	Color	(IIIOISL)		туре -	LOC-	Silt Loam	Rei	iidi KS
				1015							
3-13	10YR	5/1	90	10YR	5/6	10	_ <u>C</u>	M	Silt Loam		
									-		
-	-			-							
-				-							
										_	
1 Type: C-Con	contration I	)-Donloti	on DM-Doc	ucod Matrix	CS-Cover	od or Coa	tod Sand G	raine 21 oc	ation: PL=Pore Lining. M	-Matriy	
Hydric Soil 1			on. KM=Keu	iuceu Mauix,	C3=C0VEI	eu oi coa	teu Sanu G	I dil i S			2
Histosol (				□ Dar	k Surface (	C7)			Indicators for Prob	-	ic Soils <sup>3</sup> :
	pedon (A2)				•	•	(S8) (MLRA	\ 147 148\	2 cm Muck (A10)	(MLRA 147)	
Black Hist							MLRA 147,		Coast Prairie Red	ox (A16)	
	Sulfide (A4	)			ny Gleyed			110)	(MLRA 147,148)		
	Layers (A5)				leted Matri	•	,		Piedmont Floodp (MLRA 136, 147)	ain Soils (F19)	
	k (A10) (LRI				ox Dark Su				Very Shallow Dar	k Surface (TF1	2)
	Below Dark		A11)	Dep	leted Dark	Surface (F	7)		Other (Explain in		)
_ `	k Surface (A	•	,	Red	ox Depress	ions (F8)				· tomanto)	
	ıck Mineral (	•	N,		-Manganes A 136)	se Masses	(F12) (LRR	N,			
	eyed Matrix	(\$4)			-	e (F13) (M	LRA 136, 1	22)			
	Sandy Redox (S5)						s (F19) (Ml		<sup>3</sup> Indicators of hydrophytic vegetation and		egetation and
	Matrix (S6)						L) (MLRA 1		wetland hydrology must be present, unless disturbed or problematic.		
• • • • • • • • • • • • • • • • • • • •							-, (				
Restrictive L	ayer (if ob	served):									
Type:									Hydric Soil Present?	Yes 💿	No O
Depth (inc	thes):								,	165 ©	110 =
Remarks:											





Photo File: IM	IG_3417.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°31'13.214"	Lat/Northing: 38°43'7.092"N
Description:			

# No Photo

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

### WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

oject/Site: Manassas Regional A	irport	City/0	County: Manassas		Sampling Da	ate: 26-Oct-16
plicant/Owner: Manassas Regio	nal Airport		State:	VA San	npling Point:	24-2 up
estigator(s): Matt Neely		Secti	ion, Township, Range:	: S T		R
dform (hillslope, terrace, etc.):	: Flat	Local r	relief (concave, conve	x, none): flat	Slop	e:2.0%/1.1
oregion (LRR or MLRA): MLR	A 148 in LRR S	 Lat.: 38°43	3'7.869"N	Long.: 77°31'13.	 797"W	Datum: NAD 83
Map Unit Name: Aden Silt Lo	oam				sification:	
climatic/hydrologic conditions	on the site tynica	I for this time of year?	Yes  No  (If	no, explain in Rer	marks )	
Vegetation, Soil	, or Hydrology			mal Circumstance		′es ● No O
					present.	
Vegetation, Soil	, or Hydrology	naturally problem	atic? (If neede	ed, explain any an	swers in Remarl	(s.)
ımmary of Findings - <i>I</i>	Attach site m	ap showing samp	ling point locat	ions, transec	ts, importa	nt features, etc
drophytic Vegetation Present?	Yes O No	•				
/dric Soil Present?	Yes O No	$\odot$	Is the Sampled Are	a Yes O No @		
etland Hydrology Present?	Yes O No	•	within a Wetland?	res Uno G	9	
Remarks:						
łydrology						
Wetland Hydrology Indicators:				Secondary Inc	dicators (minimum	of two required)
Primary Indicators (minimum o	of one required; ch	eck all that apply)			oil Cracks (B6)	or two roadings.
Surface Water (A1)		True Aquatic Plants (B14	+)		/egetated Concave	e Surface (B8)
High Water Table (A2)		Hydrogen Sulfide Odor (0	C1)	Drainage	Patterns (B10)	
Saturation (A3)	[	Oxidized Rhizospheres al	ong Living Roots (C3)		Lines (B16)	
Water Marks (B1)		Presence of Reduced Iron	` '		on Water Table (C	2)
Sediment Deposits (B2)	L	Recent Iron Reduction in	Tilled Soils (C6)		Burrows (C8)	T (CO)
☐ Drift deposits (B3) ☐ Algal Mat or Crust (B4)	L	Thin Muck Surface (C7)			n Visible on Aerial r Stressed Plants (	• , , ,
Iron Deposits (B5)	L	Other (Explain in Remark	(S)		nic Position (D2)	,01)
Inundation Visible on Aerial Im	agery (B7)				quitard (D3)	
Water-Stained Leaves (B9)				Microtopo	graphic Relief (D4	•)
Aquatic Fauna (B13)				FAC-neutr	ral Test (D5)	
ield Observations:	O O					
	s O No O	Depth (inches):				
	S O No 💿	Depth (inches):		Hadaalaaa Baaaa	t? Yes	No •
Saturation Present? (includes capillary fringe) Yes	s ○ No ●	Depth (inches):	wetiand	Hydrology Presen	t? les 🔾	140 😊
Describe Recorded Data (strean	n gauge, monitorir	ng well, aerial photos, pre	evious inspections), if	available:		
Remarks:						

# **VEGETATION** (Five/Four Strata)- Use scientific names of plants. Dominant

Sampling Point: 24-2 up
dicator Dominance Test worksheet:
Number of Dominant Species
That are OBL, FACW, or FAC:1(A)
AC Total Number of Deminant
Total Number of Dominant Species Across All Strata:
ACU _
Percent of dominant Species That Are OBL FACW or FAC: 16.7% (A/B)
That Are OBL, FACW, or FAC: 16.7% (A/B)
Prevalence Index worksheet:
Total % Cover of: Multiply by:
OBL species0 x 1 =0
FACW species $0 \times 2 = 0$
FAC species 10 x 3 = 30
FACU speciles 15 x 4 = 60
1700 Speci CS
UIL Species X 3 -
Column Totals:(A)(B)
Prevalence Index = $B/A = 4.500$
Hydrophytic Vegetation Indicators:
Rapid Test for Hydrophytic Vegetation
Dominance Test is > 50%
Prevalence Index is ≤3.0 ¹
Morphological Adaptations <sup>1</sup> (Provide supporting
data in Remarks or on a separate sheet)
Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
Indicators of hydric soil and wetland hydrology must
be present, unless disturbed or problematic.
Definition of Vegetation Strata:
Four Vegetation Strata:
Tree stratum – Consists of woody plants, excluding vines, 3
in. (7.6 cm) or more in diameter at breast height (DBH),
regardless of height.  Sapling/shrub stratum – Consists of woody plants, excluding
vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
Herb stratum – Consists of all herbaceous (non-woody)
plants, regardless of size, and all other plants less than 3.28
ft tall.  Woody vines – Consists of all woody vines greater than 3.28
ft in height.
Five Vegetation Strata:
Tree - Woody plants, excluding woody vines, approximately
20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
diameter at breast height (DBH).
Sapling stratum – Consists of woody plants, excluding   woody vines, approximately 20 ft (6 m) or more in height and
less than 3 in. (7.6 cm) DBH.
Shrub stratum – Consists of woody plants, excluding woody
vines, approximately 3 to 20 ft (1 to 6 m) in height.
Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and
woody species, except woody vines, less than approximately
3 ft (1 m) in height.
Woody vines – Consists of all woody vines, regardless of height.
Hydrophytic
Vegetation N
Present? Yes O No O

Soil Sampling Point: 24-2 up

Profile Descri	iption: (Describe to	the depth	needed to documen	t the indic	ator or co	onfirm the	absence of indicators.)		
Depth	Matrix			lox Featu					
(inches)	Color (moist)	%	Color (moist)	%	Type 1	Loc2	Texture	Remarks	
0-6	10YR4/4	100					Silt Loam		
6-12	10YR 5/6	100					Silt Loam		
							-		
							-		
1 Tymou C-Cone	contration D Donlati	on DM_Dod	used Matrix CC Cover	ad as Casta		nina 21 aa	entions DI Doro Lining Mak	Matrix	
		on. KM=Kea	uced Matrix, CS=Cover	ed or Coate	a Sana Gr	ains ²Loc	cation: PL=Pore Lining. M=N		
Hydric Soil I							Indicators for Proble	ematic Hydric Soils <sup>3</sup>	:
Histosol (A	•		☐ Dark Surface (	•			2 cm Muck (A10) (	MLRA 147)	
	pedon (A2)		Polyvalue Belov				Coast Prairie Redox	x (A16)	
Black Histi			☐ Thin Dark Surfa		LRA 147, 1	.48)	(MLRA 147,148)	,	
	Sulfide (A4)		Loamy Gleyed				Piedmont Floodpla	in Soils (F19)	
	Layers (A5)		Depleted Matrix				(MLRA 136, 147)		
	k (A10) (LRR N)		Redox Dark Su		_		☐ Very Shallow Dark		
	Below Dark Surface (	A11)	Depleted Dark		<b>'</b> )		Other (Explain in R	Remarks)	
Thick Dark	k Surface (A12)		Redox Depress						
Sandy Mu MLRA 147	ck Mineral (S1) (LRR ', 148)	N,	Iron-Manganes MLRA 136)						
Sandy Gle	eyed Matrix (S4)		Umbric Surface	(F13) (ML	RA 136, 12	.2)	2		
Sandy Red	dox (S5)		☐ Piedmont Floor	lplain Soils	(F19) (MLI	RA 148)	<sup>3</sup> Indicators of hydrophytic vegetation and wetland hydrology must be present,		n and
Stripped M	Matrix (S6)		Red Parent Ma	terial (F21)	(MLRA 12	7, 147)		sturbed or problemation	
Restrictive La	ayer (if observed):								
Type:	ayer (ii observeu):								
Depth (inch							Hydric Soil Present?	Yes ○ No •	)
	1103)								
Remarks:									



Photo File: IN	IG_3418.JPG Orientation:	-facing
at/Long or UTM :	Long/Easting: 77°31'13.797"	Lat/Northing: 38°43'7.869"N
Description:		

# No Photo

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

### WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

e Vegetation , Soil , or Hyd	e typical for this time of y drology significant drology naturally p site map showing : No • No •	tly disturbed? Are "Nor problematic? (If need	e: S T R  ex, none): flat Slope:	)
bregion (LRR or MLRA): MLRA 148 in LF il Map Unit Name: Aden Silt Loam e climatic/hydrologic conditions on the site e Vegetation , Soil , or Hyd e Vegetation , Soil , or Hyd e Vegetation Present? Yes lydrophytic Vegetation Present? Yes lydric Soil Present? Yes lydric Soi	e typical for this time of y drology significant drology naturally p site map showing : No • No •	Local relief (concave, conversations)  38°43'6.994"N  year? Yes  No  (If the lift of the l	Long.: flat Slope: 0.0% / Long.: 77°31'14.463"W Datum: NAD  NWI classification:  If no, explain in Remarks.)  rmal Circumstances" present? Yes No Cled, explain any answers in Remarks.)  tions, transects, important features	)
region (LRR or MLRA): MLRA 148 in LE Map Unit Name: Aden Silt Loam  climatic/hydrologic conditions on the site Vegetation , Soil , or Hyd Vegetation , Soil , or Hyd Immary of Findings - Attach s Addrophytic Vegetation Present? Yes Addrophytic Vegetation on Hydrophytic Vegetation Present? Yes Addrophytic Vegetation Pr	e typical for this time of y drology significant drology naturally p site map showing : No • No •	38°43'6.994"N  year? Yes No (If the disturbed? Are "Nor problematic? (If need sampling point located is the Sampled Are	Long.: 77°31'14.463"W Datum: NAD  NWI classification:  If no, explain in Remarks.)  rmal Circumstances" present? Yes No Cled, explain any answers in Remarks.)  tions, transects, important features	)
Map Unit Name: Aden Silt Loam  climatic/hydrologic conditions on the site  Vegetation , Soil , or Hyd  Vegetation , Soil , or Hyd  Immary of Findings - Attach s  Idrophytic Vegetation Present? Yes  Idrophytic V	e typical for this time of y drology significant drology naturally p site map showing : No • No •	year? Yes No (If the lift of t	Long.: 77°31'14.463"W Datum: NAD  NWI classification:  If no, explain in Remarks.)  rmal Circumstances" present? Yes No Cled, explain any answers in Remarks.)  tions, transects, important features	)
climatic/hydrologic conditions on the site  Vegetation	e typical for this time of y drology significant drology naturally p site map showing s No • No •	year? Yes No (If the lift of t	NWI classification:  If no, explain in Remarks.)  rmal Circumstances" present? Yes No Cled, explain any answers in Remarks.)  tions, transects, important features	
climatic/hydrologic conditions on the site  Vegetation	drology Significant drology naturally p site map showing s No	tly disturbed? Are "Nor problematic? (If need sampling point locat  Is the Sampled Are	rmal Circumstances" present? Yes No Cled, explain any answers in Remarks.)  tions, transects, important features	
Vegetation , Soil , or Hyd Vegetation , Soil , or Hyd Vegetation , Soil , or Hyd Immary of Findings - Attach s Immary of Findings -	drology Significant drology naturally p site map showing s No	tly disturbed? Are "Nor problematic? (If need sampling point locat  Is the Sampled Are	rmal Circumstances" present? Yes No	
Immary of Findings - Attach s  Immary of Findings - Attach s  Inverse of Findings - Attach s	drology	problematic? (If need sampling point local	tions, transects, important features	
Immary of Findings - Attach s ydrophytic Vegetation Present? Yes ydric Soil Present? Yes Yetland Hydrology Present?  Remarks:  Hydrology  Wetland Hydrology Indicators:  Primary Indicators (minimum of one requ Surface Water (A1) High Water Table (A2)	site map showing	sampling point locat	tions, transects, important features	s, etc
ydrophytic Vegetation Present? Yes ydric Soil Present? Yes etland Hydrology Present?  Remarks:  Iydrology  Wetland Hydrology Indicators:  Primary Indicators (minimum of one requ Surface Water (A1) High Water Table (A2)	No • No •	Is the Sampled Are	ea voc No (	s, etc
etland Hydrology Present?  Agenarks:  Iydrology  Wetland Hydrology Indicators:  Primary Indicators (minimum of one requ  Surface Water (A1)  High Water Table (A2)	No ● No ●	Is the Sampled Are within a Wetland?	Yes ○ No •	
Primary Indicators (minimum of one requ Surface Water (A1) High Water Table (A2)	No ●	Is the Sampled Are within a Wetland?	Yes ○ No •	
Remarks:  Hydrology  Wetland Hydrology Indicators:  Primary Indicators (minimum of one requ  Surface Water (A1)  High Water Table (A2)		within a Wetland?		
Hydrology  Wetland Hydrology Indicators:  Primary Indicators (minimum of one requ  Surface Water (A1)  High Water Table (A2)	ired: check all that apply			
Primary Indicators (minimum of one requ Surface Water (A1) High Water Table (A2)	ired; check all that apply			
Surface Water (A1) High Water Table (A2)	ired; check all that apply		Secondary Indicators (minimum of two required)	
High Water Table (A2)		)	Surface Soil Cracks (B6)	
_ • • • • • • • • • • • • • • • • • • •	True Aquatic Pla	ints (B14)	☐ Sparsely Vegetated Concave Surface (B8)	
Saturation (A3)	Hydrogen Sulfide	e Odor (C1)	Drainage Patterns (B10)	
¬ ` ´		oheres along Living Roots (C3)	Moss Trim Lines (B16)	
Water Marks (B1)	☐ Presence of Red	` '	Dry Season Water Table (C2)	
Sediment Deposits (B2)  Drift deposits (B3)	Thin Muck Surfa	luction in Tilled Soils (C6)	Crayfish Burrows (C8) Saturation Visible on Aerial Imagery (C9)	
Algal Mat or Crust (B4)	Other (Explain in	• •	Stunted or Stressed Plants (D1)	
Iron Deposits (B5)	Other (Explain ii	r Kemarks)	Geomorphic Position (D2)	
Inundation Visible on Aerial Imagery (B7)			☐ Shallow Aquitard (D3)	
Water-Stained Leaves (B9)			Microtopographic Relief (D4)	
Aquatic Fauna (B13)			FAC-neutral Test (D5)	
Field Observations: Surface Water Present?  Yes  No	<ul><li>Depth (inches)</li></ul>	١.		
		): Wetland	d Hydrology Present? Yes O No 💿	
Saturation Present? Yes No	Depth (inches)	):		

# **VEGETATION** (Five/Four Strata)- Use scientific names of plants. Dominant

			ominant oecies? _		Sampling Point: 24-3 up
	Absolute	Re	el.Strat.	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 30 )	% Cover		over	Status	Number of Dominant Species
1 Quercus rubra	25	<b>✓</b>	50.0%	FACU	That are OBL, FACW, or FAC: (A)
2. Carva tomentosa		<b>✓</b>	50.0%	UPL	Total Number of Dominant
3	0		0.0%		Species Across All Strata: 4 (B)
4	0	Ц	0.0%		
5	0	Ш	0.0%		Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)
6	0		0.0%		That Are obt, TACW, of TAC.
7	0	Ш	0.0%		Prevalence Index worksheet:
8	0		0.0%		Total % Cover of: Multiply by:
Sapling-Sapling/Shrub Stratum (Plot size: 15	,50=	= T	otal Cover	•	0BL speci es0 x 1 =0
		<b>V</b>	E0 00/	FACU	FACW species x 2 =0
1 Quercus rubra	<u>25</u> 	<ul><li>✓</li><li>✓</li></ul>	50.0%		FAC species0 x 3 =0
2. Carya tomentosa			50.0%	UPL	FACU speciles 50 x 4 = 200
3.			0.0%		UPL species $\frac{50}{250}$ x 5 = $\frac{250}{250}$
4	_		0.0%		' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '
5			0.0%		dorum rotars.
6			0.0%		Prevalence Index = B/A = 4.500
7		Н	0.0%		Hydrophytic Vegetation Indicators:
8		Н	0.0%		Rapid Test for Hydrophytic Vegetation
9	0	Ш	0.0%		☐ Dominance Test is > 50%
10	0	Ш	0.0%		Prevalence Index is ≤3.0 <sup>1</sup>
Shrub Stratum (Plot size:)	50	= T	otal Cover		Morphological Adaptations <sup>1</sup> (Provide supporting
1	0		0.0%		data in Remarks or on a separate sheet)
2.	0		0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
3			0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4	_		0.0%		be present, unless disturbed or problematic.
5.			0.0%		Definition of Vegetation Strata:
6		$\overline{\Box}$	0.0%		Four Vegetation Strata:
7.	0	$\overline{\Box}$	0.0%		Tree stratum – Consists of woody plants, excluding vines, 3
• •		 = To	otal Cover		in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Herb Stratum (Plot size:)					Sapling/shrub stratum – Consists of woody plants, excluding
1	_	Н	0.0%		vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2			0.0%		Herb stratum – Consists of all herbaceous (non-woody)
3		Н	0.0%		plants, regardless of size, and all other plants less than 3.28
4			0.0%		ft tall. Woody vines – Consists of all woody vines greater than 3.28
5	0		0.0%		ft in height.
6			0.0%		Five Vegetation Strata:
7			0.0%		Tree - Woody plants, excluding woody vines, approximately
8	0	Ц	0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9	0	Ш	0.0%		diameter at breast height (DBH).  Sapling stratum – Consists of woody plants, excluding
10	0	Ш	0.0%		woody vines, approximately 20 ft (6 m) or more in height and
11	0		0.0%		less than 3 in. (7.6 cm) DBH.
12	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size:)	0	= T	otal Cover		Herb stratum – Consists of all herbaceous (non-woody)
1	0		0.0%		plants, including herbaceous vines, regardless of size, and
2.	0	$\overline{\Box}$	0.0%		woody species, except woody vines, less than approximately 3 ft (1 m) in height.
•		$\exists$	0.0%		Woody vines – Consists of all woody vines, regardless of
3		$\exists$	0.0%		height.
4					
5			0.0%		Hydrophytic
6		$\Box$	0.0%		Vegetation Present? Yes No •
	0	— т	otal Cove	r	· · · · · · · · · · · · · · · · · · ·

Soil Sampling Point: 24-3 up

Profile Descri	iption: (Describe to	the depth	needed to documen	t the indic	ator or co	onfirm the	absence of indicators.)		
Depth	Matrix			lox Featu					
(inches)	Color (moist)	%	Color (moist)	%	Type 1	Loc2	Texture	Remarks	
0-6	10YR4/4	100					Silt Loam		
6-12	10YR 5/6	100					Silt Loam		
							-		
							-		
1 Tymou C Cone	contration D Donlati	on DM_Dad	used Matrix CC Cover	ad as Casta		nine 21 oc	entions DI Doro Lining Mak	Matrix	
		on. KM=Kea	uced Matrix, CS=Cover	ed or Coate	a Sana Gr	ains ²Loc	cation: PL=Pore Lining. M=N		
Hydric Soil I							Indicators for Proble	ematic Hydric Soils <sup>3</sup>	:
Histosol (A	•		☐ Dark Surface (	•			2 cm Muck (A10) (	MLRA 147)	
	pedon (A2)		Polyvalue Belov				Coast Prairie Redox	x (A16)	
Black Histi			☐ Thin Dark Surfa		LRA 147, 1	.48)	(MLRA 147,148)	,	
	Sulfide (A4)		Loamy Gleyed				Piedmont Floodpla	in Soils (F19)	
	Layers (A5)		Depleted Matrix				(MLRA 136, 147)		
	k (A10) (LRR N)		Redox Dark Su		_		☐ Very Shallow Dark		
	Below Dark Surface (	A11)	Depleted Dark		<b>'</b> )		Other (Explain in R	Remarks)	
Thick Dark	k Surface (A12)		Redox Depress						
Sandy Mu MLRA 147	ck Mineral (S1) (LRR ', 148)	N,	Iron-Manganes MLRA 136)						
Sandy Gle	eyed Matrix (S4)		Umbric Surface	(F13) (ML	RA 136, 12	.2)	2		
Sandy Red	dox (S5)		☐ Piedmont Floor	lplain Soils	(F19) (MLI	RA 148)	<sup>3</sup> Indicators of hydrophytic vegetation and wetland hydrology must be present,		n and
Stripped M	Matrix (S6)		Red Parent Ma	terial (F21)	(MLRA 12	7, 147)		sturbed or problemation	
Restrictive La	ayer (if observed):								
Type:	ayer (ii observeu):								
Depth (inch							Hydric Soil Present?	Yes ○ No •	)
	1103)								
Remarks:									



Photo File: IN	IG_3419.JPG	Orientation:	-facing
_at/Long or UTM :	Long/Easting	: 77°31'14.463"	Lat/Northing: 38°43'6.994"N
Description:			

# No Photo

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

### WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Independent (hillslope, terrace, etc.): Footslope  Local relief (concave, convex, none): flat  Slope: 0.0% / 0.0  Datum: NAD 83  I Map Unit Name: Aden Silt Loam  NWI classification:  Climatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)  Regetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No No vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)  Lat.: 38°43'6.232"N  NWI classification:  Yes No Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)  Lat.: 38°43'6.232"N  NWI classification:  Yes No Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)	westigator(s): Matt Neely Indform (hillslope, terrace, etc.): For three independent of the property of the pro	cootslope 8 in LRR S  he site typical for the site map site site site site site site site site	Local relief (co	nship, Range: S concave, convex, none N Long.: No (If no, ex	e): flat Slo 77°31'12.796"W  NWI classification: plain in Remarks.)  rcumstances" present?	Pipe: 0.0% / 0.0 o
adform (hillslope, terrace, etc.): Footslope   Local relief (concave, convex, none): flat   Slope: 0,0% / 0,0   pregion (LRR or MLRA): MLRA 148 in LRR   Lat.: 38°43′6.232″N   Long.: 77°31′12.796″W   Datum: NAD 83   IMap Unit Name: Aden Silt Loam   NWI classification:   climatic/hydrologic conditions on the site typical for this time of year? Yes  No	bregion (LRR or MLRA): MLRA 14 il Map Unit Name: Aden Silt Loam e climatic/hydrologic conditions on the Vegetation , Soil , the Vegetation Present?	he site typical for the or Hydrology or Hydrology character site map s	Local relief (co	No (If no, ex	e): flat Slo 77°31'12.796"W  NWI classification: plain in Remarks.) rcumstances" present?	Datum: NAD 83
Map Unit Name:   Aden Silt Loam	region (LRR or MLRA): MLRA 14.  Map Unit Name: Aden Silt Loam  climatic/hydrologic conditions on t  Vegetation , Soil ,  Vegetation , Soil ,  Immary of Findings - Atta  ydrophytic Vegetation Present?	he site typical for the or Hydrology or Hydrology character site map s	Lat.: 38°43'6.232"  nis time of year? Yes  significantly disturbed?  naturally problematic?	No (If no, ex	77°31'12.796"W  NWI classification:  plain in Remarks.)  rcumstances" present?	Datum: NAD 83
Map Unit Name: Aden Silt Loam	Map Unit Name: Aden Silt Loam  climatic/hydrologic conditions on t  Vegetation , Soil ,  Vegetation , Soil ,  immary of Findings - Atta  drophytic Vegetation Present?	he site typical for the or Hydrology or Hydrology or Hydrology och site map s	nis time of year? Yes significantly disturbed?	No (If no, ex	NWI classification: plain in Remarks.) rcumstances" present?	
Map Unit Name: Aden Silt Loam	Map Unit Name: Aden Silt Loam  climatic/hydrologic conditions on t  Vegetation , Soil ,  Vegetation , Soil ,  immary of Findings - Atta  drophytic Vegetation Present?	he site typical for the or Hydrology or Hydrology or Hydrology och site map s	nis time of year? Yes significantly disturbed?	No (If no, ex	NWI classification: plain in Remarks.) rcumstances" present?	
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   Vegetation	climatic/hydrologic conditions on t  Vegetation , Soil ,  Vegetation , Soil ,  Immary of Findings - Atta  Adrophytic Vegetation Present?	or Hydrology  or Hydrology  och site map s	significantly disturbed? naturally problematic?	Are "Normal Cir	plain in Remarks.)	Yes ● No ○
Vegetation	Vegetation , Soil , , Vegetation , Soil , ,  Immary of Findings - Atta  Adrophytic Vegetation Present?  Adric Soil Present?	or Hydrology  or Hydrology  och site map s	significantly disturbed? naturally problematic?	Are "Normal Cir	rcumstances" present?	Yes   No
Interpretation	Vegetation , Soil , , , , , , , , , , , , , , , , , , ,	or Hydrology   ch site map s	naturally problematic?		•	165 0 110 0
Attach site map showing sampling point locations, transects, important features, etc ydrophytic Vegetation Present? Yes \ No \ No \ was within a Wetland? Yes \ No \ was wetland? Yes \ No \ was particular (noth a yetland and the year of the year of the year of the year of yea	ummary of Findings - Atta ydrophytic Vegetation Present? ydric Soil Present?	ch site map s	• •	(If needed, exp	lain any anguero in Dame	
Advisophytic Vegetation Present? Yes No  Average No	ydrophytic Vegetation Present?		1		лані ану анэмегэ іп кета	ırks.)
Is the Sampled Area within a Wetland?  Wetland Hydrology Present?  Wetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Algal Mat or Crust (B4)  Water Stained Leaves (B9)  Water Stained Leaves (B9)  Water Stained Leaves (B9)  Water Fable (A2)  Algal Mat or Crust (B4)  Water Stained Leaves (B9)  Water Table Present?  Wetland Hydrology Present?  Yes No   Depth (inches):  Wetland Hydrology Present?  Yes No   Wetland Hydrology Present?  Yes No   Wetland Hydrology Present?  Yes No   Depth (inches):  Wetland Hydrology Present?  Yes No   Depth (inches):  Wetland Hydrology Present?  Yes No   Wetland Hydrology Present?  Yes No   Wetland Hydrology Present?  Yes No   Depth (inches):  Wetland Hydrology Present?  Yes No   Pepth (inches):  Per Advance Methal Attention Reduction of two required.  Presence of Recondance Reduction (D2)  Pepth (inches):  Per Advance Methal Attention Reduction (D2)  Per Advance Methal Reduction Reduction Reduction (D2)  Per Advance Methal Reduction Reduction Reduction (D2)  Per Advance Methal Reduction Reduction Reduction Reduction Redu	ydric Soil Present?		nowing sampling p	oint locations,	, transects, import	ant features, etc
etland Hydrology Present? Yes No • within a Wetland? Yes No • Depth (inches): wetland Hydrology Present? Yes No • No • Depth (inches): wetland Hydrology Present? Yes No • No		Yes 🔾 No 🖲				
Indicators   Primary Indicators   Secondary   Seconda		Yes O No 💿	Is the	Sampled Area	- O N- O	
Secondary_Indicators (minimum of two required)   Primary Indicators (minimum of two required)   Primary Indicators (minimum of one required)   Primary Indicators (minimum of two required:	atland Hydrology Present?	Yes O No 💿			s U NO U	
Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)						
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Trinh Muck Surface (C7)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):	 lydrology					
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  True Aquatic Plants (B14)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Trinh Muck Surface (C7)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Mater-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Depth (inches):  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Sparsely Vegetated Concave Surface (B8)  Sparsely Vegetated Concave Surface (B8)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Saturation Present?  Yes  No  Depth (inches):  Surface Water Present?  Yes  No  No  Depth (inches):  Surface Water Present?  Yes  No  No  Depth (inches):  Surface Water Present?  Yes  No  No  Depth (inches):  Surface Water Present?  No  Depth (inches):  Surface Water Present?  Yes  No  No  Depth (inches):  Surface Water Present?  No  No  Depth (inches):	Wetland Hydrology Indicators:				Secondary Indicators (minimu	
Surface Water (A1)		e required; check all	l that apply)		_	in or two reduired?
Saturation (A3)						ave Surface (B8)
Water Marks (B1)	High Water Table (A2)	☐ Hyd	lrogen Sulfide Odor (C1)			. ,
Sediment Deposits (B2)	Saturation (A3)	Oxi	dized Rhizospheres along Livin	g Roots (C3)	☐ Moss Trim Lines (B16)	
Drift deposits (B3)	Water Marks (B1)	Pre	sence of Reduced Iron (C4)		Dry Season Water Table (	C2)
Algal Mat or Crust (B4)	_ ' ' '	☐ Rec	ent Iron Reduction in Tilled So	oils (C6)		
☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5)  Field Observations: Surface Water Present? Yes No Depth (inches): Water Table Present? Yes No Depth (inches): Gaturation Present? Fincludes capillary fringe) Yes No Depth (inches): ☐ Wetland Hydrology Present? Yes No Depth (inches): ☐ Obertain Test (D5)  Wetland Hydrology Present? Yes No Depth (inches): ☐ Obertain Test (D5)	_ ' ' '		* *	L		• , , ,
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Solution Present?  Yes No Peth (inches):  Solution Present?		☐ Oth	er (Explain in Remarks)	L	$\neg$	` '
Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):		(B7)				
Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):					_	04)
Surface Water Present?  Yes No Depth (inches): Water Table Present?  Yes No Depth (inches):  Depth (inches):  Saturation Present? Includes capillary fringe)  Yes No Depth (inches):  Depth (inches):	Aquatic Fauna (B13)				_	•
Vater Table Present? Yes No Depth (inches):						
Saturation Present?  Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches):	Surface Water Present? Yes	No 🖭 D	epth (inches):	-		
fincludes capillary fringe)  Yes No Depth (inches):	Water Table Present? Yes	No 💿 D	epth (inches):	_		
includes capillary fringe)	VAC	No 💿 D	epth (inches):	Wetland Hydrol	logy Present? Yes	' No ●
	includes capillary fringe)			ecoctions) if availal	hlo:	

# **VEGETATION** (Five/Four Strata)- Use scientific names of plants. Dominant

			ominant oecies? _		Sampling Point: 24-4 up
Tree Stratum (Plot size: <u>30</u> )	Absolute % Cover	Re	el.Strat.	Indicator Status	Dominance Test worksheet:
1. Quercus rubra	25	<b>V</b>	41.7%	FACU	Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)
2 Acer rubrum		_ _	25.0%	FAC	
3 Carva tomentosa			16.7%	UPL	Total Number of Dominant Species Across All Strata: 4 (B)
4. Quercus alba			16.7%	FACU	Species Across All Strata.
5			0.0%		Percent of dominant Species
6			0.0%		That Are OBL, FACW, or FAC: 50.0% (A/B)
7			0.0%		Prevalence Index worksheet:
8.			0.0%		Total % Cover of: Multiply by:
	- 60 :	= To	otal Cover		0BL species
Sapling-Sapling/Shrub Stratum (Plot size: 15	) —				FACW species x 2 =0
1 Carpinus caroliniana	5		16.7%	FAC	FAC species 37 x 3 = 111
2. Carya tomentosa	10	<b>✓</b>	33.3%	UPL	
3 Asimina triloba	15	<b>V</b>	50.0%	FAC	20 100
4	0		0.0%		orL species X 5 = (D)
5	0		0.0%		Column Total s: 94 (A) 359 (B)
6	0	Ц	0.0%		Prevalence Index = $B/A = 3.819$
7	0	Ц	0.0%		Hydrophytic Vegetation Indicators:
8	0		0.0%		Rapid Test for Hydrophytic Vegetation
9.	0		0.0%		Dominance Test is > 50%
0	0		0.0%		Prevalence Index is ≤3.0 ¹
Shrub Stratum (Plot size:)	30 :	= T	otal Cover	i	Morphological Adaptations <sup>1</sup> (Provide supporting
1	0		0.0%		data in Remarks or on a separate sheet)
2.			0.0%		Problematic Hydrophytic Vegetation 1 (Explain)
3			0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4	_		0.0%		be present, unless disturbed or problematic.
5			0.0%		Definition of Vegetation Strata:
6.			0.0%		Four Vegetation Strata:
7.	0		0.0%		Tree stratum – Consists of woody plants, excluding vines, 3
•		 = To	otal Cover		in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Herb Stratum (Plot size:)			0.00/		Sapling/shrub stratum – Consists of woody plants, excluding
1	_		0.0%		vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2			0.0%		Herb stratum – Consists of all herbaceous (non-woody)
3			0.0%		plants, regardless of size, and all other plants less than 3.28 ft tall.
4			-		Woody vines – Consists of all woody vines greater than 3.28
5			0.0%		ft in height.
6					Five Vegetation Strata:
7			0.0%		Tree - Woody plants, excluding woody vines, approximately
8					20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).
9			0.0%		Sapling stratum – Consists of woody plants, excluding
0			0.0%		woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.
1		$\vdash$	0.0%		Shrub stratum – Consists of woody plants, excluding woody
2	0_		0.0% otal Cover		vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size:)	:	= 10	otai Cover		Herb stratum – Consists of all herbaceous (non-woody)
1 Smilax rotundifolia	2	Ш	50.0%	FAC	plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately
2. Lonicera japonica	2		50.0%	FACU	3 ft (1 m) in height.
3	0		0.0%		Woody vines – Consists of all woody vines, regardless of
4	0		0.0%		height.
5			0.0%		Hydrophytic
	0		0.0%		Vegetation Vac Na (8)
6					Present? Yes V No V

Soil Sampling Point: 24-4 up

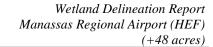
Profile Description: (Describe to the depth	needed to document the indicator or confirm the	absence of indicators.)
Depth <u>Matrix</u>	Redox Features	
(inches) Color (moist) %	Color (moist) % Type 1 Loc2	Texture Remarks
0-6 10YR 4/4 100		Silt Loam
6-12 10YR 5/6 100		Silt Loam
<sup>1</sup> Type: C=Concentration. D=Depletion. RM=Redu	iced Matrix, CS=Covered or Coated Sand Grains 2Loc	ration: PL=Pore Lining. M=Matrix
Hydric Soil Indicators:	·	Indicators for Problematic Hydric Soils <sup>3</sup> :
Histosol (A1)	Dark Surface (S7)	
Histic Epipedon (A2)	Polyvalue Below Surface (S8) (MLRA 147,148)	2 cm Muck (A10) (MLRA 147)
Black Histic (A3)	Thin Dark Surface (S9) (MLRA 147, 148)	☐ Coast Prairie Redox (A16) (MLRA 147,148)
Hydrogen Sulfide (A4)	Loamy Gleyed Matrix (F2)	Piedmont Floodplain Soils (F19)
Stratified Layers (A5)	Depleted Matrix (F3)	(MLRA 136, 147)
2 cm Muck (A10) (LRR N)	Redox Dark Surface (F6)	Very Shallow Dark Surface (TF12)
Depleted Below Dark Surface (A11)	Depleted Dark Surface (F7)	Other (Explain in Remarks)
☐ Thick Dark Surface (A12)	Redox Depressions (F8)	
Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)	☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
Sandy Gleyed Matrix (S4)	Umbric Surface (F13) (MLRA 136, 122)	
Sandy Redox (S5)	Piedmont Floodplain Soils (F19) (MLRA 148)	<sup>3</sup> Indicators of hydrophytic vegetation and
Stripped Matrix (S6)	Red Parent Material (F21) (MLRA 127, 147)	wetland hydrology must be present, unless disturbed or problematic.
	Red Furcht Flaterial (121) (Flater 127, 117)	diffess distarbed of problemade.
Restrictive Layer (if observed):		
Туре:		Hydric Soil Present? Yes ○ No ●
Depth (inches):		Tryunc Son Fresent: 165 C NO C
Remarks:		



IG_3420.JPG	Orientation:	-facing
Long/Easting:	77°31'12.796"	Lat/Northing: 38°43'6.232"N
	_	IG_3420.JPG Orientation:  Long/Easting: 77°31'12.796"

# No Photo

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				



APPENDIX B
USACE Jurisdictional Determination and Supporting Documentation
File: NAO 2017-00508



#### DEPARTMENT OF THE ARMY US ARMY CORPS OF ENGINEERS NORFOLK DISTRICT

FORT NORFOLK 803 FRONT STREET NORFOLK VA 23510-1011

March 14, 2017

### PRELIMINARY JURISDICTIONAL DETERMINATION

Northern Virginia Regulatory Section NAO-2017-00508 (Manassas Regional Airport)

Manassas Regional Airport 10600 Harry J. Parrish Boulevard Manassas, VA 20110

Ladies and/or Gentlemen:

This letter is in regard to your request for a verification of a preliminary jurisdictional determination for waters of the U.S. (including wetlands) on property known as the Manassas Regional Airport, located on an approximately 47 acre parcel, at 10600 Harry J. Parrish Boulevard, in Manassas, Virginia.

The maps entitled "Manassas Regional Airport Corporate Development Environmental Assessment Wetland Delineation Map", by Mill Creek Environmental Consultants, LTD dated October 2016 (copies enclosed) provides the location of waters and/or wetlands on the property listed above. The basis for this delineation includes application of the Corps' 1987 Wetland Delineation Manual and Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region, and the positive indicators of wetland hydrology, hydric soils, and hydrophytic vegetation and the presence of an ordinary high water mark.

Discharges of dredged or fill material, including those associated with mechanized landclearing, into waters and/or wetlands on this site may require a Department of the Army permit and authorization by state and local authorities including a Virginia Water Protection Permit from the Virginia Department of Environmental Quality (DEQ), a permit from the Virginia Marine Resources Commission (VMRC) and/or a permit from your local wetlands board. This letter is a confirmation of the Corps preliminary jurisdiction for the waters and/or wetlands on the subject property and does not authorize any work in these areas. Please obtain all required permits before starting work in the delineated waters/wetland areas.

This is a preliminary jurisdictional determination and is therefore not a legally binding determination regarding whether Corps jurisdiction applies to the waters or wetlands in question. Accordingly, you may either consent to jurisdiction as set out in this preliminary jurisdictional determination and the attachments hereto if you agree with the determination, or you may request and obtain an approved jurisdictional determination.

"This preliminary jurisdictional determination and associated wetland delineation map may be submitted with a permit application."

Enclosed is a copy of the "Preliminary Jurisdictional Determination Form". Please review the document, sign, and return one copy to Ms. Theresita Crockett-Augustine either via email (<a href="mailto:theresita.m.crockett-augustine@usace.army.mil">theresita.m.crockett-augustine@usace.army.mil</a>) or via standard mail to US Army Corps of Engineers, Northern Virginia Field Office at 18139 Triangle Plaza, Suite 213, Dumfries, Virginia 22026 within 30 days of receipt and keep one for your records. This delineation of waters and/or wetlands is valid for a period of five years from the date of this letter unless new information warrants revision prior to the expiration date.

If you have any questions, please contact Ms. Theresita Crockett-Augustine at (703) 221-9736 or <a href="mailto:theresita.m.crockett-augustine@usace.army.mil">theresita.m.crockett-augustine@usace.army.mil</a>.

Sincerely,

Theresita Crockett-Augustine Environmental Scientist Northern Virginia Regulatory Section

Direct Hugustin

**Enclosures** 

### Appendix 2 - PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

### **BACKGROUND INFORMATION:**

A. REPORT COMPLETION DATE FOR PJD: March 14, 2017

#### B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:

Manassas Regional Airport 10600 Harry J. Parrish Boulevard Manassas, VA 20110

**DISTRICT OFFICE, FILE NAME, AND NUMBER:** NAO, Manassas Regional Airport, NAO-2017-00508

# C. PROJECT LOCATION(S) AND BACKGROUND INFORMATION: (USE THE ATTACHED TABLE TO DOCUMENT MULTIPLE WATERBODIES AT DIFFERENT SITES)

State: VIRGINIA County/parish/borough: City: Manassas

Center coordinates of site (lat/long in degree decimal format):

Latitude: 38.723 ° N Longitude: -77.517 ° W

Universal Transverse Mercator:

Name of nearest waterbody: Cannon Branch

### D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☐ Office (Desk) Determination. Date: ☐ Field Determination. Date(s): 2/16/17

## TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION.

Site Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
1			114 LF	RPW	Section 404
2			4.84 acre	Wetland	Section 404
3					

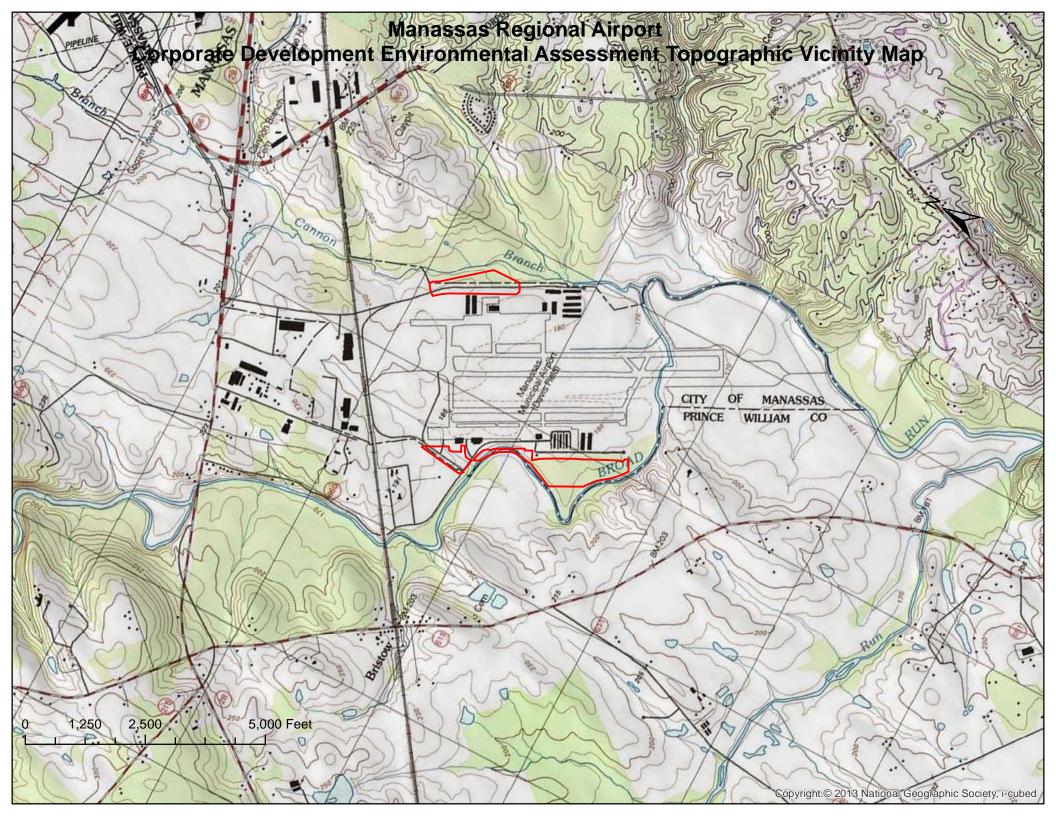
- 1. The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.
- 2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit applicant is hereby made aware that: (1) the permit applicant has elected to seek a permit authorization based on a PJD, which does not make an official determination of jurisdictional aquatic resources; (2) the applicant has the option to request an AJD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an AJD could possibly result in less compensatory mitigation being required or different special conditions; (3) the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) undertaking any activity in reliance upon the subject permit authorization without requesting an AJD constitutes the applicant's acceptance of the use of the PJD; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a PJD constitutes agreement that all aquatic resources in the review area affected in any way by that activity will be treated as jurisdictional, and waives any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an AJD or a PJD, the JD will be processed as soon as practicable. Further, an AJD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331. If, during an administrative appeal, it becomes appropriate to make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there "may be" waters of the U.S. and/or that there "may be" navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:

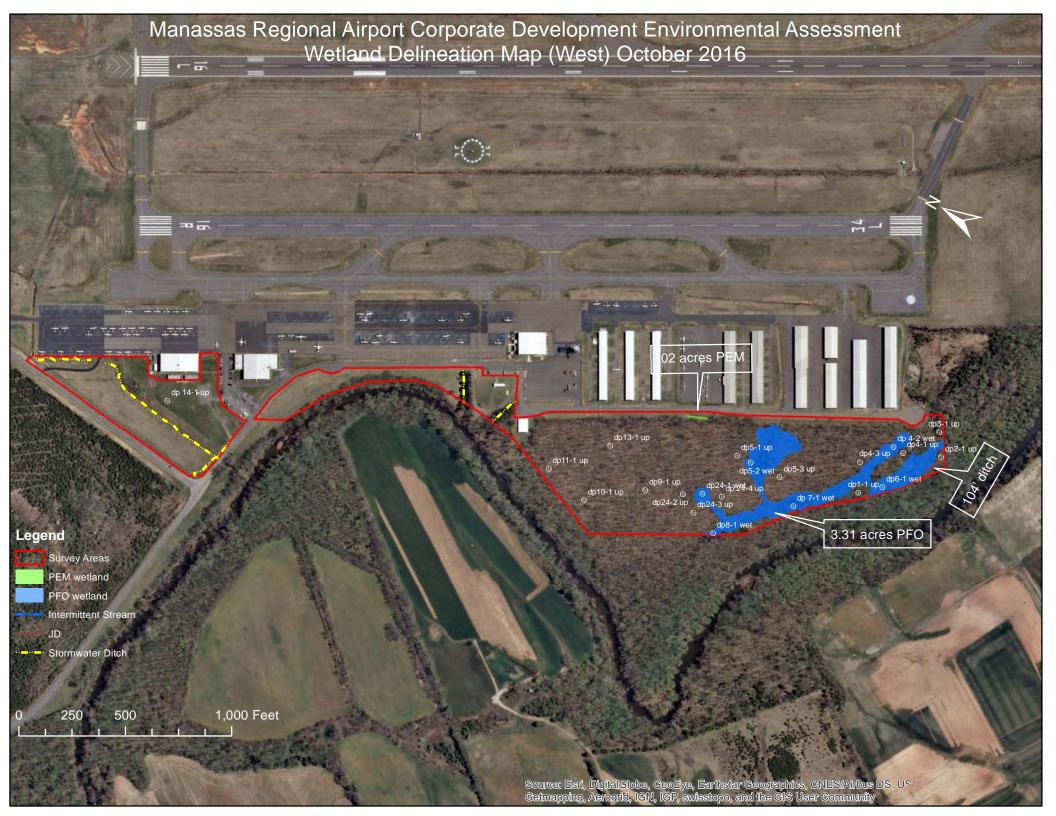
### **SUPPORTING DATA:** Data reviewed for preliminary JD (check all that apply)

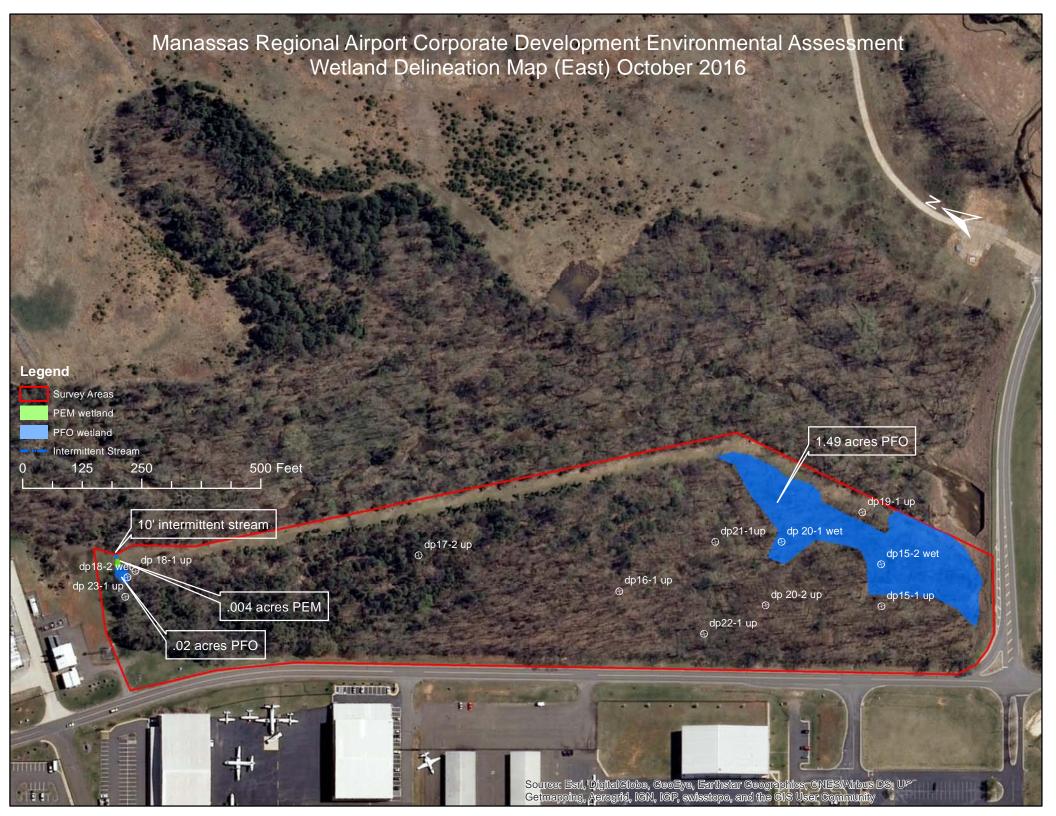
Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items.

⊠Maps, plans, plots Map:	or plat submitted by	or on behalf of the PJD requestor:
⊠Data sheets prepa	red/submitted by or c	on behalf of the PJD requestor.
	with data sheets/deli	neation report.
Office does not	concur with data she	eets/delineation report. Rationale:
Data sheets prepa	red by the Corps:	
☐Corps navigable w	aters' study:	
☐U.S. Geological Su	ırvey Hydrologic Atla	s: USGS
□NHD data.		
USGS 8 and 1	2 digit HUC maps.	
□ U.S. Geological S	Survey map(s). Cite s	cale & quad name:
	s Conservation Serv	ice Soil Survey. Citation:
National wetlands	s inventory map(s).	Cite name:
State/Local wetlar	nd inventory map(s):	
☐ FEMA/FIRM maps	<b>S</b> :	
☐ 100-year Floodpla	in Elevation:	(National Geodetic Vertical Datum of 1929)
□ Photographs	⊠Aerial (Name &	& Date):
or	⊠ Other (Name 8	& Date):
Previous determina	ation(s):	
File no.	and date of respons	e letter:
Other information (	please specify):	
		on this form has not necessarily been upon for later jurisdictional determinations.
Signature and date of Regulatory staff member completing PJD	_	Signature and date of person requesting PJD (REQUIRED, unless obtaining the signature is impracticable) <sup>1</sup>

<sup>1</sup> Districts may establish timeframes for requester to return signed PJD forms. If the requester does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.









### **DEPARTMENT OF THE ARMY US ARMY CORPS OF ENGINEERS** NORFOLK DISTRICT FORT NORFOLK

**803 FRONT STREET** NORFOLK VIRGINIA 23510-1011

MARCH 14, 2017

1. A search of the Virginia Department of Historic Resources data revealed the following:

### **Supplemental Preapplication Information**

Project Number:	NAO-2017-00508	(Manassas Re	gional Airp	ort)

Applicant: Manassas Regional Airport Project Location: Manassas, Virginia

DHR Address Res				ed on the property:	Property Name	es
76- M 036 H	entreville Road - larshall Highway lall Road - Alt Ro Alt Route 234	- Alt Route 55,	Linton Unrestricted	Bristoe Station Batt (Historic), Kettle Ru Station Operations (Historic)	lefield (Historic n Battlefield (H	c), Bull Run Bridge Historic), Manassas
'6- 199 -			Unrestricted	Orange and Alexan Train Tracks, South Intersection (Function	of the Route 2	
	Site	own archaeolo Site Category	gical resources are loc	• •	ty: NR Eligible	Restricted
44PW072		DSS Legacy	Middle Archaic (6500 - Woodland (1200 B.C.		-	Restricted: No
		Logacy	Woodiand (1200 B.C.	- 1606 A.D.)		release
resour  OTE:  1) Th res su Hi. 2) Pr frc of ha co	rces from future and information absources. Undiscontinuous pplemental informations pective permit on granting a perturn power insultation with the continuous power insultation with the continuous pective power insultation with the continuous pective from from from from from from the continuous pective insultation with the continuous pectical	own historic reedevelopment wove is for plann wovered historic mation is not into on Act (NHPA). It dees should be trmit or other assintentionally sign to prevent it, all the Advisory Cou	sources are located in	the vicinity of the post cases, the property on the subject property of the NHPA (16 U.S. who, with intent to avoided a historic property diverse effect to occur, tion (ACHP), determine	y has not been erty or adjacen er Section 106 o C. 470h-2(k)) p id the requiren to which the po unless the Co nes that circum	ntial for effects to surveyed for histor t properties and this of the National prevents the Corps nents of Section 100 ermit would relate, or
resour  NOTE:  1) The resour His resource His	rces from future are information ab sources. Undiscoupplemental information of the NHPA, has inving legal power anting such assistant of the data	own historic ree development bove is for plann bovered historic mation is not into on Act (NHPA). Itees should be simit or other ass intentionally sign to prevent it, all the Advisory Cou- stance despite to	sources are located in in: ing purposes only. In more resources may be located tended to satisfy the Corpaware that Section 110k sistance to an applicant whificantly adversely affect llowed such significant acuncil on Historic Preserva	the vicinity of the post cases, the property don the subject property of the NHPA (16 U.S. who, with intent to avoided a historic property diverse effect to occur, tion (ACHP), determined or permitted by the assertice, the Virginia	y has not been erty or adjacen or Section 106 of C. 470h-2(k)) pid the requirem to which the pounless the Cones that circum applicant.	ntial for effects surveyed for his t properties and of the National prevents the Con ents of Section ermit would relate press, after estances justify of Conservation

☐ The following federally-listed species may occur within the vicinity of the subject property. See attached.

☐ The following state-listed (or other) species may occur within the vicinity of the subject property:

Genus	Species	Subspecies	Common Name	Fedstatus	Statestatus
Alasmidonta	varicosa	-	Floater, brook	-	State Endangered

NHR ID	Site Description	Legal Status	Туре	Site Name
S_1325	This SCU delineates riparian reaches that provide habitat for one or more rare aquatic plants or animals.	SL	SCU	BROAD RUN SCU

Please note this information is being provided to you based on the preliminary data you submitted to the Corps relative to project boundaries and project plans. Consequently, these findings and recommendations are subject to change if the project scope changes or new information becomes available and the accuracy of the data.

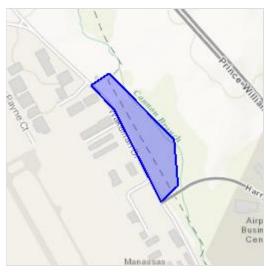
**IPaC** 

U.S. Fish & Wildlife Service

### IPaC resource list

### Location

Manassas and Prince William counties, Virginia



### Local office

Virginia Ecological Services Field Office

(804) 693-6694

(804) 693-9032

6669 Short Lane

Gloucester, VA 23061-4410

http://www.fws.gov/northeast/virginiafield/

## **Endangered species**

This resource list is for informational purposes only and should not be used for planning or analyzing project level impacts.

Page 2 of 9 **IPaC**: Explore Location

Section 7 of the Endangered Species Act requires Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list either from the Regulatory Review section in IPaC or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by creating a project and making a request from the Regulatory Review section.

### Listed species

<sup>1</sup> are managed by the Endangered Species Program of the U.S. Fish and Wildlife Service.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the <u>listing status</u> page for more information.

The following species are potentially affected by activities in this location:

### Flowering Plants

NAME	STATUS					
Harperella Ptilimnium nodosum	Endangered					
No critical habitat has been designated for this species.						
http://ecos.fws.gov/ecp/species/3739						
Mammals						
NAME	STATUS					

### **Mammals**

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis  No critical habitat has been designated for this species.	Threatened
http://ecos.fws.gov/ecp/species/9045	

IPaC: Explore Location Page 3 of 9

### Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

## Migratory birds

Birds are protected under the Migratory Bird Treaty Act

<sup>1</sup> and the Bald and Golden Eagle Protection Act<sup>2</sup>.

Any activity that results in the take (to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct) of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service

3. There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

- 1. The Migratory Birds Treaty Act of 1918.
- 2. The Bald and Golden Eagle Protection Act of 1940.
- 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern <a href="http://www.fws.gov/birds/management/managed-species/">http://www.fws.gov/birds/management/managed-species/</a>
  - birds-of-conservation-concern.php
- Conservation measures for birds <a href="http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/">http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/</a> conservation-measures.php
- Year-round bird occurrence data http://www.birdscanada.org/birdmon/default/datasummaries.jsp

The migratory birds species listed below are species of particular conservation concern (e.g. <u>Birds of Conservation Concern</u>) that may be potentially affected by activities in this location, not a list of every bird species you may find in this location. Although it is important to try to avoid and minimize impacts to all birds, special attention should be made to avoid and minimize impacts to birds of priority concern. To view available data on other bird species that may occur in your project area, please visit the <u>AKN Histogram Tools</u> and <u>Other Bird Data Resources</u>.

NAME	SEASON(S)
American Bittern Botaurus lentiginosus <a href="http://ecos.fws.gov/ecp/species/6582">http://ecos.fws.gov/ecp/species/6582</a>	Wintering
Bald Eagle Haliaeetus leucocephalus <a href="http://ecos.fws.gov/ecp/species/1626">http://ecos.fws.gov/ecp/species/1626</a>	Year-round
Black-billed Cuckoo Coccyzus erythropthalmus <a href="http://ecos.fws.gov/ecp/species/9399">http://ecos.fws.gov/ecp/species/9399</a>	Breeding
Blue-winged Warbler Vermivora pinus	Breeding
Fox Sparrow Passerella iliaca	Wintering
Kentucky Warbler Oporornis formosus	Breeding
Least Bittern Ixobrychus exilis <a href="http://ecos.fws.gov/ecp/species/6175">http://ecos.fws.gov/ecp/species/6175</a>	Breeding
Pied-billed Grebe Podilymbus podiceps	Breeding
Prairie Warbler Dendroica discolor	Breeding
Prothonotary Warbler Protonotaria citrea	Breeding
Red-headed Woodpecker Melanerpes erythrocephalus	Year-round
Rusty Blackbird Euphagus carolinus	Wintering

IPaC: Explore Location Page 5 of 9

Short-eared Owl Asio flammeus Wintering

http://ecos.fws.gov/ecp/species/9295

Snowy Egret Egretta thula Breeding

Willow Flycatcher Empidonax traillii Breeding

http://ecos.fws.gov/ecp/species/3482

Wood Thrush Hylocichla mustelina Breeding

Worm Eating Warbler Helmitheros vermivorum Breeding

What does IPaC use to generate the list of migratory bird species potentially occurring in my specified location?

#### Landbirds:

Migratory birds that are displayed on the IPaC species list are based on ranges in the latest edition of the National Geographic Guide, Birds of North America (6th Edition, 2011 by Jon L. Dunn, and Jonathan Alderfer). Although these ranges are coarse in nature, a number of U.S. Fish and Wildlife Service migratory bird biologists agree that these maps are some of the best range maps to date. These ranges were clipped to a specific Bird Conservation Region (BCR) or USFWS Region/Regions, if it was indicated in the 2008 list of Birds of Conservation Concern (BCC) that a species was a BCC species only in a particular Region/Regions. Additional modifications have been made to some ranges based on more local or refined range information and/or information provided by U.S. Fish and Wildlife Service biologists with species expertise. All migratory birds that show in areas on land in IPaC are those that appear in the 2008 Birds of Conservation Concern report.

#### Atlantic Seabirds:

Ranges in IPaC for birds off the Atlantic coast are derived from species distribution models developed by the National Oceanic and Atmospheric Association (NOAA) National Centers for Coastal Ocean Science (NCCOS) using the best available seabird survey data for the offshore Atlantic Coastal region to date. NOAANCCOS assisted USFWS in developing seasonal species ranges from their models for specific use in IPaC. Some of these birds are not BCC species but were of interest for inclusion because they may occur in high abundance off the coast at different times throughout the year, which potentially makes them more susceptible to certain types of development and activities taking place in that area. For more refined details about the abundance and richness of bird species within your project area off the Atlantic Coast, see the Northeast Ocean Data Portal. The Portal also offers data and information about other types of taxa that may be helpful in your project review.

About the NOAANCCOS models: the models were developed as part of the NOAANCCOS project: Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf. The models resulting from this project are being used in a number

IPaC: Explore Location Page 6 of 9

of decision-support/mapping products in order to help guide decision-making on activities off the Atlantic Coast with the goal of reducing impacts to migratory birds. One such product is the <u>Northeast Ocean Data Portal</u>, which can be used to explore details about the relative occurrence and abundance of bird species in a particular area off the Atlantic Coast.

All migratory bird range maps within IPaC are continuously being updated as new and better information becomes available.

Can I get additional information about the levels of occurrence in my project area of specific birds or groups of birds listed in IPaC?

#### Landbirds:

The <u>Avian Knowledge Network (AKN)</u> provides a tool currently called the "Histogram Tool", which draws from the data within the AKN (latest, survey, point count, citizen science datasets) to create a view of relative abundance of species within a particular location over the course of the year. The results of the tool depict the frequency of detection of a species in survey events, averaged between multiple datasets within AKN in a particular week of the year. You may access the histogram tools through the <u>Migratory</u> <u>Bird Programs AKN Histogram Tools</u> webpage.

The tool is currently available for 4 regions (California, Northeast U.S., Southeast U.S. and Midwest), which encompasses the following 32 states: Alabama, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Jersey, New York, North, Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin.

In the near future, there are plans to expand this tool nationwide within the AKN, and allow the graphs produced to appear with the list of trust resources generated by IPaC, providing you with an additional level of detail about the level of occurrence of the species of particular concern potentially occurring in your project area throughout the course of the year.

#### **Atlantic Seabirds:**

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAANCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

### **Facilities**

Page 7 of 9 **IPaC**: Explore Location

### Wildlife refuges

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGES AT THIS LOCATION.

### Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

# Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local Itation U.S. Army Corps of Engineers District.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

PEM1A

FRESHWATER FORESTED/SHRUB WETLAND

PFO1A

A full description for each wetland code can be found at the National Wetlands Inventory website: https://ecos.fws.gov/ipac/wetlands/decoder

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#### **Data limitations**

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

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#### **Data exclusions**

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

#### **Data precautions**

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.



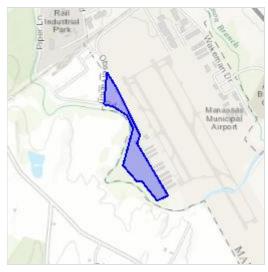
**IPaC** 

U.S. Fish & Wildlife Service

## IPaC resource list

### Location

Manassas County, Virginia



### Local office

Virginia Ecological Services Field Office

(804) 693-6694

(804) 693-9032

6669 Short Lane

Gloucester, VA 23061-4410

http://www.fws.gov/northeast/virginiafield/

## **Endangered species**

This resource list is for informational purposes only and should not be used for planning or analyzing project level impacts.

**IPaC**: Explore Location Page 2 of 8

Section 7 of the Endangered Species Act requires Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list either from the Regulatory Review section in IPaC or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by creating a project and making a request from the Regulatory Review section.

# Listed species

<sup>1</sup> are managed by the Endangered Species Program of the U.S. Fish and Wildlife Service.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the <u>listing status</u> page for more information.

The following species are potentially affected by activities in this location:

# Clams

NAME **STATUS** 

Dwarf Wedgemussel Alasmidonta heterodon ultatic No critical habitat has been designated for this species. http://ecos.fws.gov/ecp/species/784

Endangered

# Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

# Migratory birds

IPaC: Explore Location

Page 3 of 8

Birds are protected under the Migratory Bird Treaty Act

<sup>1</sup> and the Bald and Golden Eagle Protection Act<sup>2</sup>.

Any activity that results in the take (to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct) of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service

3. There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

- 1. The Migratory Birds Treaty Act of 1918.
- 2. The Bald and Golden Eagle Protection Act of 1940.
- 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern <a href="http://www.fws.gov/birds/management/managed-species/">http://www.fws.gov/birds/management/managed-species/</a>
  - birds-of-conservation-concern.php
- Conservation measures for birds <a href="http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php">http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php</a>
- Year-round bird occurrence data http://www.birdscanada.org/birdmon/default/datasummaries.jsp

The migratory birds species listed below are species of particular conservation concern (e.g. <u>Birds of Conservation Concern</u>) that may be potentially affected by activities in this location, not a list of every bird species you may find in this location. Although it is important to try to avoid and minimize impacts to all birds, special attention should be made to avoid and minimize impacts to birds of priority concern. To view available data on other bird species that may occur in your project area, please visit the <u>AKN Histogram Tools</u> and <u>Other Bird Data Resources</u>.

NAME SEASON(S)

American Bittern Botaurus lentiginosus http://ecos.fws.gov/ecp/species/6582 Wintering

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Bald Eagle Haliaeetus leucocephalus <a href="http://ecos.fws.gov/ecp/species/1626">http://ecos.fws.gov/ecp/species/1626</a>	Year-round	
Black-billed Cuckoo Coccyzus erythropthalmus <a href="http://ecos.fws.gov/ecp/species/9399">http://ecos.fws.gov/ecp/species/9399</a>	Breeding	
Blue-winged Warbler Vermivora pinus	Breeding	
Fox Sparrow Passerella iliaca	Wintering	
Kentucky Warbler Oporornis formosus	Breeding	
Least Bittern Ixobrychus exilis <a href="http://ecos.fws.gov/ecp/species/6175">http://ecos.fws.gov/ecp/species/6175</a>	Breeding	
Pied-billed Grebe Podilymbus podiceps	Breeding	
Prairie Warbler Dendroica discolor	Breeding	
Prothonotary Warbler Protonotaria citrea	Breeding	
Red-headed Woodpecker Melanerpes erythrocephalus	Year-round	
Rusty Blackbird Euphagus carolinus	Wintering	
Short-eared Owl Asio flammeus <a href="http://ecos.fws.gov/ecp/species/9295">http://ecos.fws.gov/ecp/species/9295</a>	Wintering	
Snowy Egret Egretta thula	Breeding	
Willow Flycatcher Empidonax traillii <a href="http://ecos.fws.gov/ecp/species/3482">http://ecos.fws.gov/ecp/species/3482</a>	Breeding	
Wood Thrush Hylocichla mustelina	Breeding	

IPaC: Explore Location Page 5 of 8

Worm Eating Warbler Helmitheros vermivorum

Breeding

What does IPaC use to generate the list of migratory bird species potentially occurring in my specified location?

#### Landbirds:

Migratory birds that are displayed on the IPaC species list are based on ranges in the latest edition of the National Geographic Guide, Birds of North America (6th Edition, 2011 by Jon L. Dunn, and Jonathan Alderfer). Although these ranges are coarse in nature, a number of U.S. Fish and Wildlife Service migratory bird biologists agree that these maps are some of the best range maps to date. These ranges were clipped to a specific Bird Conservation Region (BCR) or USFWS Region/Regions, if it was indicated in the 2008 list of Birds of Conservation Concern (BCC) that a species was a BCC species only in a particular Region/Regions. Additional modifications have been made to some ranges based on more local or refined range information and/or information provided by U.S. Fish and Wildlife Service biologists with species expertise. All migratory birds that show in areas on land in IPaC are those that appear in the 2008 Birds of Conservation Concern report.

## **Atlantic Seabirds:**

Ranges in IPaC for birds off the Atlantic coast are derived from species distribution models developed by the National Oceanic and Atmospheric Association (NOAA) National Centers for Coastal Ocean Science (NCCOS) using the best available seabird survey data for the offshore Atlantic Coastal region to date. NOAANCCOS assisted USFWS in developing seasonal species ranges from their models for specific use in IPaC. Some of these birds are not BCC species but were of interest for inclusion because they may occur in high abundance off the coast at different times throughout the year, which potentially makes them more susceptible to certain types of development and activities taking place in that area. For more refined details about the abundance and richness of bird species within your project area off the Atlantic Coast, see the Northeast Ocean Data Portal. The Portal also offers data and information about other types of taxa that may be helpful in your project review.

About the NOAANCCOS models: the models were developed as part of the NOAANCCOS project: Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf. The models resulting from this project are being used in a number of decision-support/mapping products in order to help guide decision-making on activities off the Atlantic Coast with the goal of reducing impacts to migratory birds. One such product is the Northeast Ocean Data Portal, which can be used to explore details about the relative occurrence and abundance of bird species in a particular area off the Atlantic Coast.

All migratory bird range maps within IPaC are continuously being updated as new and better information becomes available.

Can I get additional information about the levels of occurrence in my project area of specific birds or groups of birds listed in IPaC?

## Landbirds:

IPaC: Explore Location Page 6 of 8

The <u>Avian Knowledge Network (AKN)</u> provides a tool currently called the "Histogram Tool", which draws from the data within the AKN (latest, survey, point count, citizen science datasets) to create a view of relative abundance of species within a particular location over the course of the year. The results of the tool depict the frequency of detection of a species in survey events, averaged between multiple datasets within AKN in a particular week of the year. You may access the histogram tools through the <u>Migratory Bird Programs AKN Histogram Tools</u> webpage.

The tool is currently available for 4 regions (California, Northeast U.S., Southeast U.S. and Midwest), which encompasses the following 32 states: Alabama, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Jersey, New York, North, Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin.

In the near future, there are plans to expand this tool nationwide within the AKN, and allow the graphs produced to appear with the list of trust resources generated by IPaC, providing you with an additional level of detail about the level of occurrence of the species of particular concern potentially occurring in your project area throughout the course of the year.

## **Atlantic Seabirds:**

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAANCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

# **Facilities**

Wildlife refuges and fish hatcheries

REFUGE AND FISH HATCHERY INFORMATION IS NOT AVAILABLE AT THIS TIME

# Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under

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Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

This location overlaps the following wetlands:

FRESHWATER FORESTED/SHRUB WETLAND

PFO1C

RIVERINE

R2UBH

A full description for each wetland code can be found at the National Wetlands Inventory website: <a href="https://ecos.fws.gov/ipac/wetlands/decoder">https://ecos.fws.gov/ipac/wetlands/decoder</a>



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## **Data limitations**

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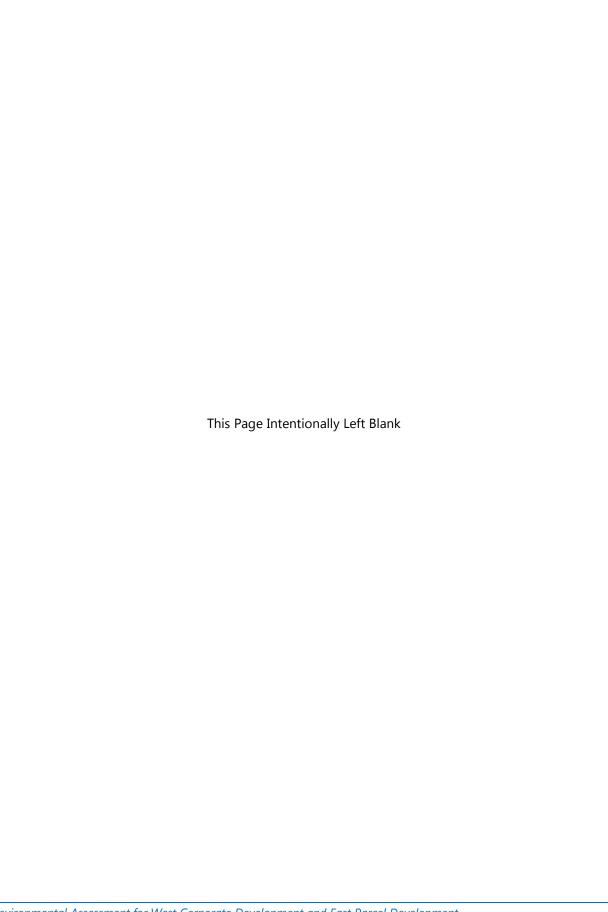
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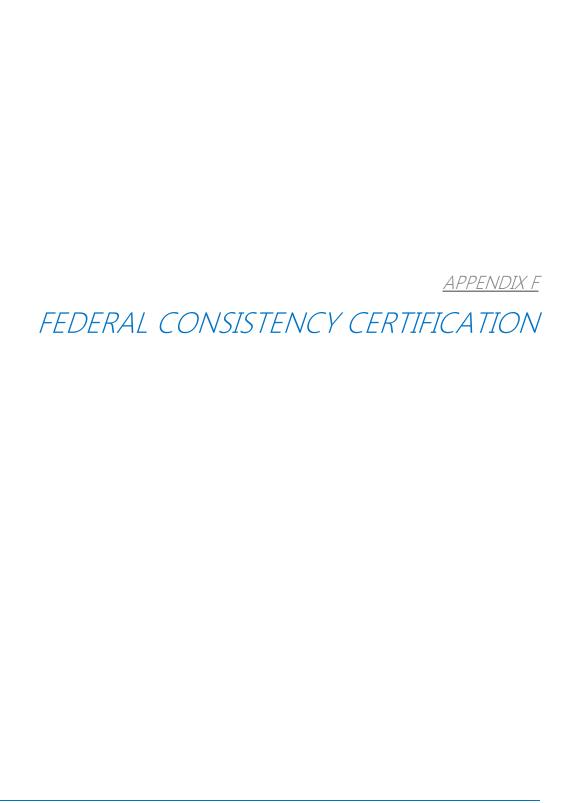
#### Data exclusions

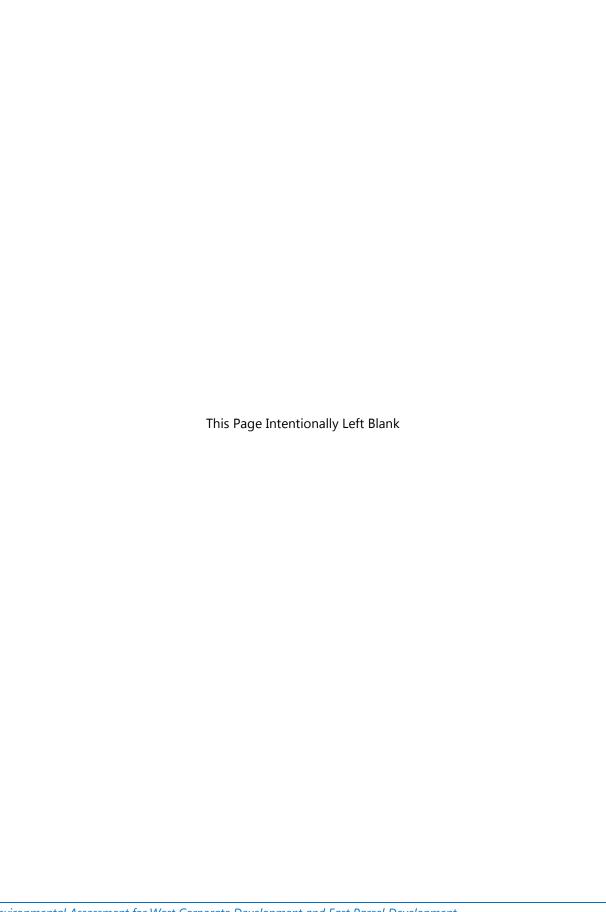
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**FEDERAL** CONSISTENCY **CERTIFICATION** FOR THE MANASSAS REGIONAL AIRPORT WEST CORPORATE **DEVELOPMENT** AND EAST PARCEL

MAY 2017



This document provides the Commonwealth of Virginia with the City of Manassas's (City's) Consistency Certification and necessary data and information under the Coastal Zone Management Act (CZMA) §307(c)(3)(A) and 15 CFR Part 930, subpart D, for the proposed corporate development at the Manassas Regional Airport (Airport).

## **CERTIFICATION**

The City certifies that the proposed activity complies with the enforceable policies of the Virginia Coastal Zone Management Program (VCP) and would be conducted in a manner consistent with the VCP.

## **NECESSARY DATA AND INFORMATION**

The City owns and operates the Airport. The Airport is largely within the City of Manassas, with about 20 acres of land on the east side of the Airport within the limits of Prince William County. The Airport intersects the jurisdictional boundaries of the City of Manassas (an independent city) and Prince William County, Virginia. Figure 1 shows the Airport's location.

The City proposes to redevelop the west side corporate area and develop a parcel on the east side of the Airport (Proposed Project). The west side of the Proposed Project, which Figure 2 shows, includes:

- » On-Airport roadway improvements
- FBO building and parking lot reconstruction
- Corporate hangar/building and parking lot construction
- » T-hangars demolition/replacement and construction and T-hangar parking lot
- West aircraft apron and taxilane tie down parking expansion
- » Taxilane extension
- » Maintenance and storage building construction
- Wash rack construction
- » Utilities extension and stormwater drainage improvements
- » Security fence extension

The east side of the Proposed Project, which Figure 3 shows, includes:

- » On-Airport roadway improvements
- » Corporate hangar/building and parking lot construction
- » Taxilane extension
- » Utilities extension and stormwater drainage improvements
- » Security fence extension

The project study area (about 160 acres) encompasses the area that construction and operation of the Proposed Project may affect. The project study area is primarily undeveloped and consists of mature, mixed hardwood forest; upland vegetation; forested wetlands; and compactly graded grass that the City regularly mows and maintains. There is Airport-related development within the project study area (e.g.,

perimeter road, small structures, navigational aids, and apron areas). The following paragraphs describe the environment characteristics of the project study area.

## ASSESSMENT OF POTENTIAL ENVIRONMENTAL EFFECTS

Because the Airport is federally obligated and must meet Federal Aviation Administration (FAA) requirements, a Federal Consistency Certification (FCC) is being submitted to the Virginia Department of Environmental Quality (VDEQ). All National Environmental Policy Act (NEPA) environmental consequences of this project will be addressed in a FAA Environmental Assessment (EA). All applicable permits would be obtained and complied with throughout the duration of the Proposed Project.

A review of permits and/or approvals required for this Proposed Project under Enforceable Polices of the VCP has been prepared as follows:

- A. Fisheries Management: This program is administered by the Marine Resources Commission (VMRC) (Virginia Code § 28.2-200 to § 28.2-713) and the Department of Game and Inland Fisheries (DGIF) (Virginia Code § 29.1-100 to § 29.1-570). The Proposed Project would not affect finfish or shellfish resources and would not affect the promotion of commercial or recreational fisheries. The project would not use tributyltin (TBT) in any form, nor would it simulate the use of that chemical by any product users. There are no commercial or recreational fisheries in the project study area.
- B. **Subaqueous Land Management**: This program is administered by the VMRC (Virginia Code § 28.2-1200 to § 28.2-1213). The Proposed Project would make use of subaqueous lands managed by the Commonwealth (see Wetlands Management). There are no sole source aquifers in the project study area.

# FIGURE 1 AIRPORT LOCATION



FIGURE 2
WEST SIDE OF PROPOSED PROJECT

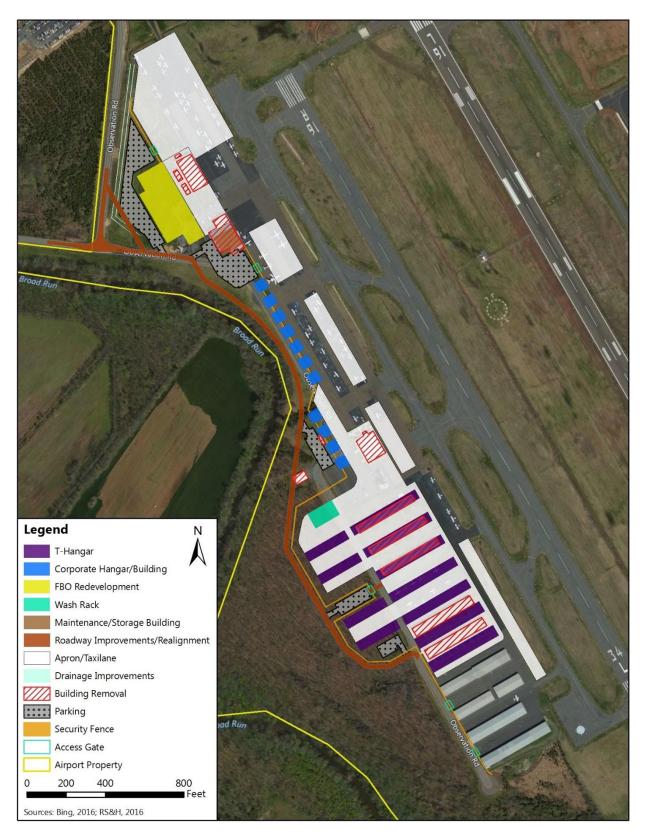


FIGURE 3
EAST SIDE OF PROPOSED PROJECT



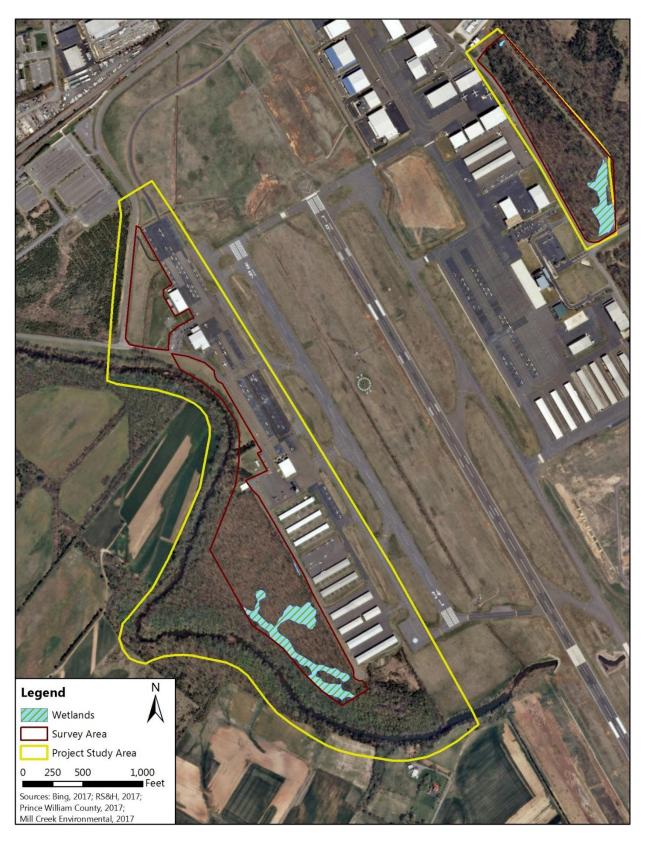
C. Wetlands Management: The tidal wetlands program is administered by the VMRC (Virginia Code § 28.2-1301 through 28.2-1320) while the Virginia Water Protection (VWP) permit program administered by VDEQ includes protection of tidal and non-tidal wetlands (Virginia Code § 62.1-44.15:5) and Water Quality Certification pursuant to Section 401 of the Clean Water Act. There are about 114 linear feet of intermittent/perineal waterway, and about 4.84 acres of Palustrine Emergent wetlands and Palustrine Forested wetlands in the project study area. The intermittent/perineal waterway and wetlands were delineated during a field survey conducted between October 24 and 26 and has undergone a preliminary jurisdictional determination by the United States Army Corps of Engineers (USACE). Figure 4 shows the location of those surface waters and wetlands. Additionally, there are Resource Protection Areas or Resource Management Areas in the project study area (see Figure 5).

The Proposed Project would directly affect about 0.02-acre of nontidal wetlands on the west side of the Airport. No indirect effects to wetlands in this area are anticipated. The development of the east parcel of the project study area would directly affect about 0.70-acre of tidal wetlands and would indirectly affect about 0.8-acre of tidal wetlands. The potential indirect effect would be due to segmentation of the identified wetland area. In total, about 1.5 acres of wetlands would be affected as a result of the Proposed Project. The construction and operation of the Proposed Project would not have a direct or indirect affect the 89-acre parcel that is part of the wetland mitigation site for the construction of Route 234-Bypass.

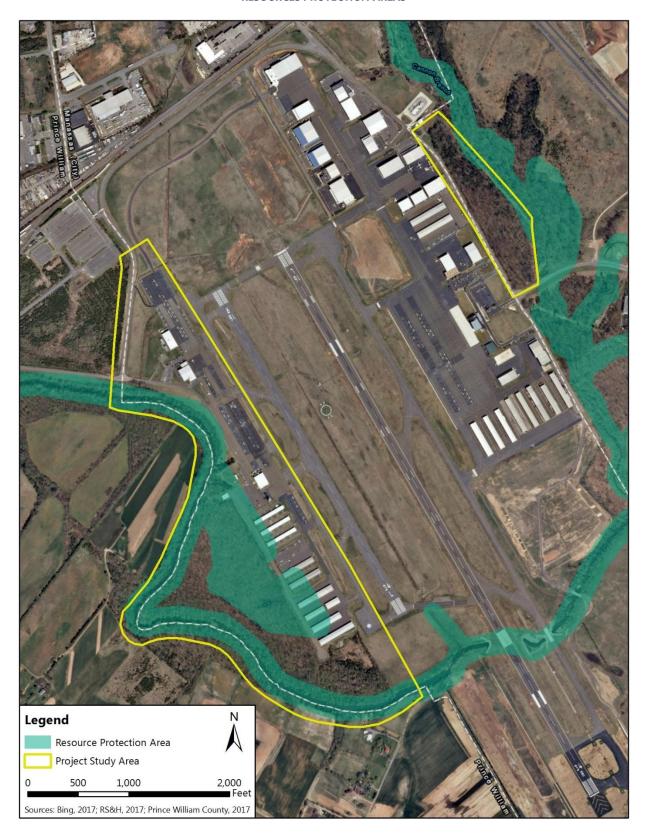
The Proposed Project qualifies for a USACE Regional Joint Permit Application (JPA), specifically the Standard JPA, used by the USACE, the VDEQ, the VRMC, and the Local Wetlands Boards (LWB). According to the USACE, the Standard JPA authorizes "most commercial and noncommercial projects in tidal waters, tidal wetlands, and coastal primary sand dunes and beaches in Virginia." As required by the permit, the Proposed Project would cause the permanent loss of about 0.70-acre of tidal wetlands.

Wetland mitigation is generally required for projects that permanently impact over 0.10-acre of wetlands. All wetland mitigation would comply with the USACE-USEPA Compensatory Mitigation for Losses of Aquatic Resources, dated April 10, 2008 (33 CFR 325 and 332/40 CFR 230). As previously mentioned, the City would submit a JPA, which would include a design overlay showing the limits of wetland impacts, as well as the Jurisdictional Determination. As the lead agency for the permitting process, the VDEQ would contact the City to obtain any additional information that may be required to process the JPA. The City would send out an invitation for bid from a certified wetland banks servicing the appropriate hydrologic unit code for the project study area to determine who would be the source of compensatory mitigation. Once the bank is identified, a bill of sale and contract documents would be drafted to complete the credit transfer. After the mitigation is paid for, the City would send proof of transfer back to the VDEQ demonstrating that they have met the compensatory mitigation requirement set forth in the permit.





# FIGURE 5 RESOURCES PROTECTION AREAS



- D. **Dune Management**: This program is administered by VMRC (Virginia Code § 28.2-1400 through § 28.2-1420). No coastal primary sand dunes are present in the project study area.
- E. Non-point Source Pollution Control: The Erosion and Sediment Control Law program is administered by VDEQ (Virginia Code § 62.1-44.15:51 et seq.) while the Coastal Lands Management is administered by VDEQ's Water Division and 84 localities in Tidewater Virginia (Virginia Code § 62.1-44.15:67 through 62.1-44.15:79 and Virginia Administrative Code 9 VAC 25-830-10 et seq.) The Proposed Project would be designed and constructed to minimize soil erosion and hinder the input of chemical nutrients and sediments into the Chesapeake Bay, its tributaries and other waters of the Commonwealth. The City would submit a project-specific erosion and sediment control (ESC) plan prior to the start of construction. Also, all erosion and sediment controls would be installed during mobilization in accordance with the Virginia Erosion and Sediment Control Handbook (VESCH, 3<sup>rd</sup> Edition) to prevent any erosion or introduction of chemical nutrients or sediments into rivers or tributaries that carry runoff from the Airport.
- F. Point Source Pollution Control: This program is administered by the State Water Control Board (as delegated to VDEQ) pursuant to Virginia Code § 62.1-44.15. The Proposed Project would generate new point sources of pollution; however, best management practices (BMPs) would be taken to prevent spillage of oils or lubricants into the drainage system. All surface runoff would be properly treated through the use of BMPs in accordance with state and local requirements. The design would specify that all mobilization, setup, construction, and cleanup activities be carried out in conformance with regulatory provisions. The Proposed Project would be conducted in accordance with the VWP program issued pursuant to Section 401 of the Clean Water Act.
- G. Shoreline Sanitation: This program is administered by the Department of Health (Virginia Code § 32.1-164 through § 32.1-165). The Proposed Project includes the construction of restroom facilities in the FBO building on the west side of the project study area, and possibly the corporate hangars on both the west side and east side of the project study area. These restroom facilities would be constructed in accordance with all federal and state building codes. Additionally, the restroom facilities will connect to existing sanitation infrastructure and will undergo all required inspections. The Proposed Project does not include to the construction of septic tanks. Overall, the Proposed Project is not anticipated to affect shoreline sanitation.
- H. Air Pollution Control: This program is administered by the State Air Pollution Control Board (Virginia Code §10.1-1300 through 10.1-1320). The project study area, located in the City of Manassas, is classified as a maintenance area for the PM<sub>2.5</sub> standard and as marginal nonattainment for the 2008 O<sub>3</sub> standard. Construction of the Proposed Project would cause temporary increases in emissions, specifically from the use of construction equipment and construction-related vehicles. A construction emission inventory for the Proposed Project was prepared, using available information, in order to estimate temporary construction-related emissions. Construction is anticipated to occur over a five-year period. The temporary criteria pollutant emissions due to construction of the Proposed Project would not be significant because

they would not exceed the *de minimus* threasholds (see Table 1). Operation of the Proposed Project would increase surface traffic from the increase in employees at the Airport, estimated to be at about 30 employees. However, employees are likely to already reside in the area; and as such, the Proposed Project would not significantly change vehicle emissions in the area. Additionally, operation of the Proposed Project would not change aviation operations at the Airport. Overall, the Proposed Project would not adversely affect the PM<sub>2.5</sub> maintenance or O<sub>3</sub> marginal nonattainment status of the area. Therefore, construction and operation of the Proposed Project would comply with the Metropolitan Washington Air Quality Committee State Implementation Plan (SIP).

TABLE 1
ANNUAL CONSTRUCTION EMISSION INVENTORY SUMMARY (TONS)

	CO	NOx	$SO_x$	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC
Emission Quantity	5.93	9.77	0.03	0.64	0.57	15.11
USEPA Threshold	N/A	100	N/A	N/A	100	50

I. Coastal Lands Management: This program is administered by DEQ's Water Division and 84 localities in Tidewater, Virginia established pursuant to the Chesapeake Bay Preservation Act (Virginia Code §§ 62.1-44.15:67 through 62.1-44.15:79) and Chesapeake Bay Preservation Area Designation and Management Regulations (Virginia Administrative Code 9 VAC 25-830-10 et seq.).

The project study area is within the Virginia Coastal Zone. The eastern portion of the project study area, located in Prince William County, is subject to the requirements of the Chesapeake Bay Preservation Act. In addition, Broad Run, which intersects the western portion of the project study area, is within Prince William County and subject to the Chesapeake Bay Preservation Act.

The Proposed Project would affect about 0.20-acre of nontidal wetlands on the west side of the project study area, and directly affect about 0.70-acre of tidal wetlands and indirectly affect about 0.80-acre of tidal wetlands on the east side of the project study area. As previously described, wetlands within the project study area have undergone a preliminary jurisdictional determination by the USACE and the Proposed Project qualifies for a Standard JPA. Construction activities would occur with the designated floodway and the 100-year floodplain (see Figure 6). About 2.7-acres on the west side and about 0.25-acre on the east side of the project study area are within the designated floodway, and about 19.9-acres on the west side and about 3.1-acres on the east side of the project study area are within the 100-year floodplain. However, in compliance with USDOT Order 5650.2, Floodplain Management and Protection, a floodplain analysis was conducted using Hydrologic Engineering Center's River Analysis System (HEC-RAS), which concluded that the Proposed Project would not result in an increase in the 100-year flood elevation or change in flood boundaries.

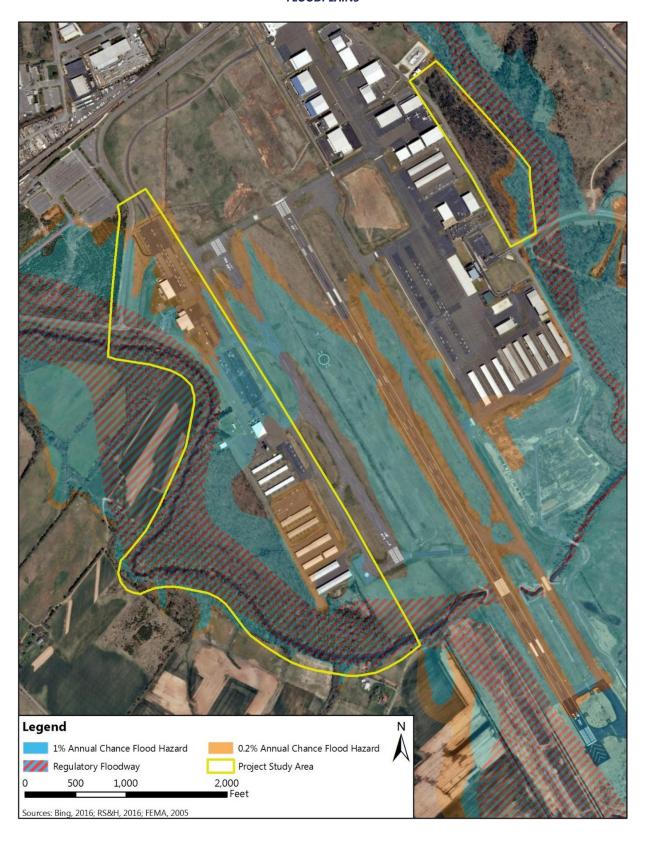
The Proposed Project would increase impervious surface by about 25 acres. As previously described, the Proposed Project would affect wetlands, which are also considered surface waters, in the project study area (see Wetlands Management for a description of those resources).

Construction and operation of the Proposed Project would have a less than significant effect on surface water. The City would be responsible for ensuring that a VPDES permit for construction activities is obtained prior to the start of ground disturbing activities. In addition, the selected construction contractor would be responsible for adhering to the VPDES permit requirements and implementation of BMPs during construction.

The implementation of the Proposed Project would permanently increase the amount of impervious surface by about 25 acres, which would increase stormwater runoff in the area. VDEQ regulates surface water quality and quantity through the Virginia Stormwater Management Program (VSMP). To meet VSMP requirements for water quantity as identified in Virginia Administrative Code 9VAC25-870-66, the Proposed Project would include on-site stormwater management facilities for detention. Water quality compliance as identified in 9VAC25-870-65 requires that the Proposed Project include best management practices such as dry swales, bioretention, infiltration, and sheet flow to open space. In addition, the City would amend the Airport's VPDES general permit for stormwater discharges associated with industrial activities. This includes updating the Airport's SWPPP.

The increase in impervious surface, about 25-acres, due to the Proposed Project would not be significant as compliance with the VPDES construction and other permits will ensure that the Proposed Project would not adversely affect nearby surface water resources (e.g., wetlands, ground water).

# FIGURE 6 FLOODPLAINS



# **SUMMARY OF FINDINGS**

Although applicants are not required to make findings with respect to the coastal effects of the advisory policies, applicants should demonstrate adequate consideration of policies which are in the nature of recommendations (see 15 CFR 930.58(a)(3)). The Proposed Project is not located along a shorefront, so the advisory policies for shorefront access planning and protection are not applicable.

Pursuant to 15 CFR §930.41, the Virginia Coastal Zone Management Program has 60 days from the receipt of this letter in which to concur with or object to this Consistency Determination, or to request an extension under 15 CFR §930.41(b). Virginia's concurrence will be presumed if its response is not received by the FAA on the 60<sup>th</sup> day from receipt of this determination. The State's response should be sent to:

Mr. Juan Rivera Manassas Regional Airport 8500 Public Works Drive Manassas, VA 20110 (703) 257-8261 jrivera@manassasva.gov Susan Stafford
Federal Aviation Administration
Beckley Airports Field Office
176 Airport Circle, Rm 101
Beaver, WV 25813
304-252-6216 x 130
susan.stafford@faa.gov



# COMMONWEALTH of VIRGINIA

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David K. Paylor Director

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# **MEMORANDUM**

**TO**: Janine Howard, DEQ Environmental Program Planner

**FROM**: Daniel Moore, DEQ Principal Environmental Planner

**DATE**: June 14, 2017

Molly Joseph Ward

Secretary of Natural Resources

SUBJECT: DEQ #17-061F: Manassas Regional Airport Development, City of Manassas and

Prince William County

We have reviewed the Consistency Certification application for the proposed Manassas Regional Airport West Corporate Development and East Parcel Development project in the City of Manassas and Prince William County and offer the following comments regarding consistency with the provisions of the *Chesapeake Bay Preservation Area Designation and Management Regulations* (Regulations):

The City of Manassas is not subject to the Chesapeake Bay Preservation Act or the Regulations. Our review of the submitted documentation shows that the proposed West Corporate Development project will occur solely within the confines of the city-owned airport property, and as such, the project is not subject to review for Bay Act compliance.

In Prince William County, the areas protected by the Chesapeake Bay Preservation Act, as locally implemented, require conformance with performance criteria. These areas include Resource Protection Areas (RPAs) and Resource Management Areas (RMAs) as designated by the local government. RPAs include tidal wetlands, certain non-tidal wetlands and tidal shores. RPAs also include a 100-foot vegetated buffer area located adjacent to and landward of these features and along both sides of any water body with perennial flow. RMAs, which require less stringent performance criteria, include all areas of the County not designated as RPA.

The proposed East Parcel Development project will occur on approximately 20 acres of land within Prince William County. The project calls for on-site roadway improvements and taxi lane extensions, construction of three surface parking lots and several airplane hangar buildings, stormwater drainage improvements and the installation of additional security fencing. The

roadway improvements component of the East Parcel Development project would be considered exempt from the Regulations provided the road improvements are constructed in accordance with (i) regulations promulgated pursuant to the *Virginia Erosion and Sediment Control Law* and the *Virginia Stormwater Management Act*, (ii) an erosion and sediment control plan and a stormwater management plan approved by DEQ, or (iii) local water quality protection criteria at least as stringent as the above state requirements. The exemption of public roads is further conditioned on the following:

Optimization of the road alignment and design, consistent with other applicable requirement, to prevent or otherwise minimize (i) encroachment into the RPA and (ii) adverse effects on water quality.

The application materials submitted do not indicate the exact nature of the roadway improvements for the north-south road at the east side of the East Parcel Development site. Based on DEQ review of the aerial maps provided and the County's online GIS Mapper, the current roadway in question appears to be an unimproved narrow dirt road that lies exclusively within the RPA designated by Prince William County and associated with Cannon Run. Widening or hardscaping (asphalt or concrete) this dirt road would constitute significant water quality impacts to Cannon Run and would not be considered consistent with the above-referenced requirement to minimize encroachment into the RPA by an otherwise exempt roadway.

9VAC25-830-110 of the *Chesapeake Bay Preservation Area Designation and Management Regulations* require that a site-specific evaluation be conducted, and a Water Quality Impact Assessment (WQIA) be submitted, for projects that propose land-disturbing activities on lands containing RPAs. Such site-specific evaluations are required in order to facilitate RPA boundary adjustments, as needed. Until such time as a site-specific evaluation has been conducted and the WQIA submitted for review, and without more specific information about the proposed improvements to the unimproved dirt road referenced above, we cannot determine if those portions of the proposed East Parcel Development project that lie within Prince William County would be consistent with the Act and the Regulations. It should be noted that the site-specific RPA boundary determination may also result in realignments to the proposed surface parking lots and/or the proposed hangar buildings, as some or all of these project components may encroach into the Cannon Run RPA buffer.

## **MEMORANDUM:**

**Date:** July 11, 2017

**To:** Janine Howard, Virginia Department of Environmental Quality

From: Natalie Heath, RS&H (on behalf of the City of Manassas)

Subject: DEQ #17-061F Manassas Regional Airport Development, City of Manassas and

Prince William County

Update to Federal Consistency Certification

Dear Ms. Howard,

On 04 May 2017, RS&H, Inc. (RS&H), on behalf of the City of Manassas (City) submitted the Federal Consistency Certification for the Manassas Regional Airport (Airport) West Corporate Development and East Parcel Development (referred to as the FCC Report). Since that time, and based on additional information from your office on 15 June 2017, the proposed footprint of the Proposed Project, specifically with regards to the east parcel development, has been reduced to minimize potential environmental impacts. The purpose of this memorandum is to provide your agency with the updated information as it relates to the updated layout and change in potential effects.

#### **NECESSARY DATA AND INFORMATION**

The proposed east parcel development has been realigned to the west to completely avoid the identified Resource Protection Areas (RPA). Figure 3 of the FCC Report showed the preliminary layout of the east parcel development area. Figure 3R at the end of this memorandum shows the updated layout. The east parcel development includes the same components outlined in the original FCC Report.

## ASSESSMENT OF POTENTIAL ENVIRONMENTAL EFFECTS

The reduced footprint of the proposed development in the east parcel has reduced the potential environmental effects. Those changes are identified below. Note that the west side of the Proposed Project has not changed; therefore, the effects on the west side of the Airport remain the same as those described in the FCC Report.

**C. Wetlands Management**: The reduced footprint of the development of the east parcel decreases the area of affected wetland from the roughly 1.5 acres stated in the FCC report to 0.60 acre. The change the proposed development footprint would not affect, directly or indirectly, the 89-acre parcel that is part of the wetlands mitigation site for the construction of Route 234-Bypass.

The project study area has undergone a preliminary jurisdictional determination by the USACE and the Proposed Project still qualifies for a USACE Regional Joint Permit Application (JPA), specifically the Standard JPA, used by the USACE, the VDEQ, the VRMC, and the Local Wetlands Boards (LWB). Additionally, all wetland mitigation would still comply with the USACE-USEPA Compensatory Mitigation for Losses of Aquatic Resources, dated April 10, 2008 (33 CFR 325 and 332/40 CFR 230).

Additionally, there are RPAs in the project study area; however, the Proposed Project is not located within those protection areas.

**I. Coastal Lands Management:** The reduced footprint of the development of the east parcel decreases the area of affected wetland to about 0.65-acre of wetlands. As previously described, wetlands within the project study area have undergone a preliminary jurisdictional determination by the USACE and the Proposed Project qualifies for a Standard JPA.

The FCC Report stated that about 0.25-acre of the proposed development in the east parcel were within the regulatory floodway and about 3.1-acres were within the 100-year floodplain. With the realignment of the development of the east parcel, construction activities would affect zero acres within the regulatory floodway and about 1.25-acres within the 100-year floodplain. In compliance with USDOT Order 5650.2, *Floodplain Management and Protection*, a floodplain analysis is being conducted using Hydrologic Engineering Center's River Analysis System (HEC-RAS), which concluded that the Proposed Project would not result in an increase in the 100-year flood elevation or change in flood boundaries.

#### SUMMARY OF FINDINGS

The Airport understands the importance of the RPA and has adjusted the design of the east portion of the Proposed Project to avoid any construction in the area. Overall, the reduced footprint of the east parcel development area reduces the potential environmental impacts associated with this portion of the Proposed Project. The review of other permits and/or approvals under Enforceable Polices of the VCP remains applicable, as well as the analysis related to the west side of the project study area.











# COMMONWEALTH of VIRGINIA

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David K. Paylor Director

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July 25, 2017

Mr. Juan Rivera Manassas Regional Airport 10600 Harry J. Parrish Blvd. Manassas, VA 20110

RE: Federal Consistency Certification, 90-Day Status: Manassas Regional Airport West Corporate Development and East Parcel Development, City of Manassas and Prince William County, DEQ 17-061F

Dear Mr. Rivera,

Molly Joseph Ward

Secretary of Natural Resources

The Department of Environmental Quality (DEQ) is responsible for coordinating the review of federal consistency certifications (FCCs) and responding to appropriate agencies and applicants on behalf of the Commonwealth. Pursuant to the Coastal Zone Management Act of 1972 (CZMA), as amended, all activities located within Virginia's designated coastal management area requiring a federal permit, license, or approval must be consistent with the Virginia Coastal Zone Management Program (CZMP). The CZMP is comprised of a network of environmental policies administered by several agencies of the Commonwealth. The FCC submitted by RS&H on behalf of the City of Manassas indicated that the proposed project will require approval from the Federal Aviation Administration (FAA). Accordingly, DEQ is coordinating the review of the Manassas Regional Airport West Corporate Development and East Parcel Development FCC with agencies administering the enforceable policies of the CZMP.

On May 2, 2017, DEQ's Office of Environmental Impact Review (OEIR) received the FCC for the proposed development. The six-month legal deadline for the Commonwealth's response to the FCC is **October 29, 2017**. This letter is sent as required under 15 CFR Part 930, sub-section 930.62(b), to provide an update on the status of the review and the basis for further delay within 90 days of receiving a FCC.

Manassas Regional Airport West Corporate Development and East Parcel Development DEQ# 17-061F FCC 90-Day Status Letter

# **Project Description**

The City of Manassas (applicant) is seeking approval from the Federal Aviation Administration (FAA) for the Manassas Regional Airport West Corporate Development and East Parcel Development project. The city owns and operates the airport which intersects the jurisdictional boundaries of the City of Manassas and Prince William County with approximately 20 acres of land on the east side of the airport being located within the limits of the county. The West Corporate Area development involves onairport roadway improvements, reconstruction of the Fixed Based Operator (FBO) building and parking lot, construction of a corporate hangar, building and associated parking lots, T-hangar reconstruction, the expansion of the west aircraft apron and taxilane tie down parking, a taxilane extension, the construction of a maintenance building and wash rack, extension of utilities and stormwater drainage improvements. and a security fence extension. The East Parcel development includes roadway improvements, the construction of a corporate hangar, building, and parking lot, extension of a taxilane and utilities connections, stormwater drainage improvements. and a security fence extension. The project study area which encompasses the area that may be affected by the proposed project is 160 acres. The applicant certifies that the project is consistent with the enforceable policies of the CZMP.

## Status of the Review

In accordance with the provision of CZMA federal consistency regulation § 930.62(a), at the earliest practicable time, DEQ shall notify the federal agency and the applicant whether the state concurs with or objects to a consistency certification. If DEQ has not issued a decision within three months following commencement of the review, it shall notify the applicant and the federal agency of the status of the matter and the basis for further delay (§ 930.62(b)). This letter constitutes the 90-day notification of the status of the consistency review of the proposed project.

# **Project Analysis and Proposed Resolution**

Consistency with the CZMP depends on compliance with the applicable enforceable policies (attached) of the federally approved state coastal management program. In a memorandum dated June 14, 2017 (attached), the DEQ Chesapeake Bay and Local Government Assistance Programs Office (OLGP) indicated that, based on the information submitted, it is not possible for compliance with the Chesapeake Bay Preservation Act and the coastal lands management enforceable policy to be determined with respect to the east parcel development.

OLGP stated that portions of the east parcel development appear to occur within a Resource Protection Area (RPA) associated with Cannon Run. An on-site inspection must occur to determine he boundary of the RPA and a Water Quality Impact Assessment must be submitted for projects that propose land-disturbing activities on

Manassas Regional Airport West Corporate Development and East Parcel Development DEQ# 17-061F FCC 90-Day Status Letter

lands that contain RPAs. This information is necessary for OLGP to determine the consistency of the project with the coastal lands management enforceable policy.

On June 15, 2017 DEQ sent the supplemental information request to the project consultant. Supplemental documentation was submitted to DEQ on July 11, 2017. DEQ OEIR has submitted this information to OLGP and the documentation is currently being reviewed.

Since consistency with the coastal lands management enforceable policy has not been determined at this time, DEQ OEIR is currently unable to complete its review of the FCC. DEQ is coordinating with the applicant's agent (RS&H) and OLGP to resolve this issue. Once OLGP is able to make a determination on the coastal lands management enforceable policy, DEQ OEIR will complete the Commonwealth's review of the FCC and respond.

If you have questions, please call Janine Howard at (804) 698-4299.

Sincerely,

Bettina Sullivan, Program Manager **Environmental Impact Review** 

Natalie Heath, RS&H ec:

Daniel Moore, OLGP

Juan Rivera, Manassas

## **MEMORANDUM:**

Date: August 17, 2017

To: Janine Howard, Virginia Department of Environmental Quality

From: Natalie Heath, RS&H (on behalf of the City of Manassas)

DEQ #17-061F Manassas Regional Airport Development, City of Manassas and Subject:

Prince William County

Update to Federal Consistency Certification (Revised)

Dear Ms. Howard,

On May 4, 2017, RS&H, Inc. (RS&H), on behalf of the City of Manassas (City) submitted the Federal Consistency Certification for the Manassas Regional Airport (Airport) West Corporate Development and East Parcel Development Environmental Assessment (referred to as the FCC Report). Since that time, RS&H submitted an update via a memorandum dated July 11, 2017 based on additional information from your office on June 15, 2017. The purpose of this memorandum is to replace the July 11 memorandum with the most up-to-date project information as it relates to the layout and change in potential effects.

#### **NECESSARY DATA AND INFORMATION**

As described in the FCC Report, the west parcel development would affect the floodway and floodplain in the City of Manassas. Mitigation for these potential floodplain effects would occur in an area not previously analyzed for environmental impacts. Figure 2 of the FCC report showed the layout of the west parcel development. Figure 2R at the end of this memorandum includes the proposed floodplain mitigation area. In addition, the proposed east parcel development has been realigned to completely avoid the identified Resource Protection Areas (RPA), floodway, and floodplain. Figure 3 of the FCC Report showed the preliminary layout of the east parcel development area. Figure 3R at the end of this memorandum shows the updated layout, which reduces the development footprint. However, the east parcel development includes the same components outlined in the original FCC Report.

# ASSESSMENT OF POTENTIAL ENVIRONMENTAL EFFECTS

The floodplain mitigation for the west parcel development and the reduced footprint of the proposed east parcel development changes the potential environmental effects. Those changes are described below. Note that the proposed west corporate development layout of the Proposed Project has not changed, with the exception of additional stormwater drainage improvements.

C. Wetlands Management: The floodplain mitigation for the west corporate development includes cutting in an area that has been delineated as a wetland. This would affect about 1.60 acres of Palustrine Forested wetlands on the west side of the Airport. Because of the floodplain mitigation requirements, this wetland impact cannot be avoided. The total wetland impact from the west corporate development would be about 1.62 acres.

The reduced footprint of the east parcel development eliminates wetland impacts on the east side. In total, the Proposed Project would affect about 1.62 acres of wetlands. The change the proposed development footprint would not affect, directly or indirectly, the 89-acre parcel that is part of the wetlands mitigation site for the construction of Route 234-Bypass.

The wetlands within the project study area of the EA have undergone a jurisdictional determination by the USACE. The Airport will submit the Joint Permit Application for a USACE Individual Permit and a Virginia Water Protection Permit, along with a compensatory mitigation plan, to the Virginia Marine Resources Commission. Additionally, all wetland mitigation would still comply with the USACE-USEPA Compensatory Mitigation for Losses of Aquatic Resources, dated April 10, 2008 (33 CFR 325 and 332/40 CFR 230).

There are RPAs in the project study area; however, the Proposed Project within the east parcel is not located within those protection areas and would not affect them.

I. Coastal Lands Management: As the previous section describes, the Proposed Project would affect about 1.62 acres of wetlands, in total. As previously described, wetlands within the project study area have undergone a jurisdictional determination by the USACE and the Proposed Project qualifies for a USACE Individual Permit and a Virginia Water Protection Permit.

The floodplain impacts for the west corporate development remain the same as described in the FCC Report. Mitigation for the potential floodplain impacts would occur in an area southwest of the proposed west corporate development and would result in a no-rise condition. The FCC Report stated that about 0.25-acre of the proposed east parcel development were within the regulatory floodway and about 3.1-acres were within the 100-year floodplain. With the realignment of the east parcel development, construction activities would not affect any land within the regulatory floodway or 100-year floodplain.

## **SUMMARY OF FINDINGS**

The Airport understands the importance of the RPA and has adjusted the layout of the east parcel development of the Proposed Project to avoid situating any proposed development in these areas. The Airport also understands the importance of floodplains and wetlands has also avoided or minimized potential floodplain and wetland impacts where feasible in both the west corporate and east parcel development areas. Overall, the review of other permits and/or approvals under Enforceable Polices of the VCP remains applicable.

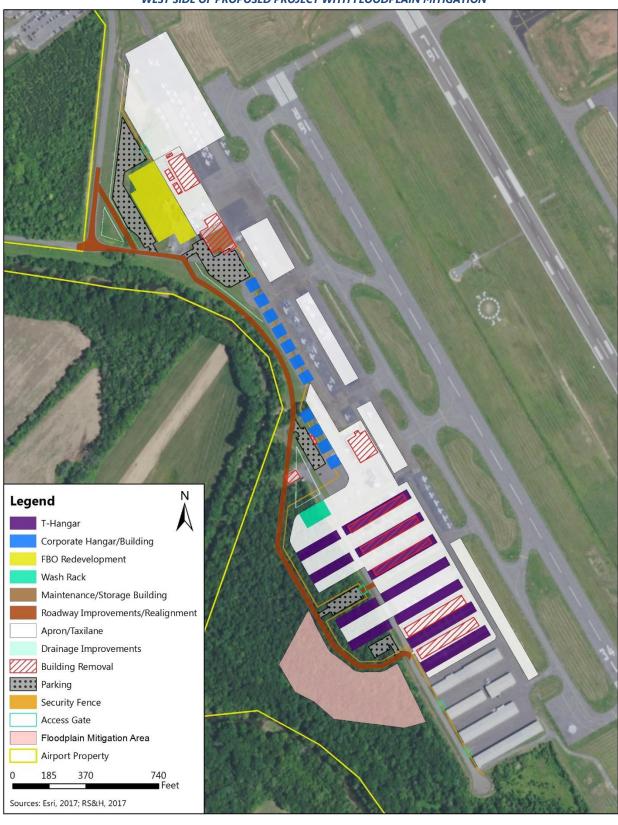


FIGURE 2R WEST SIDE OF PROPOSED PROJECT WITH FLOODPLAIN MITIGATION

Legend Apron/Taxilane Corporate Hangar/Building Parking Roadway Improvements/Realignment Drainage Improvements Airport Property Boundary = County/City Boundary 105 210 420 Sources: Esri, 2017; RS&H, 2017

FIGURE 3R EAST SIDE OF PROPOSED PROJECT



# COMMONWEALTH of VIRGINIA

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### **MEMORANDUM**

TO: Janine Howard, DEQ Environmental Program Planner

FROM: Daniel Moore, DEQ Principal Environmental Planner

DATE: October18, 2017

Molly Joseph Ward

Secretary of Natural Resources

SUBJECT: DEQ #17-061F: Manassas Regional Airport Development, City of Manassas and

Prince William County

We have reviewed the Consistency Certification application for the proposed Manassas Regional Airport West Corporate Development and East Parcel Development project in the City of Manassas and Prince William County and offer the following comments regarding consistency with the provisions of the *Chesapeake Bay Preservation Area Designation and Management Regulations* (Regulations):

The City of Manassas is not subject to the Chesapeake Bay Preservation Act or the Regulations. Our review of the submitted documentation shows that the proposed West Corporate Development project will occur solely within the confines of the city-owned airport property, and as such, the project is not subject to review for Bay Act compliance.

In Prince William County, the areas protected by the Chesapeake Bay Preservation Act, as locally implemented, require conformance with performance criteria. These areas include Resource Protection Areas (RPAs) and Resource Management Areas (RMAs) as designated by the local government. RPAs include tidal wetlands, certain non-tidal wetlands and tidal shores. RPAs also include a 100-foot vegetated buffer area located adjacent to and landward of these features and along both sides of any water body with perennial flow. RMAs, which require less stringent performance criteria, include all areas of the County not designated as RPA.

The proposed East Parcel Development project will occur on approximately 20 acres of land within Prince William County. The project calls for on-site roadway improvements and taxi lane extensions, construction of three surface parking lots and several airplane hangar buildings, stormwater drainage improvements and the installation of additional security fencing. The

roadway improvements component of the East Parcel Development project would be considered exempt from the Regulations provided the road improvements are constructed in accordance with (i) regulations promulgated pursuant to the *Virginia Erosion and Sediment Control Law* and the *Virginia Stormwater Management Act*, (ii) an erosion and sediment control plan and a stormwater management plan approved by DEQ, or (iii) local water quality protection criteria at least as stringent as the above state requirements. The exemption of public roads is further conditioned on the following:

Optimization of the road alignment and design, consistent with other applicable requirement, to prevent or otherwise minimize (i) encroachment into the RPA and (ii) adverse effects on water quality.

The roadway improvements for the proposed Wakeman Drive realignment on the east side of the East Parcel Development may result in impacts to the County-designated RPA associated with Cannon Run. It should be noted that the site-specific RPA boundary determination may also result in realignments to the proposed surface parking lots and/or the proposed hangar buildings, as some or all of these project components may encroach into the Cannon Run RPA buffer.

9VAC25-830-110 of the Chesapeake Bay Preservation Area Designation and Management Regulations require that a site-specific evaluation be conducted, and a Water Quality Impact Assessment (WQIA) be submitted, for projects that propose land-disturbing activities on lands containing RPAs. Such site-specific evaluations are required in order to facilitate RPA boundary adjustments, as needed. The applicant is required to contact the Prince William County Department of Public Works, Division of Watershed Management at 703-792-7070 to inquire about submittal requirements for the County's Preservation Area Site Assessment (PASA) process, including the requirement for a site-specific RPA evaluation and, if necessary, a WQIA.

Provided adherence to the above requirements, and approval by Prince William County of any potential impacts on County-designated RPA lands from the proposed East Parcel Development, the proposed activity would be consistent with the *Chesapeake Bay Preservation Act* and the Regulations.



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David K. Paylor Director

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October 24, 2017

Mr. Juan Rivera Manassas Regional Airport 8500 Public Works Drive Manassas, VA 20110

RE: Federal Consistency Certification for the Manassas Regional Airport West Corporate Development and East Parcel Development, City of Manassas and Prince William County, DEQ 17-061F

Dear Mr. Rivera:

Molly Joseph Ward

Secretary of Natural Resources

The Commonwealth of Virginia has completed its review of the above-referenced Federal Consistency Certification (FCC) submitted for the West Corporate Development and East Parcel Development project at the Manassas Regional Airport in the City of Manassas and Prince William County, Virginia. The Department of Environmental Quality is responsible for coordinating Virginia's review of FCCs and responding to appropriate officials on behalf of the Commonwealth. This letter is in response to the FCC submittal dated May 2017 and received on May 2, 2017 as well as the August 17, 2017 project update memorandum prepared by RS&H for the Manassas Regional Airport. The following agencies and locality participated in this review:

Department of Environmental Quality (DEQ)
Department of Game and Inland Fisheries (DGIF)
Department of Conservation and Recreation (DCR)
Virginia Department of Health (VDH)
Department of Transportation (VDOT)
Department of Historic Resources (DHR)
Department of Aviation (DOAV)
Prince William County

In addition, the Marine Resources Commission, Department of Forestry, the Northern Virginia Regional Commission and the City of Manassas were invited to comment on the proposal.

### PROJECT DESCRIPTION

The City of Manassas (applicant) is seeking approval from the Federal Aviation Administration (FAA) for the Manassas Regional Airport West Corporate Development and East Parcel Development project. The city owns and operates the airport which intersects the jurisdictional boundaries of the City of Manassas and Prince William County with approximately 20 acres of land on the east side of the airport being located within the limits of the county. The West Corporate Area development involves onairport roadway improvements, reconstruction of the Fixed Based Operator (FBO) building and parking lot, construction of a corporate hangar, building and associated parking lots, T-hangar reconstruction, the expansion of the west aircraft apron and taxilane tie down parking, a taxilane extension, the construction of a maintenance building and wash rack, extension of utilities and stormwater drainage improvements, and a security fence extension. The East Parcel development includes roadway improvements, the construction of a corporate hangar, building, and parking lot, extension of a taxilane and utilities connections, stormwater drainage improvements, and a security fence extension. The project study area which encompasses the area that may be affected by the proposed project is 160 acres. The applicant certifies that the project is consistent with the enforceable policies of the Virginia Coastal Zone Management Program.

### **PUBLIC PARTICIPATION**

In accordance with 15 CFR §930.2, the public was invited to participate in the review of the proposal. Public notice of the proposed action was published in the Office of Environmental Impact Review (OEIR) Program Newsletter and on the DEQ website from May 3, 2017 to June 2, 2017. No public comments were received in response to the notice.

### FEDERAL CONSISTENCY UNDER THE COASTAL ZONE MANAGEMENT ACT

Pursuant to the *Coastal Zone Management Act of 1972*, as amended and federal consistency regulations (15 CFR Part 930, Subpart D, § 930.50 *et seq.*), activities requiring a federal permit, license, or approval that can have reasonably foreseeable effects on Virginia's coastal uses or resources must be conducted in a manner which is consistent with the Coastal Zone Management (CZM) Program. The CZM Program is comprised of a network of programs administered by several agencies. In order to be consistent with the CZM Program, the applicant must obtain all the applicable permits and approvals listed under the enforceable policies of the CZM Program prior to commencing the project.

### FEDERAL CONSISTENCY CONCURRENCE

The applicant certifies that the project is consistent with the enforceable policies of the CZM Program. Based on our review of the FCC, the August 17, 2017 project update memorandum and supporting documentation and the comments submitted by agencies

administering the enforceable policies of the CZM Program, DEQ concurs that the proposal is consistent with the CZM Program provided that prior to implementation of the project all applicable permits and approvals are obtained as described below. However, other state approvals which may apply to this project are not included in this concurrence. Therefore, the applicant must ensure that this project is constructed and operated in accordance with all applicable federal, state, and local laws and regulations.

### FEDERAL CONSISTENCY ANALYSIS

According to information in the FCC, the proposed project would have no effect on the following enforceable policies: fisheries management; subaqueous lands management; dunes management; and shoreline sanitation. The agencies of the Commonwealth responsible for the administration of the enforceable policies of the CZM Program generally agree with the findings in the FCC. The applicant must ensure that the proposed action is consistent with all enforceable policies. The analysis which follows responds to the discussion of the enforceable policies of the CZM Program that apply to this project.

- **1. Nonpoint Source Pollution Control**. According to the FCC (page 9), the project will be designed and constructed to minimize soil erosion and the input of nutrients and sediment into waterways. Prior to construction all erosion and sediment controls will be installed in accordance with the *Virginia Erosion and Sediment Control Handbook* (1992, 3rd Edition) and a project-specific erosion and sediment control plan will be developed.
- 1(a) Agency Jurisdiction. The DEQ Office of Stormwater Management (OSWM) administers the nonpoint source pollution control enforceable policy through the *Virginia Erosion and Sediment Control Law and Regulations* (*VESCL&R*) and *Virginia Stormwater Management Law and Regulations* (*VSWML&R*). In addition, DEQ is responsible for the issuance, denial, revocation, termination and enforcement of the Virginia Stormwater Management Program (VSMP) General Permit for Stormwater Discharges from Construction Activities related to municipal separate storm sewer systems (MS4s) and construction activities for the control of stormwater discharges from MS4s and land-disturbing activities under the Virginia Stormwater Management Program.
- **1(b) Requirements.** DEQ OSWM did not respond to DEQ's request for comments. Regulatory guidance for the control of nonpoint source pollution is presented below.
- 1(b)(i) Erosion and Sediment Control Plan. The project sponsor is responsible for submitting a project-specific erosion and sediment control (ESC) plan to the locality in which the project is located for review and approval pursuant to the local ESC requirements, if the project involves a land-disturbing activity equal to or greater than 10,000 square feet (2,500 square feet in a Chesapeake Bay Preservation Area). Depending on local requirements the area of land disturbance requiring an ESC plan may be less. The ESC plan must be approved by the locality prior to any land-disturbing

activity at the project site. All regulated land-disturbing activities associated with the project, including on and off site access roads, staging areas, borrow areas, stockpiles, and soil intentionally transported from the project, must be covered by the project specific ESC plan. Local ESC program requirements must be requested through the locality.

- **1(b)(ii) Stormwater Management Plan.** Depending on local requirements, a Stormwater Management (SWM) plan may be required. Local SWM program requirements must be requested through the locality.
- 1(b)(iii) General Permit for Stormwater Discharges from Construction Activities (VAR10). The operator or owner of a construction activity involving land disturbance of equal to or greater than 1 acre is required to register for coverage under the General Virginia Pollutant Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from Construction Activities and develop a project specific stormwater pollution prevention plan (SWPPP). The SWPPP must be prepared prior to submission of the registration statement for coverage under the General Permit and the SWPPP must address water quality and quantity in accordance with the *Virginia Stormwater Management Program Regulations*. General information and registration forms for the General Permit are available on DEQ's website at: <a href="https://www.deq.virginia.gov/Programs/Water/StormwaterManagement/VSMPPermits/ConstructionGeneralPermit.aspx">www.deq.virginia.gov/Programs/Water/StormwaterManagement/VSMPPermits/ConstructionGeneralPermit.aspx</a>.
- **1(c) Agency Recommendation.** Consider utilizing permeable paving for walkways and parking areas, where appropriate. Revegetate denuded areas promptly following construction work.
- **1(d) Conclusion.** The project, as proposed, is consistent with the nonpoint source pollution control enforceable policy of the CZM Program, provided it complies with the applicable ESC, SWM, and VPDES requirements.
- **2. Air Pollution Control**. According to the FCC (page 9), a temporary increase in vehicular emissions from construction work is expected to occur. These temporary impacts will be minimal and will not affect regional air quality.
- **2(a) Agency Jurisdiction.** DEQ's Air Quality Division, on behalf of the State Air Pollution Control Board, is responsible for the development of regulations that implement Virginia's Air Pollution Control Law. DEQ is charged to carry out mandates of the state law and related regulations as well as Virginia's federal obligations under the Clean Air Act as amended in 1990. The program implements the federal Clean Air Act to provide a legally enforceable State Implementation Plan for the attainment and maintenance of the National Ambient Air Quality Standards. This program is administered by the State Air Pollution Control Board at DEQ (Virginia Code §10-1.1300 through §10.1-1320).

- **2(b) Agency Finding.** According to the DEQ Air Division, the project site is located in a designated ozone attainment area and an emission control area for oxides of nitrogen (NOx) and volatile organic compounds (VOCs).
- **2(c) Recommendation.** Precautions should be taken to restrict the emissions of volatile organic compounds (VOCs) and oxides of nitrogen (NOx) during construction, principally by controlling or limiting the burning of fossil fuels.

### 2(d) Requirements.

**2(d)(i) Fugitive Dust.** During future construction, fugitive dust must be kept to a minimum by using control methods outlined in 9 VAC 5-50-60 *et seq.* of the *Regulations for the Control and Abatement of Air Pollution*. These precautions include, but are not limited to, the following:

- Use, where possible, of water or chemicals for dust control;
- Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials;
- · Covering of open equipment for conveying materials; and
- Prompt removal of spilled or tracked dirt or other materials from paved streets and removal of dried sediments resulting from soil erosion.

**2(d)(ii) Open Burning.** If project activities include open burning or the use of special incineration devices, this activity must meet the requirements under 9 VAC 5-130-10 through 9 VAC 130-60 and 9 VAC 5-130-100 of the *Regulations* for open burning. In addition, the *Regulations* provide for, but do not require, the local adoption of a model ordinance concerning open burning. The applicant should contact local fire officials to determine what local requirements, if any, exist.

**2(d)(iii) Asphalt Paving.** A precaution, which typically applies to road construction and paving work (9 VAC 5-45-780 *et seq.*), places limitations on the use of "cut-back" (liquefied asphalt cement, blended with petroleum solvents), and may apply to the project. The asphalt must be "emulsified" (predominantly cement and water with a small amount of emulsifying agent) except when specified circumstances apply. Moreover, there are time-of-year restrictions on its use from April through October in VOC emission control areas.

**2(d)(iv) Fuel Burning Equipment.** Should the proposed project require the installation of fuel-burning equipment (boilers, generators, etc.), or other air pollution emitting equipment, the project may be subject to 9 VAC 5-80, Article 6, Permits for New and Modified sources.

**2(e) Conclusion.** The project, as proposed, is consistent with the air pollution control enforceable policy of the CZM Program, provided it adheres to the above requirements.

- 3. Coastal Lands Management. According to the FCC (page 10), the eastern side of the study area is within Prince William County which is subject to the requirements of the Chesapeake Bay Preservation Act. Additionally Broad Run which intersects the western portion of the study area is also within Prince William County and subject to the Chesapeake Bay Preservation Act. According to the August 17, 2017 project update memorandum, the redesigned and reduced footprint of the east parcel development eliminates wetlands impacts. The airport understands the importance of the nearby Resource Protection Area (RPA) and has adjusted the layout to avoid any encroachment into the RPA. The East Parcel Development and RPA map submitted via email (Alberts/Moore email, 9/22/17) shows the Wakeman Drive Realignment being located just outside of the RPA.
- **3(a) Agency Jurisdiction.** The DEQ Office of Local Government Programs (OLGP) administers the coastal lands management enforceable policy through the Chesapeake Bay Preservation Act (Bay Act) (Virginia Code §62.1-44.15 *et seq.*) and *Chesapeake Bay Preservation Area Designation and Management Regulations* (*Regulations*) (9 VAC 25-830-10 *et seq.*).
- **3(b) Coordination.** The DEQ OLGP and OEIR coordinated with the project consultant significantly regarding the east side development and potential impacts to the RPA. A 90-day status letter was issued on July 25, 2017 (attached) detailing supplemental information that was required in order to determine consistency with the Bay Act. This coordination resulted in the submittal of the August 17, 2017 project update memorandum as well as further documentation related to the RPA and discussions with Prince William County (see Item 9(b)).
- **3(b) Agency Findings.** The City of Manassas is not subject to the Chesapeake Bay Preservation Act or the Regulations. OLGP's review of the submitted documentation shows that the proposed West Corporate Development project will occur solely within the confines of the city-owned airport property, and as such, the West Corporate Development portion of the project is not subject to review for Bay Act compliance.

In Prince William County, the areas protected by the Chesapeake Bay Preservation Act, as locally implemented, require conformance with performance criteria. These areas include RPAs and Resource Management Areas (RMAs) as designated by the local government. RPAs include tidal wetlands, certain non-tidal wetlands and tidal shores. RPAs also include a 100-foot vegetated buffer area located adjacent to and landward of these features and along both sides of any water body with perennial flow. RMAs, which require less stringent performance criteria, include all areas of the County not designated as RPA.

The proposed East Parcel Development project will occur on approximately 20 acres of land within Prince William County. The project calls for on-site roadway improvements and taxi lane extensions, construction of three surface parking lots and several airplane hangar buildings, stormwater drainage improvements and the installation of additional security fencing.

The roadway improvements for the proposed Wakeman Drive realignment on the east side of the East Parcel Development may result in impacts to the County-designated RPA associated with Cannon Run. It should be noted that the site-specific RPA boundary determination may also result in realignments to the proposed surface parking lots and/or the proposed hangar buildings, as some or all of these project components may encroach into the Cannon Run RPA buffer.

**3(c) Requirement.** The roadway improvements component of the East Parcel Development project would be considered exempt from the Regulations provided the road improvements are constructed in accordance with (i) regulations promulgated pursuant to the *Virginia Erosion and Sediment Control Law* and the *Virginia Stormwater Management Act*, (ii) an erosion and sediment control plan and a stormwater management plan approved by DEQ, or (iii) local water quality protection criteria at least as stringent as the above state requirements. The exemption of public roads is further conditioned on the following:

Optimization of the road alignment and design, consistent with other applicable requirement, to prevent or otherwise minimize (i) encroachment into the RPA and (ii) adverse effects on water quality.

9VAC25-830-110 of the Chesapeake Bay Preservation Area Designation and Management Regulations require that a site-specific evaluation be conducted, and a Water Quality Impact Assessment (WQIA) be submitted, for projects that propose land-disturbing activities on lands containing RPAs. Such site-specific evaluations are required in order to facilitate RPA boundary adjustments, as needed. The applicant is required to contact the Prince William County Department of Public Works, Division of Watershed Management at 703-792-7070 to inquire about submittal requirements for the County's Preservation Area Site Assessment (PASA) process, including the requirement for a site-specific RPA evaluation and, if necessary, a WQIA.

- **3(d) Conclusion.** Provided adherence to the above requirements, and approval by Prince William County of any potential impacts on County-designated RPA lands from the proposed East Parcel Development, the proposed activity would be consistent with the *Chesapeake Bay Preservation Act* and the Regulations and the coastal lands enforceable policy of the CZM Program.
- **4. Wetlands Management**. According to the August 17, 2017 project update memorandum (pages 1-2), mitigation for potential floodway and floodplain impacts in the City of Manassas associated with the west side development includes cutting in an area that has been designated as a wetland. Approximately 1.60-acres of Palustrine Forested Wetlands would be affected by this unavoidable impact.

The FCC found that the east side development would impact a total of 1.5-acres of wetlands. However, the east parcel development was subsequently redesigned to minimize potential RPA impacts and per the August 17, 2017 project update

memorandum (page 2), wetlands impacts will not result from the east side development portion of the project.

In total, the project will impact approximately 1.62 acres of wetlands.

- **4(a) Agency Jurisdiction.** The wetlands management enforceable policy is administered by the Virginia Marine Resources Commission (tidal wetlands) (Virginia Code 28.2-1301 through 28.2-1320) and the Department of Environmental Quality through the Virginia Water Protection (VWP) Permit program (tidal and non-tidal wetlands) (Virginia Code §62.1-44.15:20 and Water Quality Certification pursuant to Section 401 of the Clean Water Act).
- **4(b) Agency Findings.** The DEQ Northern Regional Office (NRO) confirmed that, as described, the project will impact surface waters or wetlands. Upon receipt of a Joint Permit Application for the proposed surface water impacts, DEQ VWP Permit staff will review the proposed project in accordance with the VWP permit program regulations and current VWP permit program guidance.

The VMRC did not comment on the proposal.

- **4(c) Agency Requirement.** Submit a Joint Permit Application for the proposed impacts to non-tidal wetlands.
- **4(d) Agency Recommendation.** Avoid and minimize impacts to surface waters and wetlands to the maximum extent practicable.
- **4(e) Conclusion.** Provided a JPA is submitted and a VWP Permit is obtained, as necessary, the project is consistent with the wetlands management enforceable policy of the Virginia CZM Program.
- **5. Point Source Pollution Control.** According to the FCC, the proposed project will generate new point sources of pollution. All runoff will be properly treated via the use of Best Management Practices (BMPs). According to supplemental information provided by the project consultant (Heath/Howard email, 6/14/17), new stormwater outfalls on the west side of the property will either connect to the existing stormwater conveyance system or directly to Broad Run. On the east side, new outfalls will connect to Cannon Branch. It is estimated that there will be two new outfalls on the west side of the airport and one on the east side, though the project design is still preliminary.
- **5(a) Agency Jurisdiction.** The point source program is administered by the State Water Control Board pursuant to Virginia Code §62.1-44.15. Point source pollution control is accomplished through the implementation of the National Pollutant Discharge Elimination System (NPDES) permit program established pursuant to §402 of the federal Clean Water Act and administered in Virginia as the VPDES permit program. The Water Quality Certification requirements of §401 of the Clean Water Act of 1972 is administered under the Virginia Water Protection Permit program.

- **5(b) Agency Findings.** The airport has an existing VPDES Industrial Stormwater General Permit (VAR050985) for discharges from the stormwater conveyance system. Based on information provided, new outfalls will be created as part of this project.
- **5(c) Agency Requirement.** The new outfalls will require a permit modification for the facility's VPDES Industrial Stormwater General Permit (VAR050985). Coordinate with DEQ NRO regarding the new outfalls.
- **5(d) Conclusion.** Provided a permit modification is obtained, as necessary, for the proposed new outfalls, the project is consistent with the point source pollution control enforceable policy of the Virginia CZM Program.
- **6. Subaqueous Lands Management.** The FCC (page 2) indicates that subaqueous lands will be impacted.
- **6(a) Agency Jurisdiction.** Pursuant to Section 28.2-1204 of the Code of Virginia, the Virginia Marine Resources Commission (VMRC) has jurisdiction over any encroachments in, on, or over any state-owned rivers, streams, or creeks in the Commonwealth. Accordingly, any portion of the project involving encroachments channelward of ordinary high water along natural rivers and streams may require a permit. In addition, VMRC generally requires permits for encroachments on non-tidal streams with a drainage area greater than five square miles or with an average instream flow of at least five cubic feet per second.

VMRC serves as the clearinghouse for the Joint Permit Application (JPA) used by:

- VMRC for encroachments on or over state-owned subaqueous beds as well as tidal wetlands;
- U.S. Army Corps of Engineers (Corps) for issuing permits pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act;
- DEQ for issuance of a Virginia Water Protection Permit; and
- local wetlands board for impacts to wetlands.

Any jurisdictional impacts would be reviewed by VMRC during the JPA process.

- 6(b) Agency Findings. VMRC did not comment on the FCC.
- **6(c) Agency Requirement.** Submit a JPA to VMRC for the proposed impacts to subaqueous lands. Upon receipt of the JPA, VMRC will determine whether a permit is necessary.
- **6(d) Conclusion.** Provided a JPA is submitted and a permit obtained, if required, the project is consistent with the subaqueous lands management enforceable policy of the Virginia CZM Program.

- **7. Fisheries Management.** The FCC (page 2) states that commercial or recreational fisheries resources will not be impacted.
- **7(a) Agency Jurisdiction.** The fisheries management enforceable policy is administered by the Virginia Marine Resources Commission (VMRC) (Virginia Code § 28.2-200 to § 28.2-713) and the Department of Game and Inland Fisheries (DGIF) (Virginia Code § 29.1-100 to § 29.1-570). In addition, the Virginia Department of Health (VDH) Division of Shellfish Sanitation (DSS) is responsible for protecting the health of the consumers of molluscan shellfish and crustacea by ensuring that shellfish growing waters are properly classified for harvesting, and that molluscan shellfish and crustacea processing facilities meet sanitation standards.
- **7(b) Agency Findings.** Broad Run, which borders the airport on the southern side, is designated a Threatened and Endangered Species Water due to the presence of state Endangered brook floaters. It does not appear any instream work is proposed; therefore DGIF does not anticipate this project to result in significant adverse impacts upon this species.
- **7(c) Agency Recommendation.** If instream work becomes necessary, the airport should coordinate further with DGIF (Amy Ewing, 804-367-2211).
- **7(d) Conclusion.** Assuming adherence to erosion and sediment controls, DGIF finds this project consistent with the fisheries management enforceable policy of the CZM Program.

### ADDITIONAL ENVIRONMENTAL CONSIDERATIONS

In addition to the enforceable policies of the CZM Program, comments were also provided with respect to other applicable requirements and recommendations. The applicant must ensure that this project is constructed and operated in accordance with all applicable federal, state, and local laws and regulations.

- 1. Solid and Hazardous Waste Management.
- **1(a) Agency Jurisdiction.** On behalf of the Virginia Waste Management Board, the DEQ Division of Land Protection and Revitalization is responsible for carrying out the mandates of the Virginia Waste Management Act (Virginia Code §10.1-1400 *et seq.*), as well as meeting Virginia's federal obligations under the Resource Conservation and Recovery Act (CERCLA) and the Comprehensive Environmental Response Compensation Liability Act, commonly known as Superfund. The DEQ Division of Land Protection and Revitalization also administers those laws and regulations on behalf of the State Water Control Board governing Petroleum Storage Tanks (Virginia Code §62.1-44.34:8 *et seq.*), including Aboveground Storage Tanks (9VAC25-91 *et seq.*) and Underground Storage Tanks (9VAC25-580 *et seq.* and 9VAC25-580-370 *et seq.*), also

known as 'Virginia Tank Regulations', and  $\S$  62.1-44.34:14 et seq. which covers oil spills.

### Virginia:

- Virginia Waste Management Act, Virginia Code § 10.1-1400 et seq.
- Virginia Solid Waste Management Regulations, 9 VAC 20-81
  - o (9 VAC 20-81-620 applies to asbestos-containing materials)
- Virginia Hazardous Waste Management Regulations, 9 VAC 20-60
   (9 VAC 20-60-261 applies to lead-based paints)
- Virginia Regulations for the Transportation of Hazardous Materials, 9 VAC 20-110.

### Federal:

- Resource Conservation and Recovery Act (RCRA), 42 U.S. Code sections 6901 et seq.
- U.S. Department of Transportation Rules for Transportation of Hazardous Materials, 49 Code of Federal Regulations, Part 107
- Applicable rules contained in Title 40, Code of Federal Regulations.
- **1(b) Agency Findings**. DEQ's Division of Land Protection and Revitalization (DLPR) conducted a search of its solid and hazardous waste databases (2,000-foot radius), including petroleum release sites, in the project area vicinity to identify waste sites in close proximity to the area. A number of sites of concern were identified in close proximity to the airport or within airport property.

# <u>Hazardous Waste/RCRA Facilities</u> – located in close proximity to the project area

- VAD988212643, Tri-State Tours, 10680 Wakeman Court, Manassas, VA 22110. Small quantity generator (SQG)
- VA0000347922, Wilcox Woodworks, 10687 Wakeman Court, Manassas, VA 22110. SQG
- VAR000506774, Corfu Contractors, 10599 Residence Road, Manassas, VA 20136. SQG

# Petroleum Releases - two within the project area (\*denotes the same address)

4. PC#20013062, Manassas Airport – New Control Tower, 10522 Terminal Road, Manassas, VA 22110. Release Date: 09/25/2000. Status: Closed.

\*PC#19910187, Dulles Aviation Incorporated – Manassas Airport, 10522 Terminal Road, Manassas, VA 22110. Release Date: 08/21/1990. Status: Closed.

- \*PC#19993317, Manassas Municipal Airport, 10522 Terminal Road, Manassas, VA 22110. Release Date: 03/22/1999. Status: Closed.
- \*PC#19973688, Manassas Airport Old Control Tower, 10522 Terminal Road, Manassas, VA 22110. Release Date: 09/05/1996. Status: Closed.
- \*PC#19870385, Manassas Airport, 10522 Terminal Road, Manassas, VA 22110. Release Date: 12/09/1986. Status: Closed.
- 5. PC#19900438, VDOT Manassas Area Headquarters Shop, 10228 Residency Road, Manassas, VA 22110. Release Date: 10/16/1989. Status: Closed.

### 1(c) Requirements.

- **1(c)(i) Contaminated Waste.** Any soil that is suspected of contamination or wastes that are generated during construction must be tested and disposed of in accordance with applicable federal, state, and local laws and regulations. All construction and demolition debris must be characterized in accordance with the *Virginia Hazardous Waste Management Regulations* prior to disposal at an appropriate facility.
- **1(c)(ii) Petroleum Release Sites and Storage.** If evidence of a petroleum release is discovered, it must be reported to DEQ, as authorized by Virginia Code § 62.1-44.34.8 through 9 and 9 VAC 25-580-10 *et seq*.

The installation and use of an aboveground storage tank (>660 gallons) for temporary fuel storage (>120 days) during the project must follow the requirements in 9 VAC 25-91-10 *et seq*.

- 1(c)(iii) Asbestos and/or Lead-based Paint. All structures being demolished/renovated/removed should be checked for asbestos-containing materials (ACM) and lead-based paint (LBP) prior to demolition. If ACM or LBP are found, in addition to federal waste-related regulations, state regulations 9 VAC 20-80-620 for ACM and 9 VAC 20-60-261 for LBP must be followed.
- **1(d) Pollution Prevention Recommendation.** DEQ recommends that the applicant implement pollution prevention principles, including the reduction, reuse, and recycling of all solid wastes generated. All generation of hazardous wastes should be minimized and handled appropriately.

The identified petroleum releases should be further evaluated to establish the location, nature and extent of the releases and the potential to impact the proposed project. Contact the NRO at (703) 583-3800 (Tanks Program) for further information about the petroleum release cases.

Questions or requests for further information may be directed to DEQ-DLPR, Katy Dacey at (804) 698-4274.

- **1(e) Petroleum Release Recommendation.** The applicant should evaluate the location, nature, and extent of the identified petroleum release and the potential for it to impact the project. The facility representative should contact the DEQ's NRO at 703-583-3800 (Tanks Program) for further information and for access to the administrative records of the petroleum contamination case which was identified on the airport property.
- 2. Natural Heritage Resources.
- 2(a) Agency Jurisdiction.
- **2(a)(i) Natural Heritage Resources.** The Virginia Department of Conservation and Recreation's (DCR) Division of Natural Heritage (DNH): DNH's mission is conserving Virginia's biodiversity through inventory, protection and stewardship. The Virginia Natural Area Preserves Act (Virginia Code §10.1-209 through 217), authorized DCR to maintain a statewide database for conservation planning and project review, protect land for the conservation of biodiversity, and the protect and ecologically manage the natural heritage resources of Virginia (the habitats of rare, threatened and endangered species, significant natural communities, geologic sites, and other natural features).
- **2(a)(ii) Threatened and Endangered Plant and Insect Species.** The Virginia Department of Agriculture and Consumer Services (VDACS): The Endangered Plant and Insect Species Act of 1979 (Virginia Code Chapter 39 §3.1-1020 through 1030) authorizes VDACS to conserve, protect and manage endangered and threatened species of plants and insects. Under a Memorandum of Agreement established between VDACS and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species.
- **2(b) Agency Findings.** DCR DNH found that the Broad Run Stream Conservation Unit (SCU) is adjacent to the project site. The Broad Run SCU has been given a biodiversity ranking of B3, which represents a site of high significance. Natural heritage resources associated with this site are:

Alasmidonta varicosa Elliptio lanceolata

Brook floater Yellow lance

G3/S1/NL/LE G2G3/S2S3/SOC/NL

The Brook floater is currently listed as endangered by the Department of Game and Inland Fisheries (DGIF). The Yellow lance is currently classified as a species of concern by the United States Fish and Wildlife Service (USFWS); however, this designation has no official legal status. In addition, Broad Run has been designated by the DGIF as a "Threatened and Endangered Species Water" for the Brook floater. According to DCR's species distribution model, the potential may exist for the Dwarf wedgemussel (Alasmidonta heterodon, G1G2/S1/LE/LE) adjacent to the project area.

Refer to the attached DCR memorandum dated June 1, 2017 for more details about the identified species.

- **2(b)(i) State-listed Plant and Insect Species.** DCR finds that the current activity will not affect any documented state-listed plant and insect species.
- **2(b)(ii) State Natural Area Preserves.** DCR finds that there are no State Natural Area Preserves under its jurisdiction in the project vicinity.
- **2(c) Recommendations.** To minimize adverse impacts to the aquatic ecosystem as a result of the proposed activities, DCR recommends the implementation of and strict adherence to applicable state and local erosion and sediment control/storm water management laws and regulations.

Contact DCR-DNH to secure updated information on natural heritage resources if the scope of the project changes and/or six months has passed before it is utilized. New and updated information is continually added to the Biotics Data System.

### 3. Public Water Supply.

- **3(a) Agency Jurisdiction.** The Virginia Department of Health (VDH), Office of Drinking Water (ODW) reviews projects for the potential to impact public drinking water sources (groundwater wells and surface water intakes). VDH administers both federal and state laws governing waterworks operation.
- **3(b) Agency Findings.** VDH ODW identified two public groundwater wells within a 1-mile radius of the project site.

PWS ID Number City/County		System Name	Facility Name
6153264	PRINCE WILLIAM	BROAD RUN GOLF	WELL
6153041	PRINCE WILLIAM	BRISTOW MANOR GOLF CLUB	WELL

Additionally, the project is within the watershed of the Fairfax County Water Authority's Occoquan Reservoir public surface water intake (PWS ID 6059501).

### 3(c) Recommendation.

- Best Management Practices should be employed on the project site including Erosion & Sedimentation Controls as well as Spill Prevention Controls & Countermeasures.
- Properly manage materials on site and during transport to prevent impacts to nearby surface water.
- **3(d) Requirement.** Potential impacts to public water distribution systems or sanitary sewage collection systems must be verified by the local utility as applicable.

### 4. Aviation.

- **4(a) Agency Jurisdiction.** The Virginia Department of Aviation is a state agency that plans for the development of the state aviation system; promotes aviation; grants aircraft and airports licenses; and provides financial and technical assistance to cities, towns, counties and other governmental subdivisions for the planning, development, construction and operation of airports, and other aviation facilities.
- **4(b) Agency Findings.** DOAV finds that the proposed project is consistent with the approved Airport Layout Plan. DOAV has been working with and providing comments on the project directly to the airport sponsor, in coordination with the FAA's Washington Airports District office.

# 5. Historic Structures and Architectural Resources.

- 5(a) Agency Jurisdiction. The Virginia Department of Historic Resources (DHR) conducts reviews of both federal and state projects to determine their effect on historic properties. Under the federal process, DHR is the State Historic Preservation Office, and ensures that federal undertakings - including licenses, permits, or funding comply with Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulation at 36 CFR Part 800. Section 106 requires federal agencies to consider the effects of federal projects on properties that are listed or eligible for listing on the National Register of Historic Places. For state projects or activities on state lands, DHR is afforded an opportunity to review and comment on (1) the demolition of state property; (2) major state projects requiring an EIR; (3) archaeological investigations on state-controlled land; (4) projects that involve a landmark listed in the Virginia Landmarks Register; (5) the sale or lease of surplus state property; (6) exploration and recovery of underwater historic properties; and (7) excavation or removal of archaeological or historic features from caves. See DHR's website for more information about applicable state and federal laws and how to submit an application for review: http://www.dhr.virginia.gov/StateStewardship/Index.htm.
- **5(b) Agency Finding.** DHR received information for this project for review pursuant to Section 106 of the National Historic Preservation Act, including a Phase I Archeological Study. The new development will not cause any additional adverse impacts from the current conditions on the site, in areas where the development will be visible.

Based on its review DHR concurs with the FAA that the proposed airport improvement project will have no adverse effect on historic properties with the condition that protective measures are employed during construction for adjacent site 44PW0729.

**6. Pesticides and Herbicides**. Should maintenance of the property require the use of pesticides or herbicides for landscape maintenance, these chemicals should be in accordance with the principles of integrated pest management. The least toxic pesticides that are effective in controlling the target species should be used.

Contact the Department of Agriculture and Consumer Services at (804) 786-3501 for more information.

### 7. Transportation Impacts.

- **7(a) Agency Jurisdiction.** The Virginia Department of Transportation (VDOT) provides comments pertaining to potential impacts to existing and future transportation systems.
- **7(b) Agency Findings.** The VDOT Northern Virginia District Office did not have any transportation-related concerns related to the project.

### 8. Wildlife Resources.

- **8(a) Agency Jurisdiction.** The Department of Game and Inland Fisheries, as the Commonwealth's wildlife and freshwater fish management agency, exercises enforcement and regulatory jurisdiction over wildlife and freshwater fish, including state or federally listed endangered or threatened species, but excluding listed insects (*Virginia Code* Title 29.1). The DGIF is a consulting agency under the U.S. Fish and Wildlife Coordination Act (16 U.S.C. sections 661 *et seq.*), and provides environmental analysis of projects or permit applications coordinated through DEQ and several other state and federal agencies. DGIF determines likely impacts upon fish and wildlife resources and habitat, and recommends appropriate measures to avoid, reduce, or compensate for those impacts.
- **8(b) Agency Findings.** DGIF did not indicate that wildlife or threatened and endangered species would be impacted by this project.
- **8(c) Agency Recommendation.** To minimize overall impacts to wildlife resources, DGIF offers the following comments about development activities:
  - Avoid and minimize impacts to undisturbed forest, wetlands, and streams to the fullest extent practicable;
  - Maintain naturally vegetated buffers of at least 100 feet in width around wetlands and on both sides of perennial and intermittent streams, where practicable;
  - Conduct significant tree removal and ground clearing activities outside of the primary songbird nesting season of March 15 through August 15;
  - Implement and maintain appropriate erosion and sediment controls throughout project construction and site restoration.

### 9. Locality Comments.

**9(a) Agency Jurisdiction.** In accordance with CFR 930, Subpart A, § 930.6(b) of the *Federal Consistency Regulations*, DEQ, on behalf of the state, is responsible for securing necessary review and comment from other state agencies, the public, regional government agencies, and local government agencies, in determining the Commonwealth's concurrence or objection to a federal consistency certification.

**9(b) Locality Comments.** Prince William County reviewed the FCC and provided a copy of a scoping response dated December 9, 2016 that the county sent to the project consultant. The letter indicated that Piper Lane provides the only access to the western development site.

Prince William County indicated that there is the potential for direct and indirect impacts to historic resources to occur and identified two Civil War battlefields (Bristoe Station and Kettle Run battlefields) that may be impacted. These battlefields should be taken into consideration in the Environmental Assessment for the project. Some archaeological surveying of the east parcel development area has occurred and the county indicated that the airport consulted with the Prince William County Archaeologist on the scope of work for further cultural resources surveying in January 2017.

The County indicated via discussions with DEQ's Office of Local Government Programs that it would require a Preservation Area Site Assessment for the east site development that is proposed in the near vicinity of a RPA. Refer to Item 3 in the Federal Consistency Analysis section above for more details.

**9(c) Locality Recommendation.** The County recommends an analysis of Piper Lane to assess its adequacy to handle the additional traffic associated with the new development on the west side. The analysis should take into consideration the width, pavement thickness, drainage and capacity of the roadway.

Archaeological surveying of undisturbed areas proposed for development should occur, including metal detector surveys by an archaeologist. Continue to coordinate with the county regarding their concerns related to cultural resources.

# **REGULATORY AND COORDINATION NEEDS**

- 1. Nonpoint Source Pollution Control.
- **1(a) Erosion and Sediment Control and Stormwater Management**. This project must comply with *Virginia's Erosion and Sediment Control Law* (Virginia Code § 62.1-44.15:61) and *Regulations* (9 VAC 25-840-30 *et seq.*) and *Stormwater Management Law* (Virginia Code § 62.1-44.15:31) and *Regulations* (9 VAC 25-870-210 *et seq.*) as locally administered. Land-disturbing activities of equal to or greater than 10,000 square feet (2,500 square feet in a Chesapeake Bay Preservation Area) would be regulated by *VESCL&R* and *VSWML&R*. Local erosion and sediment control, and stormwater management plan requirements should be coordinated with the locality.

Specific questions regarding Erosion and Sediment control requirements should be directed to DEQ, Larry Gavan at (804) 698-4040.

- **1(b)** General Permit for Stormwater Discharges from Construction Activities (VAR10). For projects involving land-disturbing activities of equal to or greater than one acre the applicant is required to register for coverage under the Virginia Stormwater Management Program General Permit for Discharges of Stormwater from Construction Activities (9 VAC 25-870-1 *et seq.*). Specific questions regarding the Stormwater Management Program requirements should be directed to DEQ, Holly Sepety at (804) 698-4039.
- **2. Air Pollution Control**. Activities associated with this project may be subject to air regulations administered by DEQ. The state air pollution regulations that may apply to the project are:
  - fugitive dust and emissions control (9VAC5-50-60 et seq.);
  - asphalt paving operations (9VAC5-45-760 et seq.);
  - permits for fuel-burning equipment (9VAC5-80-1100 et seq.); and
  - open burning restrictions (9VAC5-130 et seq.).

Contact DEQ NRO at (783) 583-3800 with questions.

- **3. Natural Heritage Resources.** Contact DCR-DNH, Rene Hypes at (804) 786-7951 to secure updated information on natural heritage resources if six months passes before the project is implemented.
- **4. Solid and Hazardous Wastes**. All solid waste, hazardous waste, and hazardous materials must be managed in accordance with all applicable federal, state, and local environmental regulations. Contact DEQ NRO (783-583-3800) for information on the location and availability of suitable waste management facilities in the project area or if free product, discolored soils, or other evidence of contaminated soils are encountered.
- **4(a) Asbestos-Containing Material.** It is the responsibility of the owner or operator of a demolition activity to thoroughly inspect the affected part of the facility prior to demolition for the presence of asbestos, including Category I and Category II nonfriable asbestos-containing material. Upon classification as friable or non-friable, all asbestos-containing material shall be disposed of in accordance with the Virginia Solid Waste Management Regulations (9 VAC 20-80-640) and transported in accordance with the Virginia regulations governing Transportation of Hazardous Materials (9 VAC 20-110-10 *et seq.*). Contact the Department of Labor and Industry (804-371-2327) for additional information.
- **4(b) Lead-Based Paint.** This project must comply with the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) regulations and with the Virginia Lead-Based Paint Activities Rules and Regulations. For additional information regarding these requirements, contact the Department of Professional and Occupational Regulation at (804) 367-8500.

**5. Chesapeake Bay Preservation Act.** Coordinate with the Prince William County Department of Public Works, Division of Watershed Management at 703-792-7070 regarding the submittal requirements for the County's Preservation Area Site Assessment (PASA) process, including the requirement for a site-specific RPA evaluation and, if necessary, a WQIA.

The project must be conducted in a manner that is consistent with the coastal lands management enforceable policy of the CZM Program as administered by DEQ pursuant to the Chesapeake Bay Preservation Act (Virginia Code 62.1-44.15 *et seq.*) and the Chesapeake Bay Preservation Area Designation and Management Regulations (9VAC25-830 *et. seq.*). For additional information contact Daniel Moore (804-698-4520).

- **6. Historic Resources**. Coordinate with DHR (Adrienne Birge-Wilson, 804-482-6092) as necessary with questions regarding its findings and the protective measures for adjacent site 44PW0729.
- **7. Wetlands and Subaqueous Lands Impacts**. A Joint Permit Application must be submitted to VMRC for the proposed wetlands and subaqueous lands impacts. Contact VMRC (Tony Watkinson, 757-247-2250) with questions.
- **8. Point Source Pollution Control**. Contact the DEQ NRO (Susan Mackert, 703-583-3853) regarding a permit modification to add new outfalls to the existing VPDES Industrial Stormwater General Permit (VAR050985) for the facility.
- **9. Potable and Sanitary Water Collection Systems**. Potential impacts to public water distribution systems or sanitary sewage collection systems must be verified by the local utility. Contact the VDH Office of Drinking Water with questions related to its recommendations (Arlene Fields Warren, 804-864-7781).
- **10. Wildlife Resources**. Coordinate with DGIF (Amy Ewing, 804-367-2211) with questions regarding its recommendations to protect wildlife resources or to aid in the development of project-specific measures to minimize project impacts to wildlife.
- **11. Locality Coordination**. Coordinate with Prince William County (Justin Patton, 703-792-5792) regarding the county's comments and recommendations related to cultural resources and the analysis of the adequacy of Piper Lane to handle the increased traffic associated with the proposed west side development. See also Item 5 Chesapeake Bay Preservation Act above.

Thank you for the opportunity to comment on the FCC submitted for the West Corporate Development and East Parcel Development project at the Manassas Regional Airport. Detailed comments of reviewing agencies are attached for your review. If you have questions, please do not hesitate to call me at (804) 698-4204 or Janine Howard at (804) 698-4299.

Sincerely,

Bettina Sullivan, Program Manager Environmental Impact Review

Ec:

Robbie Rhur, DCR
Amy Ewing, DGIF
Tony Watkinson, VMRC
Roger Kirchen, DHR
Greg Evans, DOF
Arlene Warren, VDH
Elizabeth Jordan, VDOT
Robert Lazaro, Northern Virginia Regional Commission
William Patrick Pate, City of Manassas
Christopher E. Martino, Prince William County
Clay Morris, Prince William County
Susan Simmers, DOAV
Susan Stafford, FAA
Juan Rivera, Manassas Regional Airport
Natalie Heath, RS&H

# DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION OF AIR PROGRAM COORDINATION

# **ENVIRONMENTAL REVIEW COMMENTS APPLICABLE TO AIR QUALITY**

TO: Janine L. H	oward DI	EQ - OEIA PROJEC	T NUM	BER: DEQ #17-061F
PROJECT TYPE	E: ☐ STATE EA / EIR X	FEDERAL EA / EIS	s	oc .
	X CONSISTENCY CER	RTIFICATION		
PROJECT TITLE	E: Manassas Regional Airp Parcel Development	oort West Corpora	ate Dev	elopment and East
PROJECT SPON	NSOR: Federal Aviation Ad	ministration		
PROJECT LOCA		TAINMENT SION CONTROL AI	REA FO	PR NOX & VOC
REGULATORY F	REQUIREMENTSMAY BE API	PLICABLE TO:	×	CONSTRUCTION OPERATION
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Ks. Lane	2			

(Kotur S. Narasimhan) Office of Air Data Analysis

**DATE: May 4, 2017** 

Molly Joseph Ward Secretary of Natural Resources

Clyde E. Cristman *Director* 



Rochelle Altholz Deputy Director of Administration and Finance

David C. Dowling
Deputy Director of
Soil and Water Conservation
and Dam Safety

Thomas L. Smith Deputy Director of Operations

### **MEMORANDUM**

DATE:

June 1, 2017

T0:

Janine Howard, DEQ

FROM:

Roberta Rhur, Environmental Impact Review Coordinator

SUBIECT:

DEQ 17-061F, Manassas Regional Airport West & East Parcel Development

DEPARTMENT OF CONSERVATION AND RECREATION

### Division of Natural Heritage

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in our files, the Broad Run Stream Conservation Unit is adjacent to the project site. Stream Conservation Units (SCUs) identify stream reaches that contain aquatic natural heritage resources, including 2 miles upstream and 1 mile downstream of documented occurrences, and all tributaries within this reach. SCUs are also given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain. The Broad Run SCU has been given a biodiversity ranking of B3, which represents a site of high significance. Natural heritage resources associated with this site are:

Alasmidonta varicosa Elliptio lanceolata Brook floater Yellow lance

G3/S1/NL/LE G2G3/S2S3/SOC/NL

The Brook floater, a small freshwater mussel species, is known from the northeastern United States primarily in the Atlantic Slope drainages (NatureServe, 2009). In Virginia, it is recorded from the Potomac River basin with a possible record from the James River. Of 14 documented records in Virginia, only two are thought to be viable. Population declines have been documented throughout its range (NatureServe, 2009). The Brook floater typically inhabits flowing-water habitats in and near riffles and rapids of smaller creeks with rocky or gravelly substrates (Nedeau et al., 2000 per NatureServe, 2009). Many facets of its life history are unknown including its fish host. Threats for the Brook floater in particular include poor water quality as this species does not tolerate silt or nutrient pollution well (Stevenson and Bruenderman, 1995). Please note that this species is currently listed as endangered by the Virginia Department of Game and Inland Fisheries (VDGIF).

The Yellow lance occurs in mid-sized rivers and second and third order streams. To survive, it needs a silt-free, stable streambed and well-oxygenated water that is free of pollutants. This species has been the subject of taxonomic debate in recent years (NatureServe, 2009). Currently in Virginia, the Yellow lance is

recognized from populations in the Chowan, James, York, and Rappahannock drainages. Its range also extends into Neuse-Tar river system in North Carolina. In recent years, significant population declines have been noted across its range (NatureServe, 2009). The Yellow lance may be particularly sensitive to chemical pollutants and exposure to fine sediments from erosion (NatureServe, 2009). Please note that this species is currently classified as a species of concern by the United States Fish and Wildlife Service (USFWS); however, this designation has no official legal status.

Considered good indicators of the health of aquatic ecosystems, freshwater mussels are dependent on good water quality, good physical habitat conditions, and an environment that will support populations of host fish species (Williams et al., 1993). Because mussels are sedentary organisms, they are sensitive to water quality degradation related to increased sedimentation and pollution. They are also sensitive to habitat destruction through dam construction, channelization, and dredging, and the invasion of exotic mollusk species.

In addition, Broad Run has been designated by the VDGIF as a "Threatened and Endangered Species Water" for the Brook floater.

Please note according to DCR's species distribution model, potential may exist for the Dwarf wedgemussel (*Alasmidonta heterodon*, G1G2/S1/LE/LE) adjacent to the project area. To minimize adverse impacts to the aquatic ecosystem as a result of the proposed activities, DCR recommends the implementation of and strict adherence to applicable state and local erosion and sediment control/storm water management laws and regulations. Due to the legal status of the Brook floater, DCR also recommends coordination with Virginia's regulatory authority for the management and protection of this species, the VDGIF, to ensure compliance with the Virginia Endangered Species Act (VA ST §§ 29.1-563 – 570).

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

New and updated information is continually added to Biotics. Please re-submit project information and map for an update on this natural heritage information if the scope of the project changes and/or six months has passed before it is utilized.

The Virginia Department of Game and Inland Fisheries (VDGIF) maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from <a href="http://vafwis.org/fwis/">http://vafwis.org/fwis/</a> or contact Ernie Aschenbach at 804-367-2733 or <a href="mailto:Ernie.Aschenbach@dgif.virginia.gov">Ernie.Aschenbach@dgif.virginia.gov</a>.

The remaining DCR divisions have no comments regarding the scope of this project. Thank you for the opportunity to comment.

Cc: Amy Ewing, DGIF Troy Anderson, USFWS

### Literature Cited

NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 16, 2010 and April 5, 2010).

Nedeau, E.J., M.A. McCollough, and B.I. Swartz. 2000. The freshwater mussels of Maine. Maine Department of Inland Fisheries and Wildlife, Augusta, Maine. 118 pp.

Stevenson, Phillip H. and Sue A. Bruenderman 1995. A Guide to Endangered and Threatened Species of Virginia. K. Terwilliger ed. The McDonald and Woodward Publishing Company, Blacksburg, Virginia. p. 74.

Williams, J.D., M.L. Warren, Jr., K.S. Cummings, J.L. Harris, and R.J. Neves. 1993. Conservation status of freshwater mussels of the United States and Canada. Fisheries 18: 6-9.

From:

Ewing, Amy (DGIF)

Sent:

Thursday, June 08, 2017 11:20 AM

To:

Howard, Janine (DEQ)

Cc:

nhreview (DCR)

Subject:

ESSLog# 38126\_17-061F\_ManassasRegionalAirport\_DGIF\_AME20170608

### Janine,

Broad Run, which borders the airport on the southern side, is designated a Threatened and Endangered Species Water due to the presence of state Endangered brook floaters. It does not appear any instream work is proposed in which case we do not anticipate this project to result in significant adverse impacts upon this species. If instream work becomes necessary, we recommend additional coordination with us.

This project is located within 2 miles of a documented occurrence of a state or federal threatened or endangered plant or insect species and/or other Natural Heritage coordination species. Therefore, we recommend coordination with VDCR-DNH regarding the protection of these resources.

To minimize the adverse impacts of linear utility/road project development on wildlife resources, we offer the following general recommendations: avoid and minimize impacts to undisturbed forest, wetlands, and streams to the fullest extent practicable; maintain naturally vegetated buffers of at least 100 feet in width around wetlands and on both sides of perennial and intermittent streams, where practicable; conduct significant tree removal and ground clearing activities outside of the primary songbird nesting season of March 15 through August 15; and, implement and maintain appropriate erosion and sediment controls throughout project construction and site restoration. We understand that adherence to these general recommendations may be infeasible in some situations. We are happy to work with the applicant to develop project-specific measures as necessary to minimize project impacts upon the Commonwealth's wildlife resources.

Assuming adherence to erosion and sediment controls, we find this project consistent with the Fisheries Management Section of the CZMA.

Thanks, Amy

# Amy M. Ewing

Environmental Services Biologist/FWIS Program Manager

Chair, Team WILD (Work, Innovate, Lead and Develop)

VA Department of Game and Inland Fisheries

7870 Villa Park Dr., Suite 400, PO Box 90778, Henrico, VA 23228

804-367-2211 © Our mission is to: Conserve, Connect, and Protect © www.dgif.virginia.gov

"That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics" Aldo Leopold, 1948



# COMMONWEALTH of VIRGINIA

## **Department of Historic Resources**

Molly Joseph Ward Secretary of Natural Resources 2801 Kensington Avenue, Richmond, Virginia 23221

Julie V. Langan Director

Tel: (804) 367-2323 Fax: (804) 367-2391 www.dhr.virginia.gov

June 2, 2017

Susan Stafford Federal Aviation Administration Washington Airports District Office 23723 Air Freight Lane, Suite 210 Dulles, VA 20166

Re:

Manassas Regional Airport West Corporate Development and East Parcel Development City of Manassas

DHR File No. 2017-0348

Dear Ms. Stafford,

The Virginia Department of Historic Resources (DHR) received the above referenced project for our review and comment pursuant to Section 106 (54 U.S.C. 306108) of the National Historic Preservation Act (54 U.S.C. 300101 et seq.) and it's implementing regulation, "Protection of Historic Properties" (36 CFR Part 800).

We have reviewed the report titled Phase I Archaeological Study for the Proposed West Corporate Development and East Parcel Development at Manassas Regional Airport, City of Manassas, Prince William County, Virginia prepared by Elizabeth Anderson Comer/Archaeology. It is our opinion that the fieldwork and report are consistent with applicable standards and guidelines. Much of the project area has either been previously surveyed or disturbed and the archaeological survey of roughly 18 acres of undisturbed land identified no intact sites. Based on the information provided, we find that impacts to archaeological properties are unlikely and no further archaeological survey is warranted in support of this project. We do, however, agree that protective measures should be employed during construction for adjacent site 44PW0729.

The proposed project will not be visible from most of the nine identified historic properties. Because of its scale and property type, the new development will not cause any additional

Western Region Office 962 Kime Lane Salem, VA 24153 Tel: (540) 387-5443 Fax: (540) 387-5446

Northern Region Office 5357 Main Street PO Box 519 Stephens City, VA 22655 Tel: (540) 868-7029 Fax: (540) 868-7033 Eastern Region Office 2801 Kensington Avenue Richmond, VA 23221 Tel: (804) 367-2323 Fax: (804) 367-2391 Page 2 June 2, 2017 DHR File No. 2017-0348

adverse impacts from what currently exists on the site, in areas where the development will be visible.

Based upon the sum of the review, DHR concurs with FAA that the proposed airport improvement project will have no adverse effect on historic properties with the condition that protective measures should be employed during construction for adjacent site 44PW0729.

If you have any questions regarding these comments or our review of this project, please do not hesitate to contact me via telephone at (804) 482-6092 or via email at <a href="mailto:adrienne.birge-wilson@dhr.virginia.gov">adrienne.birge-wilson@dhr.virginia.gov</a>.

Sincerely,

Adrienne Birge-Wilson, Architectural Historian Review and Compliance Division

Advienne Linge Wilson

cc: Janine Howard, DEQ



# COMMONWEALTH of VIRGINIA

Randall P. Burdette Executive Director

### **Department of Aviation** 5702 Gulfstream Road Richmond, Virginia 23250-2422

V/TDD • (804) 236-3624 FAX • (804) 236-3635

ISO 9001:2008 Certified IS-BAO Registered

Transmitted via Email

May 25, 2017

Ms. Janine Howard
Department of Environmental Quality
Office of Environmental Impact Review
629 East Main Street, Sixth Floor
Richmond, VA 23219

Re: Manassas Regional Airport

West Corporate Development and East Parcel Development

Project Number: 17-061F

Dear Mr. Fischer:

Thank you for the opportunity to comment on the West Corporate Development and East Parcel Development project at the Manassas Regional Airport in the City of Manassas and Prince William County. The project is consistent with the approved airport layout plan for the airport. The Virginia Department of Aviation has been working with and providing comments on the project directly to the airport sponsor, in coordination with the Federal Aviation Administration's Washington Airports District Office.

The Virginia Department of Aviation has no objection to the project as proposed at this time.

Susana. Simmus

Please let me know if you have any questions on our comments.

Sincerely,

Susan H. Simmers Senior Aviation Planner

ec: Juan Rivera, Airport Director

100 DOAVAS 20170525 DEQ 17-061F HEF West Corp and East Pa



### **MEMORANDUM**

TO: Janine Howard, DEQ/EIR Environmental Program Planner

FROM: Katy Dacey, Division of Land Protection & Revitalization Review Coordinator

**DATE:** May 12, 2017

COPIES: Sanjay Thirunagari, Division of Land Protection & Revitalization Review Manager; file

SUBJECT: Environmental Impact Review: EIR Project No 17-061F Manassas Regional Airport

West Corporate Development and East Parcel Development, City of Manassas, Prince

William County, VA

The Division of Land Protection & Revitalization (DLPR) has completed its review of the May 2017 EIR for the Manassas Regional Airport West Corporate Development and East Parcel Development projects located 10600 Harry J. Parrish Boulevard to Manassas Regional Airport in Manassas, Virginia 20110

Project Scope: redevelopment and development of the west and east sides of airport to include: roadway improvements, building and parking lot reconstructions, T-hangers demolition, construction of hanger and parking lot, expansion of apron and taxilane tie down parking, wash rack construction, utilities and stormwater drainage improvements, taxilane extension and security fence extension

Solid and hazardous waste issues were not addressed in the submittal. The submittal did not indicate that a search of Federal or State environmental databases was conducted. DLPR staff conducted a search (2000 foot radius) of solid and hazardous waste databases (including petroleum releases) to identify waste sites in close proximity to the project corridor. DLPR search did identify five waste sites within the project area which might impact the project. Additionally, no waste sites of possible concern were located within the zip code of the project area, 22110. DLPR staff has reviewed the submittal and offers the following comments:

# Hazardous Waste/RCRA Facilities - three in close proximity to project area.

- 1. VAD988212643, Tri-State Tours, 10680 Wakeman Court, Manassas, VA 22110. SQG
- 2. VA0000347922, Wilcox Woodworks, 10687 Wakeman Court, Manassas, VA 22110. SQG
- 3. VAR000506774, Corfu Contractors, 10599 Residence Road, Manassas, VA 20136. SQG

<u>CERCLA Sites</u> – none in the same zip code of the project area

The above information related to hazardous wastes, RCRA/CERCLA sites can be accessed from EPA's websites at <a href="https://www3.epa.gov/enviro/">https://www3.epa.gov/enviro/</a>,

https://rcrainfopreprod.epa.gov/rcrainfoweb/action/main-menu/view and https://www.epa.gov/superfund

Formerly Used Defense Sites (FUDS) - none in close proximity to project area

Solid Waste - none in close proximity to project area

<u>Virginia Remediation Program (VRP)</u> – none in close proximity to project area

<u>Petroleum Releases</u> - two within the project area (\*denotes the same address)

4. PC#20013062, Manassas Airport – New Control Tower, 10522 Terminal Road, Manassas, VA 22110. Release Date: 09/25/2000. Status: Closed.

\*PC#19910187, Dulles Aviation Incorporated – Manassas Airport, 10522 Terminal Road, Manassas, VA 22110. Release Date: 08/21/1990. Status: Closed.

\*PC#19993317, Manassas Municipal Airport, 10522 Terminal Road, Manassas, VA 22110. Release Date: 03/22/1999. Status: Closed.

\*PC#19973688, Manassas Airport – Old Control Tower, 10522 Terminal Road, Manassas, VA 22110. Release Date: 09/05/1996. Status: Closed.

\*PC#19870385, Manassas Airport, 10522 Terminal Road, Manassas, VA 22110. Release Date: 12/09/1986. Status: Closed.

5. PC#19900438, VDOT – Manassas Area Headquarters Shop, 10228 Residency Road, Manassas, VA 22110. Release Date: 10/16/1989. Status: Closed.

Please note that the DEQ's Pollution Complaint (PC) cases identified should be further evaluated by the project engineer or manager to establish the exact location, nature and extent of the petroleum release and the potential to impact the proposed project. Also, the project engineer or manager should contact the DEQ's Northern Virginia Regional Office at (703) 583-3800 (Tanks Program) for further information about the PC cases.

### PROJECT SPECIFIC COMMENTS

None

**GENERAL COMMENTS** 

# Soil, Sediment, Groundwater, and Waste Management

Any soil, sediment or groundwater that is suspected of contamination or wastes that are generated must be tested and disposed of in accordance with applicable Federal, State, and local laws and regulations. Some of the applicable state laws and regulations are: Virginia Waste Management Act, Code of Virginia

Section 10.1-1400 *et seq.*; Virginia Hazardous Waste Management Regulations (VHWMR) (9VAC 20-60); Virginia Solid Waste Management Regulations (VSWMR) (9VAC 20-81); Virginia Regulations for the Transportation of Hazardous Materials (9VAC 20-110). Some of the applicable Federal laws and regulations are: the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Section 6901 *et seq.*, and the applicable regulations contained in Title 40 of the Code of Federal Regulations; and the U.S. Department of Transportation Rules for Transportation of Hazardous Materials, 49 CFR Part 107.

### Asbestos and/or Lead-based Paint

All structures being demolished/renovated/removed should be checked for asbestos-containing materials (ACM) and lead-based paint (LBP) prior to demolition. If ACM or LBP are found, in addition to the federal waste-related regulations mentioned above, State regulations 9VAC 20-81-620 for ACM and 9VAC 20-60-261 for LBP must be followed. Questions may be directed to Jason Miller at the DEQ's Piedmont Regional Office at (804) 527-5028.

# Pollution Prevention - Reuse - Recycling

Please note that DEQ encourages all construction projects and facilities to implement pollution prevention principles, including the reduction, reuse, and recycling of all solid wastes generated. All generation of hazardous wastes should be minimized and handled appropriately.

If you have any questions or need further information, please contact Katy Dacey at (804) 698-4274.

From:

Warren, Arlene (VDH)

Sent:

Friday, May 19, 2017 10:05 AM

To:

Howard, Janine (DEQ)

Subject:

RE: NEW PROJECT FAA Manassas Airport 17-061F

Project Name: Manassas Regional Airport West Corporate Development and East Parcel Development

Project #: 17-061F

UPC#: N/A

Location: City of Manassas, Prince William County

VDH – Office of Drinking Water has reviewed the above project. Below are our comments as they relate to proximity to **public drinking water sources** (groundwater wells, springs and surface water intakes). Potential impacts to public water distribution systems or sanitary sewage collection systems **must be verified by the local utility.** 

The following public groundwater wells are located within a 1 mile radius of the project site:

PWS ID			
Number	City/County	System Name	Facility Name
6153264	PRINCE WILLIAM	BROAD RUN GOLF	WELL
6153041	PRINCE WILLIAM	BRISTOW MANOR GOLF CLUB	WELL

There are no surface water intakes located within a 5 mile radius of the project site.

The project is within the watershed of the following public surface water sources:

PWS ID		
Number	System Name	Facility Name
6059501	FAIRFAX CO WATER AUTHORITY	OCCOQUAN RESERVIOR INTAKE

• Comments from OEHS Division of Shellfish Sanitation, Mr. Eric Aschenbach, "We do not have any comments on the project."

Best Management Practices should be employed, including Erosion & Sedimentation Controls and Spill Prevention Controls & Countermeasures on the project site.

Materials should be managed while on site and during transport to prevent impacts to nearby surface water.

Best Regards,

Arlene Fields Warren
GIS Program Support Technician
Office of Drinking Water
Virginia Department of Health
109 Governor Street
Richmond, VA 23220
(804) 864-7781

The Virginia Department of Health – Office of Drinking Water appreciates the opportunity to provide comments. If you have any questions, please let me know.

From:

Dabestani, Cina (VDOT)

Sent:

Friday, June 02, 2017 10:00 AM

To:

Howard, Janine (DEQ)

Cc:

Cromwell, James R. (VDOT); Jordan, Elizabeth (VDOT); Trivedi, Rahul, P.E. (VDOT)

Subject:

NEW PROJECT FAA Manassas Airport 17-061F

Ms. Howard-

VDOT Northern Virginia District Office has carefully reviewed the subject project's documents and has no comment to offer at this time.

Thank you for providing the opportunity to review documents pertaining to this project.

Cina S. Dabestani
Sr. Transportation Engineer
Transportation Planning
Virginia Department of Transportation
703.259.2991
Cina.Dabestani@VDOT.Virginia.GOV



Please consider the environment before printing this email

From:

Burstein, Daniel (DEQ)

Sent:

Thursday, June 01, 2017 8:40 AM

To:

Howard, Janine (DEQ)

Subject:

Re: FAA - Manassas Regional Airport West Corporate Development and East Parcel

Development, City of Manassas, Prince William County - DEQ #17-061F- Review

NRO comments regarding the Federal Consistency Determination for the FAA - Manassas Regional Airport West Corporate Development and East Parcel Development, located in Prince William, Virginia are as follows:

<u>Land Protection Division</u> – The project manager is reminded that if any solid or hazardous waste is generated/encountered during construction, the project manager would follow applicable federal, state, and county regulations for their disposal.

<u>Air Compliance/Permitting</u> - The project manager is reminded that during the construction phases that occur with this project; the project is subject to the Fugitive Dust/Fugitive Emissions Rule 9 VAC 5-50-60 through 9 VAC 5-50-120. Lastly, should any open burning or use of special incineration devices be employed in the disposal of land clearing debris during demolition and construction, the operation would be subject to the Open Burning Regulation 9 VAC 5-130-10 through 9 VAC 5-130-60 and 9 VAC 5-130-100.

<u>Virginia Water Protection Permit (VWPP) Program</u> – According to the submission, impacts to surface waters will be necessary. DEQ VWP staff recommends that the avoidance and minimization of surface water impacts to the maximum extent practicable as well as coordination with the US Army Corps of Engineers. Upon receipt of a Joint Permit Application for the proposed surface water impacts, DEQ VWP Permit staff will review the proposed project in accordance with the VWP permit program regulations and current VWP permit program guidance.

Erosion and Sediment Control and Storm Water Management: DEQ has regulatory authority for the Virginia Pollutant Discharge Elimination System (VPDES) programs related to municipal separate storm sewer systems (MS4s) and construction activities. Erosion and sediment control measures are addressed in local ordinances and State regulations. Additional information is available at <a href="http://www.deq.virginia.gov/Programs/Water/StormwaterManagement.aspx">http://www.deq.virginia.gov/Programs/Water/StormwaterManagement.aspx</a>. Non-point source pollution resulting from this project should be minimized by using effective erosion and sediment control practices and structures. Consideration should also be given to using permeable paving for parking areas and walkways where appropriate, and denuded areas should be promptly revegetated following construction work. If the total land disturbance exceeds 10,000 square feet, an erosion and sediment control plan will be required. Some localities also require an E&S plan for disturbances less than 10,000 square feet. A stormwater management plan may also be required. For any land disturbing activities equal to one acre or more, you are required to apply for coverage under the VPDES General Permit for Discharges of Storm Water from Construction Activities. The Virginia Stormwater Management Permit Authority may be DEQ or the locality.

Daniel Burstein
Regional Enforcement Specialist, Senior II
Virginia Department of Environmental Quality
Northern Virginia Regional Office
13901 Crown Court
Woodbridge, VA 22193
Phone: (703) 583-3904
daniel.burstein@deq.virginia.gov.

### Howard, Janine (DEQ)

From:

Burstein, Daniel (DEQ)

Sent:

Wednesday, June 14, 2017 1:42 PM

To:

Howard, Janine (DEQ)

Subject:

RE: Federal Consistency Certification - Manassas Regional Airport West Corporate

Development and East Parcel Development (17-061F)

#### Thank you

Daniel Burstein Regional Enforcement Specialist, Senior II Virginia Department of Environmental Quality Northern Virginia Regional Office 13901 Crown Court Woodbridge, VA 22193 Phone: (703) 583-3904

daniel.burstein@deq.virginia.gov.

From: Howard, Janine (DEQ)

Sent: Wednesday, June 14, 2017 1:34 PM

To: Burstein, Daniel (DEQ)

Subject: FW: Federal Consistency Certification - Manassas Regional Airport West Corporate Development and East Parcel

Development (17-061F)

Hi Daniel,

I did some follow-up with the consultant regarding the new outfalls that are mentioned on page 9 in the FCC for the Manassas Regional Airport project to confirm that the outfalls are stormwater related (for reference I've attached the FCC and your review). The site does already have a Stormwater GP (VAR050985) and based on the consultant's response below, that permit will most likely require a modification due to the new outfalls.

I will require that they consult with NRO regarding the additional outfalls and a possible permit modification as a condition for consistency with the point source pollution control enforceable policy. If anything else comes to mind please let me know.

Janine

Janine Howard

**Environmental Impact Review Coordinator** 

Office of Environmental Impact Review Division of Environmental Enhancement Virginia Department of Environmental Quality 629 E. Main Street Richmond, VA 23219

t: (804) 698-4299

f: (804) 698-4032

For program updates and public notices please subscribe to the OEIR News Feed

From: Heath, Natalie [mailto:Natalie.Heath@rsandh.com]

Sent: Wednesday, June 14, 2017 11:30 AM

To: Howard, Janine (DEQ)

Subject: RE: Federal Consistency Certification - Manassas Regional Airport West Corporate Development and East Parcel

Development

Good morning Janine,

According to our water resources engineer, there will be new outfall(s) on the west side that will either connect to the existing storm sewer system or directly to Broad Run. On the east side, the new outfall(s) would connect to Cannon Branch because there is no existing system on that end. The designs for the area are still preliminary, so I do not have a specific number of outfalls. However, the our water resources engineer is estimating two on the west side and one on the east side.

Please let me know if you have any other questions,

Natalie

### Natalie Heath, AICP

**Environmental Specialist** 115 Alma Blvd, Suite 101, Merritt Island, FL 32953 321-454-6117 natalie.heath@rsandh.com

Stay up-to-date with our latest news and insights.



From: Howard, Janine (DEQ) [mailto:Janine.Howard@deq.virginia.gov]

Sent: Wednesday, June 14, 2017 9:40 AM

To: Heath, Natalie < Natalie. Heath@rsandh.com>

Subject: RE: Federal Consistency Certification - Manassas Regional Airport West Corporate Development and East Parcel

Development

Thanks for your reply Natalie. Keep me posted on the outfalls.

Janine

Janine Howard **Environmental Impact Review Coordinator** 

Office of Environmental Impact Review Division of Environmental Enhancement Virginia Department of Environmental Quality 629 E. Main Street Richmond, VA 23219





## Manassas Regional Airport (HEF) East Corporate Development Prince William County, Virginia

**Preservation Area Site Assessment (PASA)** 

10500 Harry J Parrish Blvd. Manassas, VA 20108 (GPIN: 7695-40-9012; Instrument No. 200712270137252)

**30 October 2017** 

Prepared for: Manassas Regional Airport 10600 Harry J. Parrish Blvd Manassas, Virginia 20110

Prepared By
Mill Creek Environmental Consultants, Ltd.
Matthew A. Neely, President
Certified Professional Wetland Delineator, Commonwealth of Virginia
No. 3402000144

## **Table of Contents**

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APPENDIX B	USACE Jurisdictional Determination and Supporting Documentation	_
	File: NAO 2017-0050	
APPENDIX C	Wetland Data Forms Relevant to PASA	

### **Background & Study Area Overview**

In the fall of 2016 Mill Creek Environmental Consultants, Ltd. was hired by RS&H, Inc. to provide multiple environmental services for an FAA required Environmental Assessment (EA) associated with the development of three (3) parcels in the vicinity of the Manassas Regional Airport. One of the parcels evaluated during that study was a ±15.5 acres study area adjacent to the intersection of Wakeman Drive and Harry J. Parrish Blvd near the Manassas Regional Airport as seen below:

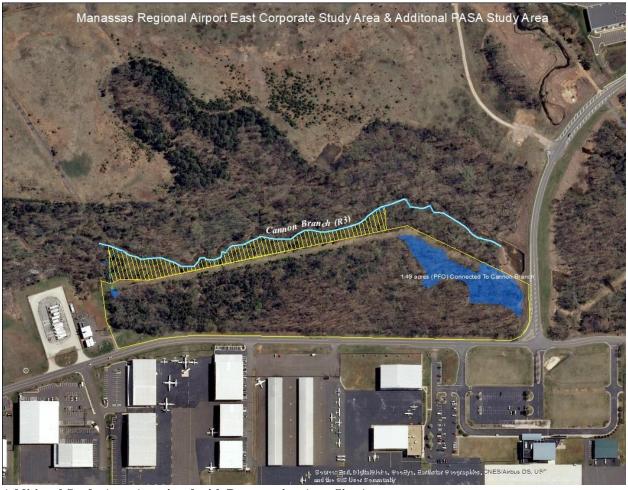


Manassas Regional Airport East Corporate Development Study Area

As required by the EA, a wetland delineation was conducted on all three parcels, and a preliminary jurisdictional determination (JD), was received from Ms. Theresita Crockett-Augustine of the U.S. Army Corps of Engineers on 14 March, 2017. The JD is included in this document (Appendix).

During that wetland delineation no waters of the US (WOUS) with perennial flow were determined to be within the boundaries of the study area parcels. However, during the review process the Virginia Department of Environmental Quality (DEQ) noted that because of its

proximity to Cannon Branch, (a verified perennial flow stream) portions of the East Corporate Development study area likely contain parts of a Resource Protection Area (RPA) associated with Cannon Branch. Due to this probability, Mill Creek was hired to conduct a Preservation Area Site Assessment (PASA) on the East Corporate Development study area, as well as a section of the land between the study area and the west (W) bank of Cannon Branch as shown below:



Additional Study Area Associated with Preservation Area Site Assessment

The size and location of the additional study area was determined based upon the confirmed delineation referenced above, in which 1.49 acres Palustrine Forested (PFO) wetlands connected to Cannon Branch were delineated within southeast (SE) corner of the East Corporate Development study area. Due to the regulations outlining those wetlands as a component of the RPA there was no reason to draw the additional study area further south (S), as the RPA buffer for the property under review would be established at the west (W) edge of those PFO wetlands. It was acknowledged that the RPA buffer associated with those PFO wetlands will extend well into the original study area boundary, as well as overlap with any RPA associated with the perennial Cannon Branch to the east (E).

This PASA was conducted to determine where the landward boundary of Cannon Branch's RPA overlaps with Manassas Regional Airport's East Corporate Development study area.

All WOUS delineated within the boundaries of the original East Corporate Development parcel have been confirmed by the US Army Corps of Engineers. The wetlands delineated between the boundary and Cannon Branch are "pending confirmation".

### **Preservation Area Components**

According to the Design and Construction Standards Manual (DCSM) Section 740.03:

A. Resource Protection Areas (RPAs) consist of lands adjacent to water bodies with perennial flow that have an intrinsic water quality value due to the biological and ecological processes they perform and are sensitive to impacts which may cause significant degradation to the quality of state waters. In their natural condition, these lands provide for the removal, reduction or assimilation of sediments, nutrients, and potentially harmful or toxic substances in runoff entering the Bay and its tributaries and minimize the adverse effects of human activities on state waters and aquatic resources.

- B. The Resource Protection Area shall consist of lands that would include:
- 1. Tidal wetlands.
- 2. Nontidal wetlands connected by surface flow and contiguous to tidal wetlands or water bodies with perennial flow.
- 3. Tidal shores.
- 4. Perennial water bodies.
- 5. An area of 100 feet in width shall be located adjacent to and landward of the components listed in subsections 1 thru 4 listed above and along both sides of a water body with perennial flow. Such area shall be designated as the landward component of RPA, notwithstanding the presence of permitted uses, encroachments, permitted vegetation clearing in compliance with Part IV (9 VAC 10-20-130 et seq.) of the Chesapeake Bay Preservation Area Designation and Management Regulations.

#### RPA & Non RPA Waters of the U.S.

- "Tidal Wetlands" defined in DCSM 740.02 (AA), are not present on-site.
- "Tidal Shores" defined by DCSM 740.02 (Z) are not present on-site.
- "Perennial Water Bodies", defined in DCSM 740.02 (Q) are present on-site. Cannon Branch, a perennial stream, runs roughly parallel and adjacent to the study area associated with this PASA.

• "Nontidal Wetlands" defined in DCSM 740.02 (O) are present on-site. All nontidal wetlands within the original East Corporate Development study area boundary have been confirmed by the US Army Corps of Engineers. Any wetlands within the additional study area boundary have been delineated but their status is "pending confirmation".

### Component Waters of the U.S. (WOUS) Associated with Cannon Branch RPA

a. ±1.49 acres Palustrine Forested (PFO) wetlands connected by surface flow and contiguous to Cannon Branch that possesses perennial flow.



PFO wetlands connected to Cannon Branch (USACE Confirmed)

b.  $\pm .02$  acres Palustrine Forested (PFO) wetlands directly adjacent to Cannon Branch.



PFO wetlands adjacent and connected to Cannon Branch

### Non RPA Component Waters of the US (WOUS)



Non-RPA component Waters of the U.S.

- a. Combined ± 299' of small linear streams (R4) leading down slope towards Cannon Branch (R3)
- b.  $\pm .004$  acres of PEM wetlands (confirmed by US Army Corps of Engineers)
- c. ±.02 acres of PFO wetlands (confirmed by US Army Corps of Engineers)

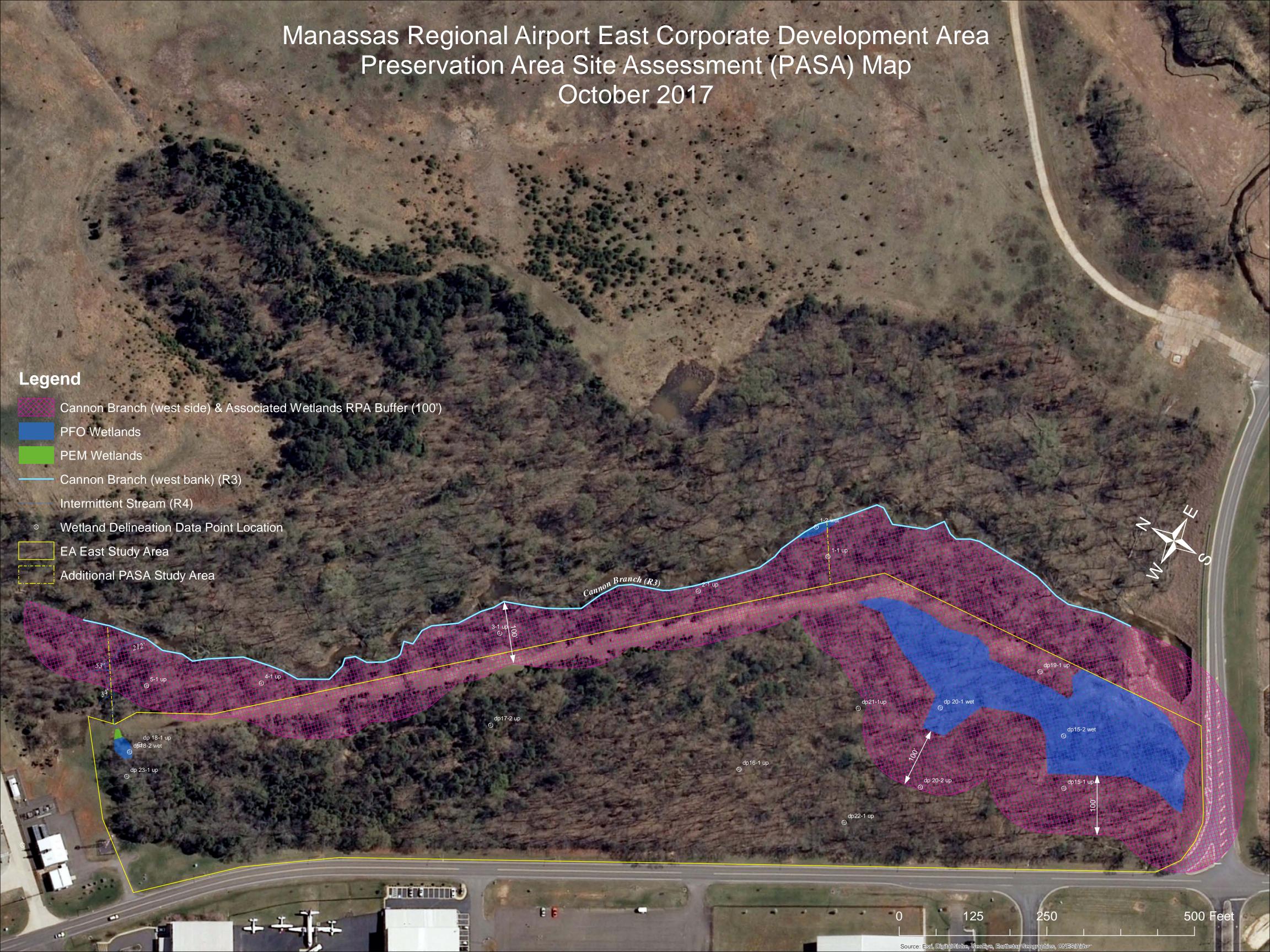
#### **RPA Buffer Determination**

The required 100' buffer determination was made based upon the site as assessed in the field. The determined RPA was established by creating a 100' buffer landward from Cannon' Branch's west (W) bank for the majority of the assessment. However, where contiguous connected wetlands were present as discussed above (PFO), the buffer was established at their landward edge and measured 100' landward toward the original study area. The proposed RPA map can be seen in Appendix A.

The JD received from the US Army Corps of Engineers, as referenced earlier in this report, can be found in Appendix B. Relevant wetland data forms can be found in Appendix C.

### APPENDIX A

Resource Protection Area Determination Map, East Corporate Development



# APPENDIX B USACE Jurisdictional Determination and Supporting Documentation File: NAO 2017-0050



#### DEPARTMENT OF THE ARMY US ARMY CORPS OF ENGINEERS NORFOLK DISTRICT

FORT NORFOLK 803 FRONT STREET NORFOLK VA 23510-1011

March 14, 2017

### PRELIMINARY JURISDICTIONAL DETERMINATION

Northern Virginia Regulatory Section NAO-2017-00508 (Manassas Regional Airport)

Manassas Regional Airport 10600 Harry J. Parrish Boulevard Manassas, VA 20110

Ladies and/or Gentlemen:

This letter is in regard to your request for a verification of a preliminary jurisdictional determination for waters of the U.S. (including wetlands) on property known as the Manassas Regional Airport, located on an approximately 47 acre parcel, at 10600 Harry J. Parrish Boulevard, in Manassas, Virginia.

The maps entitled "Manassas Regional Airport Corporate Development Environmental Assessment Wetland Delineation Map", by Mill Creek Environmental Consultants, LTD dated October 2016 (*copies enclosed*) provides the location of waters and/or wetlands on the property listed above. The basis for this delineation includes application of the Corps' 1987 Wetland Delineation Manual and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region*, and the positive indicators of wetland hydrology, hydric soils, and hydrophytic vegetation and the presence of an ordinary high water mark.

Discharges of dredged or fill material, including those associated with mechanized landclearing, into waters and/or wetlands on this site may require a Department of the Army permit and authorization by state and local authorities including a Virginia Water Protection Permit from the Virginia Department of Environmental Quality (DEQ), a permit from the Virginia Marine Resources Commission (VMRC) and/or a permit from your local wetlands board. This letter is a confirmation of the Corps preliminary jurisdiction for the waters and/or wetlands on the subject property and does not authorize any work in these areas. Please obtain all required permits before starting work in the delineated waters/wetland areas.

This is a preliminary jurisdictional determination and is therefore not a legally binding determination regarding whether Corps jurisdiction applies to the waters or wetlands in question. Accordingly, you may either consent to jurisdiction as set out in this preliminary jurisdictional determination and the attachments hereto if you agree with the determination, or you may request and obtain an approved jurisdictional determination.

"This preliminary jurisdictional determination and associated wetland delineation map may be submitted with a permit application."

Enclosed is a copy of the "Preliminary Jurisdictional Determination Form". Please review the document, sign, and return one copy to Ms. Theresita Crockett-Augustine either via email (<a href="mailto:theresita.m.crockett-augustine@usace.army.mil">theresita.m.crockett-augustine@usace.army.mil</a>) or via standard mail to US Army Corps of Engineers, Northern Virginia Field Office at 18139 Triangle Plaza, Suite 213, Dumfries, Virginia 22026 within 30 days of receipt and keep one for your records. This delineation of waters and/or wetlands is valid for a period of five years from the date of this letter unless new information warrants revision prior to the expiration date.

If you have any questions, please contact Ms. Theresita Crockett-Augustine at (703) 221-9736 or theresita.m.crockett-augustine@usace.army.mil.

Sincerely,

Theresita Crockett-Augustine Environmental Scientist Northern Virginia Regulatory Section

Direct Hugustin

**Enclosures** 

### Appendix 2 - PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

### **BACKGROUND INFORMATION:**

A. REPORT COMPLETION DATE FOR PJD: March 14, 2017

#### B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:

Manassas Regional Airport 10600 Harry J. Parrish Boulevard Manassas, VA 20110

**DISTRICT OFFICE, FILE NAME, AND NUMBER:** NAO, Manassas Regional Airport, NAO-2017-00508

# C. PROJECT LOCATION(S) AND BACKGROUND INFORMATION: (USE THE ATTACHED TABLE TO DOCUMENT MULTIPLE WATERBODIES AT DIFFERENT SITES)

State: VIRGINIA County/parish/borough: City: Manassas

Center coordinates of site (lat/long in degree decimal format):

Latitude: 38.723 ° N Longitude: -77.517 ° W

Universal Transverse Mercator:

Name of nearest waterbody: Cannon Branch

### D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☐ Office (Desk) Determination. Date: ☐ Still Determination. Date(s): 2/16/17

## TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION.

Site Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
1			114 LF	RPW	Section 404
2			4.84 acre	Wetland	Section 404
3					

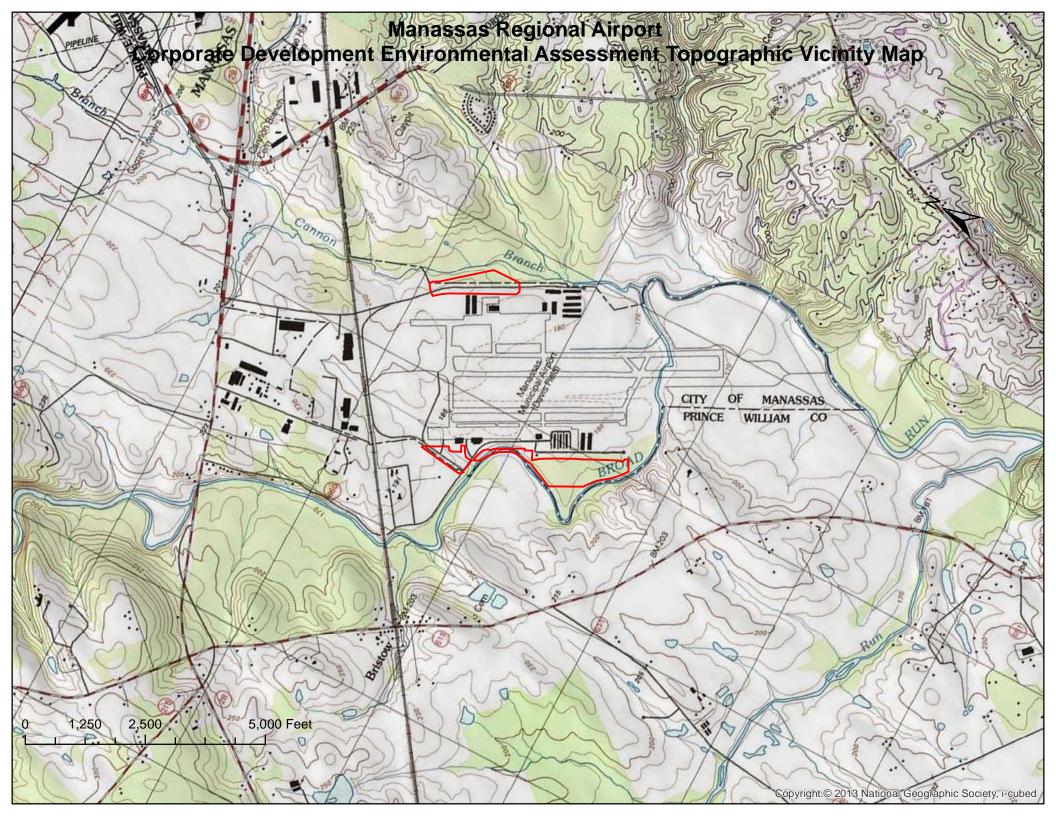
- 1. The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.
- 2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit applicant is hereby made aware that: (1) the permit applicant has elected to seek a permit authorization based on a PJD, which does not make an official determination of jurisdictional aquatic resources; (2) the applicant has the option to request an AJD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an AJD could possibly result in less compensatory mitigation being required or different special conditions; (3) the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) undertaking any activity in reliance upon the subject permit authorization without requesting an AJD constitutes the applicant's acceptance of the use of the PJD; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a PJD constitutes agreement that all aquatic resources in the review area affected in any way by that activity will be treated as jurisdictional, and waives any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an AJD or a PJD, the JD will be processed as soon as practicable. Further, an AJD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331. If, during an administrative appeal, it becomes appropriate to make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there "may be" waters of the U.S. and/or that there "may be" navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:

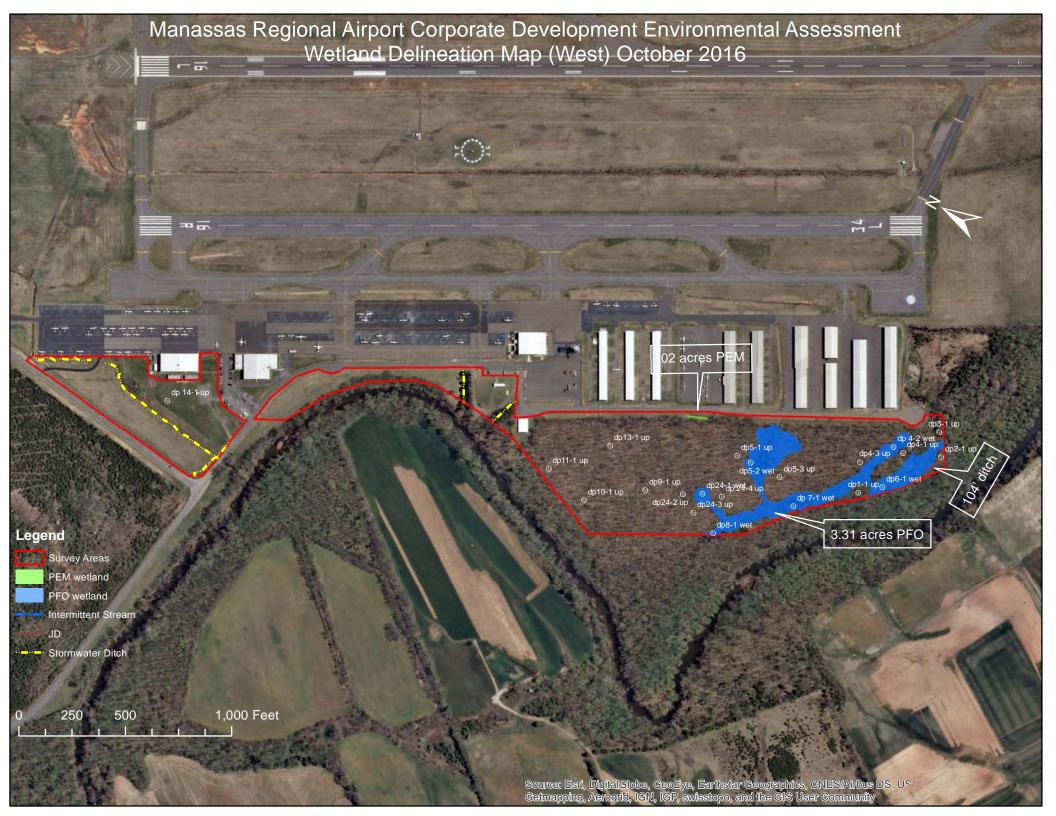
### **SUPPORTING DATA:** Data reviewed for preliminary JD (check all that apply)

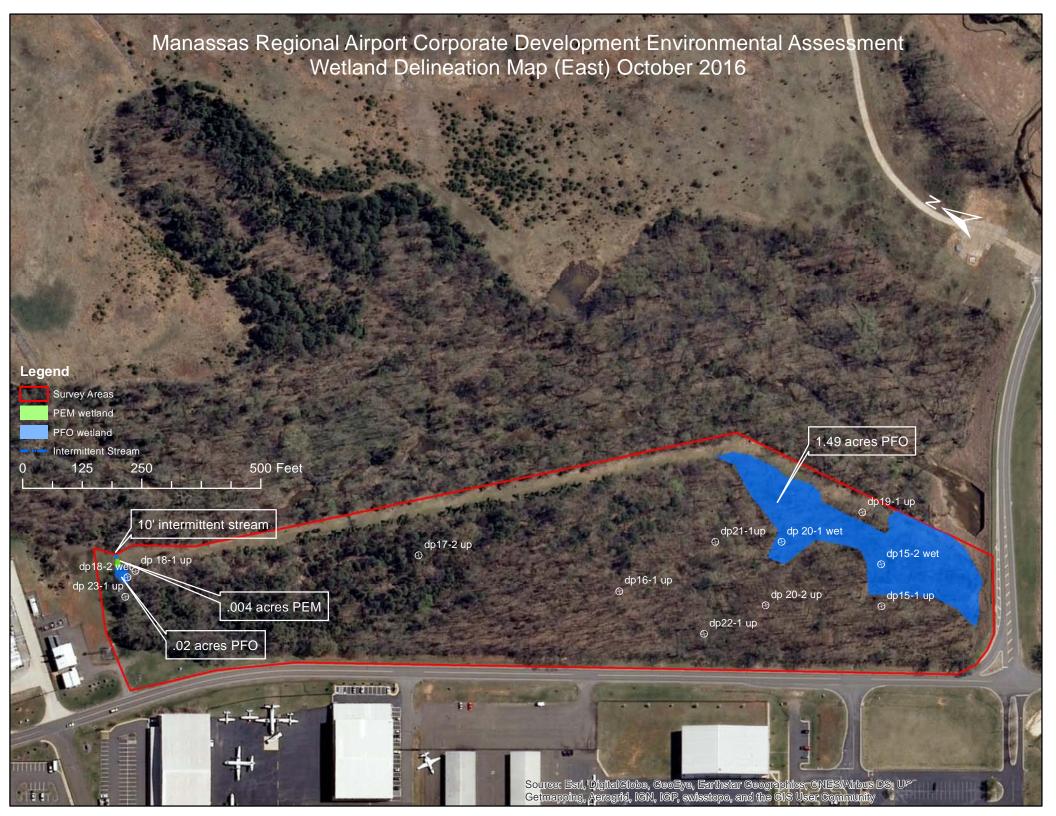
Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items.

⊠Maps, plans, plots Map:	or plat submitted by	or on behalf of the PJD requestor:							
⊠Data sheets prepa	red/submitted by or o	on behalf of the PJD requestor.							
	with data sheets/delin	neation report.							
Office does not	concur with data she	eets/delineation report. Rationale:							
Data sheets prepa	red by the Corps:								
☐Corps navigable w	aters' study:								
☐U.S. Geological Su	ırvey Hydrologic Atla	s: USGS							
□NHD data.									
☐USGS 8 and 1	☐USGS 8 and 12 digit HUC maps.								
U.S. Geological Survey map(s). Cite scale & quad name:									
	s Conservation Serv	ice Soil Survey. Citation:							
National wetlands	s inventory map(s). (	Cite name:							
State/Local wetlar	nd inventory map(s):								
☐ FEMA/FIRM map	s:								
☐ 100-year Floodpla	in Elevation:	(National Geodetic Vertical Datum of 1929)							
	⊠Aerial (Name &	& Date):							
or	⊠ Other (Name 8	& Date):							
Previous determin	ation(s):								
File no.	and date of respons	e letter:							
Other information (	(please specify):								
		on this form has not necessarily been upon for later jurisdictional determinations.							
Signature and date of Regulatory staff member completing PJD	_	Signature and date of person requesting PJD (REQUIRED, unless obtaining the signature is impracticable) <sup>1</sup>							

<sup>1</sup> Districts may establish timeframes for requester to return signed PJD forms. If the requester does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.







# APPENDIX C Wetland Data Forms Relevant to PASA

### WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

roject/Site: Manassas Regional A	irport PASA	(	City/County: M	anassas	Samplin	g Date: 16-Oct-17	
plicant/Owner: Manassas Regio	nal Airport			State: VA	Sampling Point	: 1-1 Up PASA	
vestigator(s): Matt Neely		:	Section, Townsl	nip, Range: S	т	R	
ndform (hillslope, terrace, etc.):	: Terrace	Lo	ocal relief (conc	ave, convex, n	none): flat	Slope: 0.0% / 0.0 °	
bregion (LRR or MLRA): MLR	RA 148 in LRR S		38°43'43.379"N	Lon	g.: 77°30'36.398"W	Datum: NAD 83	
il Map Unit Name: Rowland sil					NWI classification:		
e climatic/hydrologic conditions		for this time of yea	r? Yes 🖲 No	(If no	explain in Remarks.)		
e Vegetation $\Box$ , Soil $\Box$	, or Hydrology				Circumstances" present?	Yes ● No ○	
					•		
e Vegetation 🔲 , Soil 🔲	, or Hydrology	naturally pro	blematic?	(If needed,	explain any answers in Re	marks.)	
ummary of Findings - <i>I</i>	Attach site m	ap showing sa	mpling poi	nt location	ns, transects, impo	rtant features, etc	
ydrophytic Vegetation Present?	? Yes • No	$\bigcirc$			-		
lydric Soil Present?	Yes O No		Is the Sa	mpled Area	0 0		
•	Yes O No			Wetland?	Yes ○ No ●		
Vetland Hydrology Present?							
Remarks:							
Hydrology							
Wetland Hydrology Indicators:					_Secondary Indicators (mini	mum of two required)	
Primary Indicators (minimum o	of one required; ch	eck all that apply)			Surface Soil Cracks (B6		
Surface Water (A1)		True Aquatic Plants	(B14)		Sparsely Vegetated Co		
High Water Table (A2)			☐ Drainage Patterns (B10)				
Saturation (A3)		oots (C3)	Moss Trim Lines (B16)				
Water Marks (B1)		Presence of Reduce	d Iron (C4)		Dry Season Water Table (C2)		
Sediment Deposits (B2)		Recent Iron Reduct	ion in Tilled Soils	(C6)	Crayfish Burrows (C8)		
Drift deposits (B3)		Thin Muck Surface (	(C7)		Saturation Visible on A	erial Imagery (C9)	
Algal Mat or Crust (B4)		Other (Explain in Re	emarks)		Stunted or Stressed Pla	. ,	
Iron Deposits (B5)	(DT)				Geomorphic Position (	)2)	
Inundation Visible on Aerial Im	agery (B7)				Shallow Aquitard (D3)		
Water-Stained Leaves (B9)					Microtopographic Relie	i (D4)	
Aquatic Fauna (B13)					FAC-neutral Test (D5)		
Field Observations: Surface Water Present? Yes	s O No 💿	Depth (inches):					
	s O No •	, , , , =					
0 5		Depth (inches):		Wetland Hyd	drology Present? Yes	○ No •	
(includes capillary fringe) Yes	s O No 💿	Depth (inches):		•			
Describe Recorded Data (stream	n gauge, monitorin	g well, aerial photos	s, previous inspe	ections), if ava	ailable:		
Remarks:							
Kemarks.							
1							

# **VEGETATION** (Five/Four Strata)- Use scientific names of plants. Dominant

			ominant pecies? ——		Sampling Point: 1-1 Up PASA
	Absolute	Re	el.Strat. In	dicator	Dominance Test worksheet:
Tree Stratum (Plot size: <u>30</u> )	% Cover			atus	Number of Dominant Species
1 Carva tomentosa		<b>V</b>		PL	That are OBL, FACW, or FAC:3(A)
2 Nyssa sylvatica		<b>V</b>		ACU.	Total Number of Dominant
3 Ouercus rubra				ACU	Species Across All Strata:
4			0.0%		Percent of dominant Species
5			0.0%		That Are OBL, FACW, or FAC: 60.0% (A/B)
6			0.0%		P. Vices V. D. Gallabara.
7			0.0%		Prevalence Index worksheet:  Total % Cover of: Multiply by:
8		 - T≀	otal Cover		0BL species 0 x 1 = 0
Sapling-Sapling/Shrub Stratum (Plot size: 15	)	_			FACW species $10 \times 2 = 20$
1 Ulmus americana	10	<b>✓</b>		4CW_	
2			0.0%		1
3			0.0%		,
4			0.0%		or species X 5 - (P)
5			0.0%		Column Totals: 60 (A) 220 (B)
6			0.0%		Prevalence Index = B/A = 3.667
7			0.0%		Hydrophytic Vegetation Indicators:
8			0.0%		Rapid Test for Hydrophytic Vegetation
9					✓ Dominance Test is > 50%
10		Ш	0.0%		☐ Prevalence Index is ≤3.0 ¹
Shrub Stratum (Plot size:)	10 :	= To	otal Cover		$oxedsymbol{oxed}$ Morphological Adaptations $^1$ (Provide supporting
1			0.0%		data in Remarks or on a separate sheet)
2			0.0%		Problematic Hydrophytic Vegetation 1 (Explain)
3			0.0%		1 Indicators of hydric soil and wetland hydrology must
4			0.0%		be present, unless disturbed or problematic.
5			0.0%		Definition of Vegetation Strata:
6			0.0%		Four Vegetation Strata:
7			0.0%		Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH),
Herb Stratum (Plot size: 15 )	=	= To	otal Cover		regardless of height.
1 _ Microstegium vimineum		✓	_100.0% F/	AC	Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2	0		0.0%		Herb stratum – Consists of all herbaceous (non-woody)
3			0.0%		plants, regardless of size, and all other plants less than 3.28
4			0.0%		ft tall.   Woody vines – Consists of all woody vines greater than 3.28
5			0.0%		ft in height.
6		Ц	0.0%		Five Vegetation Strata:
7			0.0%		Tree - Woody plants, excluding woody vines, approximately
8			0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).
9			0.0%		Sapling stratum – Consists of woody plants, excluding
10			0.0%		woody vines, approximately 20 ft (6 m) or more in height and
11			0.0%		less than 3 in. (7.6 cm) DBH.
12	0	<u> </u>	0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size:)	10=	= 10	otal Cover		Herb stratum – Consists of all herbaceous (non-woody)
1	0	Ш	0.0%		plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately
2			0.0%		3 ft (1 m) in height.
3			0.0%		Woody vines – Consists of all woody vines, regardless of
4	^		0.0%		height.
5			0.0%		Hydrophytic
6			0.0%		Vegetation Var A Na O
	0	= T	otal Cover		Present? Yes No V
Remarks: (Include photo numbers here or on a separate	sheet.)				
	-				

Soil Sampling Point: 1-1 Up PASA

Profile Desci	ription: (Describe to	the depth	needed to documen	t the indic	cator or co	onfirm the	absence of indicators.)				
Depth	Matrix			lox Featu	res						
(inches)	Color (moist)	%	Color (moist)	%	Type 1	Loc2	Texture	Remarks			
0-6	5YR 4/4	100					Loam				
6-12	5YR 6/4	100					Loam				
				-		-	-				
-							-				
		-		-							
<sup>1</sup> Type: C=Con	centration. D=Depletion	on. RM=Red	luced Matrix, CS=Cover	ed or Coate	ed Sand Gr	ains <sup>2</sup> Loc	ation: PL=Pore Lining. M=	Matrix			
Hydric Soil								ematic Hydric Soils <sup>3</sup> :			
Histosol (			☐ Dark Surface (	S7)				· ·			
	pedon (A2)		Polyvalue Below	•	S8) (MLRA	147,148)	2 cm Muck (A10)				
Black Hist			Thin Dark Surfa				Coast Prairie Redo	ox (A16)			
	n Sulfide (A4)		Loamy Gleyed			,	(MLRA 147,148)				
	Layers (A5)		Depleted Matrix				Piedmont Floodpla (MLRA 136, 147)	ain Soils (F19)			
	ck (A10) (LRR N)		Redox Dark Su				_ `	Curfo co (TE12)			
			Depleted Dark	. ,	7)		<ul><li>✓ Very Shallow Dark Surface (TF12)</li><li>✓ Other (Explain in Remarks)</li></ul>				
	Depleted Below Dark Surface (A11)  Thick Dark Surface (A12)		Redox Depress		, ,		Utner (Explain in	Remarks)			
			☐ Iron-Manganes		F12) (LRR	N					
Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)		MLRA 136)									
Sandy Gleyed Matrix (S4) Sandy Redox (S5)		Umbric Surface				<sup>3</sup> Indicators of hydrophytic vegetation and					
		Piedmont Floor	☐ Piedmont Floodplain Soils (F19) (MLRA 148)				wetland hydrology must be present,				
☐ Stripped	Stripped Matrix (S6)		Red Parent Ma	terial (F21)	) (MLRA 12	7, 147)	unless di	sturbed or problematic.			
Restrictive L	.ayer (if observed):										
Туре:											
Depth (inc	ches):						Hydric Soil Present?	Yes O No 💿			
Remarks:	,										
Kemarks.											



Photo File: IN	IG_5332.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°30'36.398"	Lat/Northing: 38°43'43.379'
Description:			

# No Photo

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

### WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

State: VA   Sampling Point: 1-2 Wet PASA   Vestigator(9): Matt Newly   Section, Township, Range: S   T   R   R	oject/Site: Manassas Regional /	Airport PASA	City/County:	Manassas	Sampling	<b>Date:</b> 16-Oct-17	
ndform (hillslope, terrace, etc.): Floodplain   Local relief (concave, convex, none): flat   Slope:	plicant/Owner: Manassas Region	onal Airport		State: VA	Sampling Point:	1-2 Wet PASA	
region (LRR or MLRA): MLRA 148 in LRR S	estigator(s): Matt Neely		Section, Towns	ship, Range: S	т	R	
Map Unit Name: Rowland slit loam	dform (hillslope, terrace, etc.)	: Floodplain	Local relief (con-	cave, convex, none	): flat Si	ope: 0.0% / 0.0	
Map Unit Name: Rowland slit loam	region (LRR or MLRA): MLF	RA 148 in LRR S	 Lat.: 38°43'43.799"N	Long.:	77°30'36.027"W	Datum: NAD 83	
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   Vegetation	Map Unit Name: Rowland si	ilt loam					
Vegetation   , Soil   , or Hydrology   significantly disturbed?   Are "Normal Circumstances" present?   Yes  No   No   Vegetation   , Soil   , or Hydrology   naturally problematic?   (If needed, explain any answers in Remarks.)	· —		this time of year? Yes 🌘 N	O (If no own	_		
Vegetation   , Soil   , or Hydrology   naturally problematic? (If needed, explain any answers in Remarks.)					•	Yes  No	
Immary of Findings - Attach site map showing sampling point locations, transects, important features, et vidrophytic Vegetation Present? Yes No Solution No Soluti			significantly disturbed?		•		
Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   No   No   No   No   No   N	Vegetation, Soil	, or Hydrology $lacksquare$	naturally problematic?	(If needed, expl	ain any answers in Rem	arks.)	
Is the Sampled Area within a Wetland?  Ves No No No within a Wetland?  No N	ımmary of Findings -	Attach site map	showing sampling po	int locations,	transects, impor	tant features, etc	
Is the Sampled Area within a Wetland?  Yes No No within a Wetland?  Ves No	drophytic Vegetation Present	? Yes • No ·					
Agal Mat or Crust (B4)   Other (Explain in Remarks)   Other (Explain in			Is the S	ampled Area	<b>A</b> O		
Interpretation   Inte			within a	Wetland?	● No ○		
Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Geomorphic Position (D2)   Inundation Visible on Aerial Imagery (B7)   Shallow Aquatiar (D3)   Water-Stained Leaves (B9)   Microtopographic Relief (D4)   Aquatic Fauna (B13)   Ves No Depth (inches):   Surface No Depth (inches):   Saturation Present?   Yes No Depth (inches):   Seturation Present?   Yes No Depth (inches):   Saturation Hydrology Present?   Yes No Depth (inches):   Saturation Present?   Yes No Depth (inches):							
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Prifit deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Furface Water (N1)  True Aquatic Plants (B14)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)  Prainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Dry Season Water Table (C2)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  FAC-neutral Test (D5)  Wetland Hydrology Present?  Yes No  Depth (inches):  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)  Prainage Patterns (B10)  Drainage Patterns (B10)  Prainage Patterns (B10)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Dry Season Water Table (C2)  Saturation Visible on Aerial Imagery (C9)  Saturation Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  No  Depth (inches):  Surface Water Present?  Yes No  Depth (inches):  Surface Water Present?  Yes No  Depth (inches):  Surface Water Present?  Yes No  Depth (inches):  Surface Vater Present?  Yes No  Depth (inches):	ydrology						
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Mater-Stained Leaves (B9)  Aquatic Fauna (B13)  Pesh No  Depth (inches):  Surface Water Present?  Yes  No  Depth (inches):  Depth (inches):  Surface Water Prime  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)  Prainage Patterns (B10)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Feld Observations:  Surface Water Present?  Yes  No  Depth (inches):  Saturation Present?  Yes  No  Depth (inches):  Surface Water Present?  Yes  No  Depth (inches):  Surface Vater Present?  Yes  No  No  Depth (inches):  Depth (inches):  S	Vetland Hydrology Indicators:			Se	condary Indicators (minim	um of two required)	
High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Teield Observations:  Surface Water Present?  Yes  No  Depth (inches):  Dep	Primary Indicators (minimum	of one required; check a	all that apply)		1		
✓ Saturation (A3) Oxidized Rhizospheres along Living Roots (C3) Moss Trim Lines (B16)   Water Marks (B1) Presence of Reduced Iron (C4) Dry Season Water Table (C2)   Sediment Deposits (B2) Recent Iron Reduction in Tilled Soils (C6) Crayfish Burrows (C8)   Drift deposits (B3) Thin Muck Surface (C7) Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4) Other (Explain in Remarks) Stunted or Stressed Plants (D1)   Iron Deposits (B5) Geomorphic Position (D2)   Inundation Visible on Aerial Imagery (B7) Shallow Aquitard (D3)   Water-Stained Leaves (B9) Microtopographic Relief (D4)   Aquatic Fauna (B13) FAC-neutral Test (D5)    Pepth (inches):  Depth (inches):  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Depth	Surface Water (A1)	Tı	ue Aquatic Plants (B14)		Sparsely Vegetated Conc	ave Surface (B8)	
Water Marks (B1)	_ ` ` /	H,	ydrogen Sulfide Odor (C1)		Drainage Patterns (B10)		
Sediment Deposits (B2)	¬ ` ´			Roots (C3)	<u> </u>		
Drift deposits (B3)	_ ` ´						
Algal Mat or Crust (B4)	_ ' ' '			(C6)	1	ial Imagany (CO)	
Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?	_ ` ` ` `		` '		1	• , , ,	
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?		O	ner (Explain in Remarks)		1	` '	
Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?		nagery (B7)			1	,	
Field Observations: Surface Water Present?  Ves No Depth (inches): Water Table Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):	Water-Stained Leaves (B9)				Microtopographic Relief (	D4)	
Furface Water Present?  Yes No Depth (inches):  Vater Table Present?  Yes No Depth (inches):  Faturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):	Aquatic Fauna (B13)			✓	FAC-neutral Test (D5)		
Vater Table Present? Yes No Depth (inches): Saturation Present? Yes No Depth (inches): Includes capillary fringe) Yes No Depth (inches):		N. (a)	5 H ( )				
Saturation Present? Yes No Depth (inches): 3			Depth (inches):				
includes capillary fringe)  Yes No Depth (inches): 3			Depth (inches):	Wetland Hydrolo	ngy Present? Yes	No O	
	VA	s 💿 No 🔾	Depth (inches):3	Wedana Tryarole	gy i resent.		
		m gauge, monitoring we	ell, aerial photos, previous insp	ections), if availab	le:		

## **VEGETATION** (Five/Four Strata)- Use scientific names of plants. Dominant

			ominant	Sampling Point: 1-2 Wet PASA
Tree Stratum (Plot size: 30 )	Absolute % Cover	Re	ecies? ——— el.Strat. Indica over Statu	Dominance rest worksheeti
4 54 4 4 4 4	25	<b>✓</b>	62.5% FACV	Number of Dominant Species
Platanus occidentalis     Acer negundo		<b>V</b>	25.0% FAC	That are obt, thew, of the.
3. Ulmus americana			12.5% FACV	Total Number of Dominant Species Across All Strata: 3 (B)
4			0.0%	Species Across All Strata:3(B)
5			0.0%	Percent of dominant Species
6			0.0%	That Are OBL, FACW, or FAC: 100.0% (A/B)
7			0.0%	Prevalence Index worksheet:
8			0.0%	Total % Cover of: Multiply by:
	40 -	= To	otal Cover	OBL species 0 x 1 = 0
Sapling-Sapling/Shrub Stratum (Plot size:				FACW species 30 x 2 = 60
1			0.0%	FAC speciles 20 x 3 = 60
2			0.0%	FACU species $0 \times 4 = 0$
3		$\vdash$	0.0%	UPL species $0 \times 5 = 0$
4		$\vdash$	0.0%	
5	_		0.0%	
6	_		0.0%	Prevalence Index = B/A = 2.400
7		$\vdash$		Hydrophytic Vegetation Indicators:
8		$\exists$	0.0%	Rapid Test for Hydrophytic Vegetation
9		$\vdash$	0.0%	─ Dominance Test is > 50%
0		_	0.0%	Prevalence Index is ≤3.0 $^1$
Shrub Stratum (Plot size:)	=	= 10	otal Cover	Morphological Adaptations <sup>1</sup> (Provide supporting
1		Ц	0.0%	data in Remarks or on a separate sheet)
2			0.0%	Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
3			0.0%	Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
4		Ц	0.0%	
5			0.0%	Definition of Vegetation Strata:
6		Ц	0.0%	Four Vegetation Strata:  Tree stratum – Consists of woody plants, excluding vines, 3
7		Ш	0.0%	in. (7.6 cm) or more in diameter at breast height (DBH),
Herb Stratum (Plot size: 15 )	=	= To	otal Cover	regardless of height.
1. Microstegium vimineum		✓	100.0% FAC	Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2		Ш	0.0%	Herb stratum – Consists of all herbaceous (non-woody)
3		$\sqcup$	0.0%	plants, regardless of size, and all other plants less than 3.28
4		$\sqcup$	0.0%	ft tall. Woody vines – Consists of all woody vines greater than 3.28
5		$\sqcup$	0.0%	ft in height.
6			0.0%	Five Vegetation Strata:
7			0.0%	Tree - Woody plants, excluding woody vines, approximately
8			0.0%	20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).
9			0.0%	Sapling stratum – Consists of woody plants, excluding
0		$\sqcup$	0.0%	woody vines, approximately 20 ft (6 m) or more in height and
1		$\sqcup$	0.0%	less than 3 in. (7.6 cm) DBH. Shrub stratum – Consists of woody plants, excluding woody
2		-	0.0%	vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size:)	10 =	= 10	otal Cover	Herb stratum – Consists of all herbaceous (non-woody)
1			0.0%	plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately
2			0.0%	3 ft (1 m) in height.
3			0.0%	Woody vines – Consists of all woody vines, regardless of
4			0.0%	height.
5			0.0%	Hydrophytic
6.			0.0%	Vegetation
<u> </u>				Present? Yes V No

Soil Sampling Point: 1-2 Wet PASA

Profile Desc	ription: (Describe to	the depth	needed to docum	ent the ind	icator or c	onfirm the	absence of indicators.)		
Depth	Matrix			Redox Feat	ures				
(inches)	Color (moist)	%	Color (moist)	%	Type 1	Loc2	Texture	Remarks	
0-6	5YR 4/3	100					Loam		
6-12	5YR 4/2	75	2.5YR 4/6	25	С	М	Loam		
							-		
	-					-		·	
							-		
		_					-	·	
<sup>1</sup> Type: C=Cor	ncentration. D=Depleti	on. RM=Re	duced Matrix, CS=Co	vered or Coa	ted Sand G	rains <sup>2</sup> Loc	cation: PL=Pore Lining. M=	Matrix	
Hydric Soil	Indicators:						Indicators for Brobl	ematic Hydric Soils <sup>3</sup> :	
Histosol (			☐ Dark Surfac	e (S7)			_		
	ipedon (A2)			elow Surface	(S8) (MLRA	147,148)	2 cm Muck (A10)		
Black His				urface (S9) (			Coast Prairie Redo	ox (A16)	
	n Sulfide (A4)			ed Matrix (F2		,	(MLRA 147,148)		
	Layers (A5)		✓ Depleted Ma		-)		Piedmont Floodpla (MLRA 136, 147)	ain Soils (F19)	
	ck (A10) (LRR N)		_ '	Surface (F6)				Curfo co (TE12)	
		A11\		, ,			<ul><li>✓ Very Shallow Dark Surface (TF12)</li><li>✓ Other (Explain in Remarks)</li></ul>		
	Below Dark Surface (A	` '				Uther (Explain in	Remarks)		
	rk Surface (A12)			, ,	(E12) (I DD	N			
	☐ Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148) ☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)								
Sandy Gleyed Matrix (S4) Umbric Surface (F13) (MLRA 136, 122					3,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	budus ala dis usa shakina sa d			
Sandy Re	edox (S5)		☐ Piedmont F	oodplain Soil	ls (F19) (ML	.RA 148)	<sup>3</sup> Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.		
Stripped	Matrix (S6)		Red Parent	Material (F2:	1) (MLRA 12	27, 147)			
Restrictive L	.ayer (if observed):								
Type:									
Depth (inc	ches):						Hydric Soil Present?	Yes 💿 No 🔾	
Remarks:									
Remarks.									
I									



Photo File: IM	IG_5333.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting:	77°30'36.027"	Lat/Northing: 38°43'43.799"N
Description:			

# No Photo

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

### WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Map Unit Name:   MURA   148 in LRR   Lat.:   38°43'43,799"N   Long.:   77°30'36.027"W   Datum:   NAD 83	olicant/Owner: Manassas Region			
dform (hillslope, terrace, etc.):		nal Airport	State: _V	/A Sampling Point: 2-1 Up PASA
region (LRR or MLRA): MLRA 148 in LRR S	estigator(s): Matt Neely		Section, Township, Range:	S T R
Map Unit Name: Rowland slit loam	dform (hillslope, terrace, etc.):	Terrace	Local relief (concave, convex	<b>Slope:</b> 0.0% / 0.0
Map Unit Name: Rowland slit loam	region (LRR or MLRA): MLR/	A 148 in LRR S	Lat.: 38°43'43.799"N L	.ong.: 77°30'36.027"W
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   Vegetation				
Vegetation	•		ma of years Ves ♥ No ○ (75)	
Vegetation				
Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc. Adrophytic Vegetation Present? Yes No Wireliand Pydrology Present? Yes No Wireliand Hydrology Present? Yes No Wireliand Hydrology Indicators:    Vegetation Present? Yes No Wireliand Pydrology Indicators:   Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C5)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Sturted or Stressed Plants (D1)   Mater-Stained Leaves (B9)   Microtopographic Relief (D4)   Aquatic Fauna (B13)   FAC-neutral Test (D5)   Sellator Hydrology Present? Yes No Wireliand Fresent? Yes No Depth (inches):   Wetland Hydrology Present? Yes No Depth (inches):   Wet	vegetation, Soil	, or Hydrology   sign	inicantly disturbed? Are "Norm	nal Circumstances" present?
Is the Sampled Area within a Wetland?  Ves No   No   Is the Sampled Area within a Wetland?  Ves No   No   No   No   No   No   No   No	Vegetation, Soil	, or Hydrology nat	urally problematic? (If needed	d, explain any answers in Remarks.)
Is the Sampled Area within a Wetland?  Ves No   No   Is the Sampled Area within a Wetland?  Ves No   No   No   No   No   No   No   No	ımmary of Findings - A	Attach site map shov	ving sampling point locati	ons, transects, important features, etc
Is the Sampled Area within a Wetland?  Ves No No No No No No No Wetland Hydrology Present?  No N				
Vetand Hydrology   Vetand Hydrology   Vetand Hydrology   Vetand Hydrology   Vetand Hydrology   Vetand Hydrology   Indicators:   Secondary Indicators (minimum of two resultred)   Primary Indicators (minimum of one required; check all that apply)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Water Marks (B1)   Presence of Reduced Iron (C4)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunded or Stressed Plants (D1)   Iron Deposits (B5)   Geomorphic Position (D2)   Inundation Visible on Aerial Imagery (B7)   Shallow Aquitard (D3)   Mater-Stained Leaves (B9)   Microtopographic Relief (D4)   Aquatic Fauna (B13)   FAC-neutral Test (D5)   Saturation Present?   Yes   No   Depth (inches):   Wetland Hydrology Present?   Yes   No   Depth (inches):   Saturation Present?   Yes   No   Depth (inches):   Wetland Hydrology Present?   Yes   No   Depth (inches):   Saturation Present?   Yes   No   Depth (inches):   Seturation Present?   Yes   No   Depth (inches):   Saturation Present?   Yes   No   Depth (inches):   Sa			To the Commission Asses	
Interest   Present   Pre			within a Wetland?	Yes O No 🖲
Secondary Indicators (minimum of two required)   Surface Soll Cracks (B6)	etland Hydrology Present?	Tes UNU U		
Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	 Ivdrology			
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Wetland Hydrology Present?  Yes  No  Depth (inches):  Water Aquatic Plants (B14)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Dayriege Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Dayriege Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Dayriege Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Dayriege Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Dayriege Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Dayriege Soil Cracks (B6)  Dayriege Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Dayriege Soil Cracks (B6)  Moss Trim Lines (B16)  Drainage Patterns (B10)  Dayriege Soil Cracks (B6)  Drainage Patterns (B10)  Dayriege Soil Cracks (B6)  Drainage Patterns (B10)  Dayriege Soil Cracks (B6)  Drainage Patterns (B10)  Dayriege Soilon (C2)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C7)  Saturation Visible on Ae				
Surface Water (A1)		f one required: check all that	annly)	
High Water Table (A2)	$\overline{}$			
Saturation (A3)	_ ` ´		, ,	
Sediment Deposits (B2)			` '	
Drift deposits (B3)	Water Marks (B1)			
Algal Mat or Crust (B4)	Sediment Deposits (B2)	Recent Ir	on Reduction in Tilled Soils (C6)	Crayfish Burrows (C8)
☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ FAC-neutral Test (D	_ ` ` ` ′	Thin Muc	k Surface (C7)	Saturation Visible on Aerial Imagery (C9)
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Saturation Present?		Other (Ex	xplain in Remarks)	
Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Saturation Present?  Yes No Present?	_	(07)		
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Wetland Hydrology Present?  Yes No   Depth (inches):  FAC-neutral Test (D5)  Wetland Hydrology Present?  Yes No   Depth (inches):  FAC-neutral Test (D5)		agery (B7)		
Field Observations: Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):				
Furface Water Present?  Yes No Depth (inches):  Vater Table Present?  Yes No Depth (inches):  Security of the present of the p				TAC fleutidi Test (D3)
Saturation Present? Includes capillary fringe)  Yes No Depth (inches):  Wetland Hydrology Present? Yes No line		No O Depth (	(inches):	
Saturation Present?  Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches):	Water Table Present? Yes	O No O Denth (	(inches):	
includes capillally fillinge)			Wetland F	Hydrology Present? Yes 🔾 No 💿
	includes capillary fringe) Tes			

# **VEGETATION** (Five/Four Strata)- Use scientific names of plants. Dominant

		_Sı	ecies? _		<u></u>		
	Absolute	ute Rel.Stra		Indicator	Dominance Test worksheet:		
Tree Stratum (Plot size: 30	% Cover			Status			
			66.70/		Number of Dominant Species		
1 Carya tomentosa	30	<b>V</b>		UPL	That are OBL, FACW, or FAC: (A)		
2 Acer rubrum	10	<b>V</b>	22.2%	FAC			
3 Juniperus virginiana	5		11.1%	FACU	Total Number of Dominant		
<u> </u>					Species Across All Strata:3(B)		
4			0.0%				
5	0		0.0%		Percent of dominant Species That Are OBL FACW or FAC: 66.7% (A/B)		
6	_		0.0%		That Are OBL, FACW, or FAC: $\underline{66.7\%}$ (A/B)		
~			0.0%		Prevalence Index worksheet:		
7							
8	0	Ш	0.0%		Total % Cover of: Multiply by:		
(5)	45	= T	otal Cover		OBL species 0 x 1 = 0		
Sapling-Sapling/Shrub Stratum (Plot size:	)				FACW species x 2 =		
1	0		0.0%				
2	0		0.0%		FAC species $35 \times 3 = 105$		
<del>-</del>		$\overline{\Box}$			FACU species $\frac{5}{}$ x 4 = $\frac{20}{}$		
3			0.0%		, 30 150		
4	0		0.0%		1 · · · · ·		
5	0		0.0%		Column Totals:		
		П	0.0%		Durantan and Trades. D/A 2 020		
6					Prevalence Index = B/A = 3.929		
7	0	$\perp$	0.0%		Hydrophytic Vegetation Indicators:		
8	0		0.0%		Rapid Test for Hydrophytic Vegetation		
9			0.0%				
		$\overline{}$			✓ Dominance Test is > 50%		
10	0	Ш	0.0%		Prevalence Index is ≤3.0 <sup>1</sup>		
Shrub Stratum (Plot size:)	0	= T	otal Cover	•	Morphological Adaptations <sup>1</sup> (Provide supporting		
	0		0.0%		data in Remarks or on a separate sheet)		
1					. ,		
2	0_	Ш	0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)		
3	0		0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must		
			0.0%		be present, unless disturbed or problematic.		
4					Definition of Vegetation Strate		
5	0	Ш	0.0%		Definition of Vegetation Strata:		
6	0		0.0%		Four Vegetation Strata:		
7.	0		0.0%		Tree stratum – Consists of woody plants, excluding vines, 3		
		_			in. (7.6 cm) or more in diameter at breast height (DBH),		
_Herb Stratum (Plot size: _15)	0	= 10	otal Cover		regardless of height.		
1. Microstegium vimineum	25	<b>V</b>	100.0%	FAC	Sapling/shrub stratum – Consists of woody plants, excluding		
		$\overline{\Box}$			vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.		
2			0.0%		Herb stratum – Consists of all herbaceous (non-woody)		
3	0_	Ш	0.0%		plants, regardless of size, and all other plants less than 3.28		
4	0		0.0%		ft tall.		
5.	0		0.0%		Woody vines – Consists of all woody vines greater than 3.28 ft in height.		
		$\overline{\Box}$			it in neight.		
6	0_		0.0%		Five Vegetation Strata:		
7	0	Ш	0.0%		Tree - Woody plants, excluding woody vines, approximately		
8	_		0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in		
-		П	0.0%		diameter at breast height (DBH).		
9					Sapling stratum – Consists of woody plants, excluding		
10	0	Ш	0.0%		woody vines, approximately 20 ft (6 m) or more in height and		
11	0		0.0%		less than 3 in. (7.6 cm) DBH.		
12	0	П	0.0%		Shrub stratum – Consists of woody plants, excluding woody		
		_ T	otal Cover		vines, approximately 3 to 20 ft (1 to 6 m) in height.		
Woody Vine Stratum (Plot size:)		- 1	otal Covel		Herb stratum - Consists of all herbaceous (non-woody)		
1	0		0.0%		plants, including herbaceous vines, regardless of size, and		
		П			woody species, except woody vines, less than approximately		
2			0.0%		3 ft (1 m) in height.		
3	0_	Ш	0.0%		Woody vines – Consists of all woody vines, regardless of		
4.	0		0.0%		height.		
	0		0.0%				
5					Hydrophytic		
6	0	Ш	0.0%		Vegetation Veg A No O		
	0	= T	otal Cove	r	Present? Yes V No		
Remarks: (Include photo numbers here or on a separate sh	eet.)						

Soil Sampling Point: 2-1 Up PASA

Profile Descr	iption: (Descr	ibe to	the depti	needed to docume	nt the indi	cator or co	onfirm the	absence of indicators.)		
Depth		atrix			dox Featu					
(inches)	Color (mo	oist)	%	Color (moist)	%	Type 1	Loc2	Texture	Remarks	
0-10	7.5YR 5/	/6	100					Loam		
10-14	7.5YR 5/	/6	100					Loam		
						-				
<sup>1</sup> Type: C=Cond	rentration D=C	)enletic	n RM=Re	duced Matrix CS=Cove	red or Coat	ed Sand Gr	ains 21 oc	cation: PL=Pore Lining. M=Ma	atrix	
Hydric Soil I		repietic	JII. KIII—KC	duced Matrix, CS=COVE	ired or coat	eu Sanu Gi	all 15 LOC			
Histosol (A				☐ Dark Surface	(C7)			Indicators for Problem	•	
·	pedon (A2)			Polyvalue Belo	. ,	'CQ\ /MI DA	147 149)	2 cm Muck (A10) (MI	LRA 147)	
Black Hist				Thin Dark Sur				Coast Prairie Redox (	A16)	
	Sulfide (A4)						140)	(MLRA 147,148)		
				Loamy Gleyed		)		Piedmont Floodplain	Soils (F19)	
Stratified Layers (A5)			Depleted Matr				(MLRA 136, 147)	(7540)		
2 cm Muck (A10) (LRR N)			Depleted Dark	, ,	71		☐ Very Shallow Dark St			
Depleted Below Dark Surface (A11)			Redox Depres	-	<i>,</i> ,		Other (Explain in Rer	marks)		
☐ Thick Dark Surface (A12) ☐ Sandy Muck Mineral (S1) (LRR N,				☐ Iron-Mangane		F12) /I DD	N			
□ Sandy Mu MLRA 147		(LRR I	Ν,	MLRA 136)						
Sandy Gle	yed Matrix (S4)	)		Umbric Surfac	e (F13) (MI	RA 136, 12	22)	3		
Sandy Red	dox (S5)			Piedmont Floo	odplain Soils	(F19) (ML	RA 148)	Indicators of hydrol wetland hydrol	drophytic vegetation and logy must be present,	
Stripped N	Matrix (S6)			Red Parent M	aterial (F21	) (MLRA 12	7, 147)		rbed or problematic.	
Restrictive La	aver (if observ	ved):								
Type:										
Depth (incl	hes):							Hydric Soil Present?	Yes ○ No •	
Remarks:										
Kemarks.										



Photo File: IN	IG_5334.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°30'36.027"	Lat/Northing: 38°43'43.799"N
Description:			

# No Photo

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

### WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

State: VA   Sampling Point: 3-1 Up PASA	Manassas Regional Ai	rport PASA	City/County: Manassas	Sampling	<b>Date:</b> 16-Oct-17
dform (hillslope, terrace, etc.):	plicant/Owner: Manassas Region	nal Airport	State: \	VA Sampling Point:	3-1 Up PASA
region (LRR or MLRA): MLRA 148 in LRR S	estigator(s): Matt Neely		Section, Township, Range:	S T	R
region (LRR or MLRA): MLRA 148 in LRRS	dform (hillslope, terrace, etc.):	Terrace	Local relief (concave, conve	x, none): flat Sie	ope: 0.0% / 0.0
Map Unit Name: Rowland slit loam	region (LRR or MLRA): MIRA	A 148 in LRR S	— Lat.: 38°43'47 518"N L		
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   Vegetation	<u> </u>			-	
Vegetation	•		f Voc ( No ( 75-		
Vegetation					Vac ( No (
Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc.  Indrophytic Vegetation Present? Yes No    Is the Sampled Area within a Wetland? Yes No    Is the Sampled Area with	Vegetation, Soil	, or Hydrology   signif	icantly disturbed? Are "Norn	nal Circumstances" present?	res 🙂 No 🔾
It the Sampled Area within a Wetland?  Is the Sampled Area within a Wetland?  Yes No   No   Is the Sampled Area within a Wetland?  Yes No   No   No   No   Is the Sampled Area within a Wetland?  Yes No   No   No   No   No   No   No   No	Vegetation, Soil	, or Hydrology 🗌 natur	ally problematic? (If neede	d, explain any answers in Rema	arks.)
Itydrology  Wetland Hydrology Present? Yes No ●  Wetland Hydrology Indicators:  Permarks:    Is the Sampled Area within a Wetland?   Yes No ●    Is the Sampled Area within a Wetland?   Yes No ●    Is the Sampled Area within a Wetland?   Yes No ●    Is the Sampled Area within a Wetland?   Yes No ●    Is the Sampled Area within a Wetland?   Yes No ●    Is the Sampled Area within a Wetland?   Yes No ●    Is the Sampled Area within a Wetland?   Yes No ●    Is the Sampled Area within a Wetland?   Yes No ●    Is the Sampled Area within a Wetland?   Yes No ●    Is the Sampled Area within a Wetland?   Yes No ●    Is the Sampled Area within a Wetland?   Yes No ●    Is the Sampled Area within a Wetland?   Yes No ● Depth (inches):   Wetland Hydrology Present?   Yes No ● Depth (inches):   Wetland Hydrology Present	ımmary of Findings - A	Attach site map showi	ng sampling point locati	ions, transects, import	tant features, etc
Is the Sampled Area within a Wetland?  Ves No No No No No No No Wetland Hydrology Present?  No N		0 6	<u> </u>		
Ves   No   Present?   Ves   Present?   Ves   No   Present?   Ves   Present?			To the Commission America	- 0 0	
Interest			within a Wetland?	<sup>a</sup> Yes ○ No •	
Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)	etland Hydrology Present?	Tes UNU U			
Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)					_
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Drainage Patterns (B10)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):					
Surface Water (A1)		f one required, check all that s	unnlu)		ım of two reauired)
High Water Table (A2)					ave Surface (RR)
Saturation (A3)	_ ` ´		` '		we surface (bo)
Sediment Deposits (B2)			` '		
Drift deposits (B3)	Water Marks (B1)	Presence o	f Reduced Iron (C4)	Dry Season Water Table	(C2)
Algal Mat or Crust (B4)	Sediment Deposits (B2)	Recent Iron	n Reduction in Tilled Soils (C6)	Crayfish Burrows (C8)	
Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Fac-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No   Depth (inches):  Water Table Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Saturation Present?  Yes No  Depth (inches):  Yes No  Saturation Present?	_ ` ` ` ′	☐ Thin Muck	Surface (C7)	Saturation Visible on Aeri	al Imagery (C9)
☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5)		Other (Exp	lain in Remarks)		` '
Water-Stained Leaves (B9) Aquatic Fauna (B13)  No Depth (inches): Staturation Present?  Yes No Depth (inches): Staturation Present?  Yes No Depth (inches): Staturation Present?	_	ngow. (P7)			1
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Wetland Hydrology Present?  Yes No   Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Present?		agery (B7)		_ ` ` ` ′	D4)
Field Observations:  Gurface Water Present?  Ves No Depth (inches):  Vater Table Present?  Ves No Depth (inches):  Gutration Present?  Ves No Depth (inches):  Gutration Present?  Ves No Depth (inches):  Metland Hydrology Present?  Ves No Depth (inches):  Wetland Hydrology Present?	_ ` ´				J <del>4</del> )
Furface Water Present?  Yes No Depth (inches):  Vater Table Present?  Yes No Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):				TAC fleditul Test (b3)	
Saturation Present?  Includes capillary fringe)  Yes No Depth (inches):  Wetland Hydrology Present? Yes No No Depth (inches):		No O Depth (in	iches):		
Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches):	Vater Table Present? Yes	O No Depth (in	iches):		
includes Capillal y Thinge)	Saturation Present?		Wetland I	Hydrology Present? Yes ${\mathbb C}$	) No 💿
Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:	includes capillary fringe)			21.11	
	escribe Recorded Data (stream	i gauge, monitoring well, aeria	i pnotos, previous inspections), ir	avaliable:	
	emarks:				
Citation.					
Citation.					
Cinano.					

# **VEGETATION** (Five/Four Strata)- Use scientific names of plants. Dominant

				ominant oecies?		Sampling Point: 3-1 Up PASA
	ee Stratum (Plot size: _30)	Absolute % Cover	Re	el.Strat.	Indicator Status	Dominance Test worksheet:
	• •	25	<b>✓</b>	55.6%	FAC	Number of Dominant Species
•	Acer rubrum		<ul><li>✓</li><li>✓</li></ul>	44.4%	FACU	That are OBL, FACW, or FAC: (A)
_	Juniperus virginiana			0.0%	TACO	Total Number of Dominant
_			П	0.0%		Species Across All Strata:5(B)
			П	0.0%		Percent of dominant Species
			$\overline{\sqcap}$	0.0%		That Are OBL, FACW, or FAC: 40.0% (A/B)
_				0.0%		Prevalence Index worksheet:
-				0.0%	-	Total % Cover of: Multiply by:
-			= To	otal Cover		0BL species
Sa	pling-Sapling/Shrub Stratum (Plot size: 15	) ——				FACW species x 2 =0
1	Quercus montana	5	<b>✓</b>	100.0%	UPL	FAC species 35 x 3 = 105
2	15			0.0%		FACU species $\frac{40}{3}$ x 4 = $\frac{160}{3}$
3	15		Н	0.0%		, E 2E
	15		Н	0.0%		or species X 5 - (P)
5	15			0.0%		Column Totals: <u>80</u> (A) <u>290</u> (B)
6				0.0%		Prevalence Index = $B/A = 3.625$
				0.0%		Hydrophytic Vegetation Indicators:
8	19			0.0%		Rapid Test for Hydrophytic Vegetation
_	10-			0.0%		☐ Dominance Test is > 50%
10			Ш	0.0%		☐ Prevalence Index is ≤3.0 <sup>1</sup>
Sh	rub Stratum (Plot size:)	5	= To	otal Cover		Morphological Adaptations <sup>1</sup> (Provide supporting
1		0		0.0%		data in Remarks or on a separate sheet)
2	-	0		0.0%		Problematic Hydrophytic Vegetation 1 (Explain)
3	-	0		0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4		0		0.0%		be present, unless disturbed or problematic.
5		0		0.0%		Definition of Vegetation Strata:
6		0		0.0%		Four Vegetation Strata:
7		0		0.0%		Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH),
Нє	erb Stratum (Plot size: 15 )	0	= To	otal Cover		regardless of height.
	Rubus allegheniensis	20	<b>✓</b>	66.7%	FACU	Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
	Microstegium vimineum	10	<b>✓</b>	33.3%	FAC	
3		0		0.0%		Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28
4		0		0.0%		ft tall.
5		0		0.0%		Woody vines – Consists of all woody vines greater than 3.28 ft in height.
6		0		0.0%		Five Vegetation Strata:
7		0		0.0%		Tree - Woody plants, excluding woody vines, approximately
8		0		0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
		0		0.0%		diameter at breast height (DBH).
10		0		0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
11		0		0.0%		less than 3 in. (7.6 cm) DBH.
12		0		0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.
	oody Vine Stratum (Plot size:)	30	= To	otal Cover		Herb stratum – Consists of all herbaceous (non-woody)
		0		0.0%		plants, including herbaceous vines, regardless of size, and
				0.0%		woody species, except woody vines, less than approximately 3 ft (1 m) in height.
		0		0.0%		Woody vines – Consists of all woody vines, regardless of
4		0		0.0%		height.
		0	П	0.0%		
_		0	$\overline{\Box}$	0.0%		Hydrophytic Vegetation
U	•	0		otal Cover		Present? Yes No •
_	and the foundation of the second of the seco		-			<u> </u>
Rei	narks: (Include photo numbers here or on a separate she	eet.)				

Soil Sampling Point: 3-1 Up PASA

Profile Descri	Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)										
Depth		Matrix			Redox Featu						
(inches)		(moist)	%	Color (moist	) %	Type <sup>1</sup>	Loc2	Texture	Rema	arks	
0-8	5YR	4/6	100					Loam			
8-13	5YR	5/6	100					Loam			
	-										
	-	-									
		-									
		-	-								
· · ·			on. RM=Re	duced Matrix, CS=Co	overed or Coat	ed Sand G	ains <sup>2</sup> Loc	ation: PL=Pore Lining. M=	Matrix		
Hydric Soil I								Indicators for Proble	ematic Hydric	Soils <sup>3</sup> :	
Histosol (A	,			☐ Dark Surfa	. ,			2 cm Muck (A10)	(MLRA 147)		
Histic Epip					elow Surface			Coast Prairie Redo	x (A16)		
☐ Black Histi		`			Surface (S9) (I		148)	(MLRA 147,148)	` '		
Hydrogen Sulfide (A4) Stratified Layers (A5)				☐ Loamy Gley ☐ Depleted M	red Matrix (F2)	)		Piedmont Floodpla	ain Soils (F19)		
	k (A10) (LRI				Surface (F6)			(MLRA 136, 147)	C ( (TE12		
	Below Dark		\11\		ark Surface (F	7)		<ul><li>✓ Very Shallow Dark</li><li>✓ Other (Explain in I</li></ul>	•	)	
	Surface (A	•	411)		ressions (F8)	,,		☐ Other (Explain in i	Remarks)		
	ck Mineral (		N		nese Masses	(F12) (LRR	N,				
MLRA 147		(DI) (LIKIK)	,	MLRA 136)							
Sandy Gle	yed Matrix	(S4)		Umbric Sur	face (F13) (M	LRA 136, 12	22)	3- 11			
Sandy Rec	dox (S5)			Piedmont F	loodplain Soils	s (F19) (ML	RA 148)	<sup>3</sup> Indicators of wetland hyd	hydrophytic veg Irology must be	getation and e present,	
Stripped M	1atrix (S6)			Red Parent	: Material (F21	) (MLRA 12	7, 147)	unless di	sturbed or prob	lematic.	
Restrictive La	ever (if ob	served):									
Type:	-, (										
Depth (inch	nes):							Hydric Soil Present?	Yes 🔾	No 💿	
Remarks:	,										



Photo File: IN	IG_5335.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°30'41.298"	Lat/Northing: 38°43'47.518"
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

Manual Article   Manual Article   Manual Article   Matt Neely   Section, Township, Range: S   T   R   Manual Article   Matt Neely   Section, Township, Range: S   T   Matt Neely   Section, Range: S   T   Matt	oject/Site: Manassas Regional A	Airport PASA	City/County: Mai	nassas	Sampling	<b>Date:</b> 16-Oct-17
under (hillslope, terrace, etc.): Terrace	plicant/Owner: Manassas Regio	onal Airport		State: VA	Sampling Point:	4-1 Up PASA
region (LRR or MLRA): MLRA 148 in LRR S	estigator(s): Matt Neely		Section, Townshi	p, Range: S	т	R
Map Unit Name: Rowland slit loam	dform (hillslope, terrace, etc.)	: Terrace	Local relief (concav	ve, convex, none):	flat <b>S</b> I	lope: 0.0% / 0.0
Map Unit Name: Rowland slit loam	region (LRR or MLRA): MLR	RA 148 in LRR S	 Lat.: 38°43'50.64"N	<b>Long.:</b> 77	7°30'44.677"W	Datum: NAD 83
Colimatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   Vegetation	Map Unit Name: Rowland si	 It loam				
Vegetation	climatic/hydrologic conditions	s on the site tynical for this	time of year? Yes   No '	(If no. explai	n in Remarks )	
Vegetation					-	Yes   No
Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc prophytic Vegetation Present? Yes \ No \ O \ All Sthe Sampled Area within a Wetland? Yes \ No \ O \ All Sthe Sampled Area within a Wetland? Yes \ No \ O \ All Sthe Sampled Area within a Wetland? Yes \ No \ O \ All Sthe Sampled Area within a Wetland? Yes \ No \ O \ O \ All Sthe Sampled Area within a Wetland? Yes \ No \ O \ O \ O \ O \ O \ O \ O \ O \ O \			-		•	
Advisophytic Vegetation Present? Yes No  Average No  A	vegetation, Soil	, or Hydrology $\  \  \  \  \  \  \  \  \  \  \  \  \ $	iturally problematic?	(If needed, explain	any answers in Rem	arks.)
Is the Sampled Area within a Wetland?  Ves No No No No within a Wetland?  Ves No	ımmary of Findings - $\iota$	Attach site map sho	wing sampling poin	t locations, tr	ansects, impor	tant features, etc
within a Wetland?  Yes No   wetland Hydrology Present?  Yes No   wetlan	drophytic Vegetation Present	? Yes O No 💿				
No   No   No   No   No   No   No   No	dric Soil Present?	Yes O No 💿			) No (	
Netland Hydrology   Netland Hydrology Indicators:   Secondary Indicators (minimum of two required)	etland Hydrology Present?	Yes 🔾 No 💿	within a W	etland?	> 140 ©	
Vetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Iron Deposits (B5)  Water-Stained Leaves (B9)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Water Table Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):						
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Trinh Muck Surface (C7)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):	- lydrology					
Surface Water (A1)	Wetland Hydrology Indicators:			Seco	ndary Indicators (minim	num of two reauired)
High Water Table (A2)	Primary Indicators (minimum o	of one required; check all th	at apply)		Surface Soil Cracks (B6)	
Saturation (A3)	Surface Water (A1)	True A	quatic Plants (B14)			
Water Marks (B1)	¬ • ` ´					
Sediment Deposits (B2)	_ ` ´		, , ,	` '	, ,	(C2)
Drift deposits (B3)	_ ` ` '		` '			(C2)
Algal Mat or Crust (B4)	_ ' ' '		•	_		ial Imagery (C9)
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Solution Present?  Yes No Peth (inches):  Solution Present?	Algal Mat or Crust (B4)		* *		Stunted or Stressed Plan	its (D1)
Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):					Geomorphic Position (D2	<u>'</u> )
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):		nagery (B7)				<b>-</b>
Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):						(D4)
Surface Water Present? Yes No Depth (inches):					AC-fleutial Test (D3)	
Saturation Present?  Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches):		s O No O Depth	n (inches):			
Saturation Present?  Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches):		s O No O Denti	n (inches):		_	_
includes capitally fillinger	Saturation Present?		,	Wetland Hydrology	Present? Yes	) No ●
	includes capillary fringe)			+i\		
	lomarke:					
ompulse.	lemarks:					
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	Dominant Species?				Sampling Point: 4-1 Up PASA		
Tree Stratum (Plot size: 30 )	Absolute % Cover	Re	el.Strat.	Indicator Status	Dominance Test worksheet:		
4.0	15	<b>V</b>	42.9%	FACU	Number of Dominant Species That are OBL, FACW, or FAC:  (A)		
Ouercus aiba     Ouercus montana		<b>V</b>	28.6%	UPL	That are obly thew, or the		
3 Quercus velutina		$\overline{\Box}$	14.3%	UPL	Total Number of Dominant		
4 Juniperus virginiana		$\overline{\Box}$	14.3%	FACU	Species Across All Strata: 4 (B)		
5			0.0%		Percent of dominant Species		
6		$\overline{\Box}$	0.0%		That Are OBL, FACW, or FAC: 0.0% (A/B)		
7			0.0%		Prevalence Index worksheet:		
8			0.0%		Total % Cover of: Multiply by:		
	25	 = To	otal Cover		0BL species 0 x 1 = 0		
Sapling-Sapling/Shrub Stratum (Plot size: 15	)				FACW species x 2 =		
1 . Celtis occidentalis	5	<b>✓</b>	100.0%	FACU			
2	0	Ш	0.0%		•		
3	0		0.0%		1F 7F		
4	0		0.0%		or species X 5 -		
5	0		0.0%		Column Totals: <u>45</u> (A) <u>195</u> (B)		
6	0		0.0%		Prevalence Index = B/A =4.333_		
7	0		0.0%		Hydrophytic Vegetation Indicators:		
8	0		0.0%		Rapid Test for Hydrophytic Vegetation		
9	0		0.0%		Dominance Test is > 50%		
10	0		0.0%		Prevalence Index is ≤3.0 ¹		
Shrub Stratum (Plot size:)	_	= To	otal Cover		Morphological Adaptations <sup>1</sup> (Provide supporting		
1	0	П	0.0%		data in Remarks or on a separate sheet)		
2.			0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)		
3			0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must		
4	_		0.0%		be present, unless disturbed or problematic.		
5		$\Box$	0.0%		Definition of Vegetation Strata:		
		П	0.0%		Four Vegetation Strata:		
6		$\Box$	0.0%		Tree stratum – Consists of woody plants, excluding vines, 3		
7		 _ T/	otal Cover		in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.		
Herb Stratum (Plot size: 15 )		,			Sapling/shrub stratum – Consists of woody plants, excluding		
1		Ц	0.0%		vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.		
2			0.0%		Herb stratum – Consists of all herbaceous (non-woody)		
3			0.0%		plants, regardless of size, and all other plants less than 3.28		
4			0.0%		ft tall.   Woody vines – Consists of all woody vines greater than 3.28		
5			0.0%		ft in height.		
6			0.0%		Five Vegetation Strata:		
7			0.0%		Tree - Woody plants, excluding woody vines, approximately		
8	0	Н	0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).		
9		Ш	0.0%		Sapling stratum – Consists of woody plants, excluding		
10		Ц	0.0%		woody vines, approximately 20 ft (6 m) or more in height and		
11			0.0%		less than 3 in. (7.6 cm) DBH.		
12	0	Ш	0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.		
Woody Vine Stratum (Plot size: 15		= T	otal Cover		Herb stratum – Consists of all herbaceous (non-woody)		
1 Lonicera japonica	5	✓	100.0%	FACU	plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately		
2	0		0.0%		3 ft (1 m) in height.		
3	0		0.0%		Woody vines – Consists of all woody vines, regardless of		
4			0.0%		height.		
5			0.0%		- Under a badia		
6.	0		0.0%		Hydrophytic Vegetation		
<u> </u>	5	= T	otal Cover	r	Present? Yes Uno U		

Soil Sampling Point: 4-1 Up PASA

Profile Descr	iption: (De	scribe to	the depth	needed to documen	t the indic	ator or co	onfirm the	absence of indicators.)	
Depth		Matrix			lox Featu				
(inches)	Color (	(moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc2	Texture F	Remarks
0-8	5YR	4/6	100					Loam	
8-13	5YR	5/6	100					Loam	
					-				
			-						
								·	
<sup>1</sup> Type: C=Cond	centration [	)=Denleti	on RM=Rec	luced Matrix CS=Cover	ed or Coate	ed Sand Gr	ains 21 oc	cation: PL=Pore Lining. M=Matrix	
Hydric Soil I		)-Depicti	JII. KIII—Kee	deced Matrix, CS=Cover	ed of coats	su Sanu Gi	airis Loc		2
Histosol (A				☐ Dark Surface (	57)			Indicators for Problematic Hy	
·	pedon (A2)			Polyvalue Belov	•	CO) (MI DA	147 140)	2 cm Muck (A10) (MLRA 147	')
Black Hist				Thin Dark Surfa				Coast Prairie Redox (A16)	
	Sulfide (A4)	`					140)	(MLRA 147,148)	
	Layers (A5)			Loamy Gleyed				Piedmont Floodplain Soils (F	19)
				Depleted Matri				(MLRA 136, 147)	TT40)
□ 2 cm Muck (A10) (LRR N)       □ Redox Dark Surface (F6         □ Depleted Below Dark Surface (A11)       □ Depleted Dark Surface (F8)         □ Thick Dark Surface (A12)       □ Redox Depressions (F8)			. ,	7\		☐ Very Shallow Dark Surface (	IF12)		
				′)		Other (Explain in Remarks)			
				☐ Iron-Manganes		F12\ (I DD	N		
□ Sandy Mu MLRA 147	ck Mineral ( ', 148)	S1) (LRR	N,	MLRA 136)					
Sandy Gle	eyed Matrix (	(S4)		Umbric Surface	e (F13) (ML	.RA 136, 12	22)	3	
Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA				RA 148)	<sup>3</sup> Indicators of hydrophyt wetland hydrology mu	ic vegetation and ist he present.			
Stripped N	Matrix (S6)			Red Parent Ma	terial (F21)	(MLRA 12	7, 147)	unless disturbed or	
Restrictive La	aver (if obs	served):							
Type:									
Depth (incl	hes):							Hydric Soil Present? Yes	○ No •
Remarks:	,							1	
Kemarks.									



Photo File: IN	IG_5337.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	77°30'44.677"	Lat/Northing: 38°43'50.64"N
Description:			

Photo File: <b>No</b>	ne.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

pilicant/Owner: Manassas Regional Airport: State: Video Sampling Point: S-1 Up PASA restigator(e): Matt Neety Section, Township, Range: S T R    Matt Neety Service, Etrace, etc.): Ferrace   Local relief (concave, convex, none): filed: Slope: 0,0% / 0,0 foreign (LRR or MLRA): MLRA! 48 in LRR S Lat: 38º4352.314*N   Long: 77º30/45.939*W Datum: NAD 83 il Map Unit Name: Rowland slit loam   NWI classification:   Editatic (hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)	vestigator(s): Matt Neely ndform (hillslope, terrace, etc.):	al Airport				
Indiform (hilslope, terrace, etc.): Terrace	ndform (hillslope, terrace, etc.):	porc		State: VA	Sampling Point:	5-1 Up PASA
region (LRR or MLRA): MLRA 148 in LRR S			Section, Towns	hip, Range: S	т	_ R
Map Unit Name: Rowland silt loam	region (I DD or MI DA). MI DA	Terrace	Local relief (conc	ave, convex, none):	flat Slop	oe: <u>0.0%</u> / <u>0.0</u>
climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation  , Soil  , or Hydrology  significantly disturbed?  Are "Normal Circumstances" present? Yes  No  No  naturally problematic?  (If needed, explain any answers in Remarks.)  Immary of Findings - Attach site map showing sampling point locations, transects, important features, every complete the site of the	TEGIOTI (LKK OT PILKA): MLRA	148 in LRR S	Lat.: 38°43'52.314"N	<b>Long.:</b> 77	°30'45.939"W	Datum: NAD 83
Vegetation	Map Unit Name: Rowland silt	loam			IWI classification:	_
Vegetation	climatic/hydrologic conditions o	on the site typical for th	is time of vear? Yes   No	(If no. explai	n in Remarks.)	
Immary of Findings - Attach site map showing sampling point locations, transects, important features, et with the sample of the						Yes ● No ○
Immary of Findings - Attach site map showing sampling point locations, transects, important features, et a complete the post of the present? Yes			•		istances present.	
Is the Sampled Area within a Wetland?   Yes	-		•		-	-
Addric Soil Present?  Yes No			nowing sampling poi	nt locations, tr	ansects, importa	ant features, etc
etland Hydrology Present? Yes No Po No Potentian Wetland?  Within a Wetland?  Wetland Hydrology Present?  Within a Wetland?  Wetland Hydrology  Wetland Hydrology  Wetland Hydrology  Wetland Hydrology  Wetland Hydrology  Wetland Hydrology  Within a Wetland?  Wetland?  Wetland?  Wetland?  Wetland?  Wetland?  Wetland Hydrology  Wetland H						
Agal Mat or Crust (B4)  Drift deposits (B3)  Drift deposits (B1)  Drift deposits (B1)  Drift deposits (B10)  Drift deposits (B10)  Drift deposits (B10)  Drift deposits (B10)  Dr					○ No •	
Wetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Trind Algal Mat or Crust (B4)  Trun Aquatic Plants (B1)  Other (Explain in Remarks)  Stuntace (C7)  Saturation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Pesent?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):		Tes ONO O				
Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Trin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Mater-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Depth (inches):  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drift deposits (B10)  Drainage Patterns (B10)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Drainage Patterns (B10)  Drainage Patterns	 lydrology					
Surface Water (A1)	Wetland Hydrology Indicators:			Seco	ndarv Indicators (minimur	n of two reauired)
High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Hydrogen Sulfide Odor (C1)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Number of Reduction in Tilled Soils (C6)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Saturation Present?  Yes  No  Depth (inches):	Primary Indicators (minimum of	one required; check all	that apply)	s	urface Soil Cracks (B6)	
Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Crayfish Burrows (C8)  Drift deposits (B3)  Thin Muck Surface (C7)  Saturation Visible on Aerial Imagery (C9)  Algal Mat or Crust (B4)  Other (Explain in Remarks)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Shallow Aquitard (D3)  Water-Stained Leaves (B9)  Microtopographic Relief (D4)  Aquatic Fauna (B13)  Present? Yes No  Depth (inches):  Wetland Hydrology Present? Yes No  Depth (inches):  Wetland Hydrology Present? Yes No  Depth (inches):  Wetland Hydrology Present? Yes No  Depth (inches):  Souricular Frince)	_ ` ′					e Surface (B8)
Water Marks (B1)			• ,		• , ,	
Sediment Deposits (B2)				` ' _	` '	27)
Drift deposits (B3)	_ ` ´		` '			.2)
Algal Mat or Crust (B4)					, , ,	Imagery (C9)
□ Inundation Visible on Aerial Imagery (B7) □ Water-Stained Leaves (B9) □ Aquatic Fauna (B13) □ FAC-neutral Test (D5)  Field Observations: Surface Water Present? Water Table Present? Ves No Depth (inches): Saturation Present? Yes No Depth (inches):	Algal Mat or Crust (B4)		• •		tunted or Stressed Plants	(D1)
Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):	_			G	Geomorphic Position (D2)	
Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):		gery (B7)				
Field Observations:  Surface Water Present?  Yes No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	_					4)
Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):					AC-fleutidi Test (D3)	
Saturation Present? (includes capillary fringe)  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):		○ No ● De	epth (inches):			
Saturation Present? Yes No Depth (inches):	Water Table Present? Yes	○ No ● D∈	epth (inches):			
(includes capillary fininge)				Wetland Hydrology	Present? Yes	No 🕑
bescribe Recorded Data (stream gauge, monitoring well, aerial priotos, previous inspections), il available.	(includes capillary fringe)			actions) if availables		
	rescribe Recorded Data (stream)	gaage, monitoring weil,	, acriai priotos, previoas irispi	cetions), ii available.		
	emarks:					
	emarks:					
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	temarks:					
	Remarks:					
	Remarks:					
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	lemarks:					
	Remarks:					

	Dominant ———Species? ————				Sampling Point: 5-1 Up PASA		
	Absolute	Re	el.Strat.	Indicator	Dominance Test worksheet:		
Tree Stratum (Plot size: <u>30</u> )	% Cover			Status	Number of Dominant Species		
1 Juniperus virginiana		<b>V</b>		FACU	That are OBL, FACW, or FAC: 3 (A)		
2. Ouercus palustris		<b>V</b>	40.0%	FACW	Total Number of Dominant		
3 Ouercus coccinea		<b>✓</b>	20.0%	UPL	Species Across All Strata:		
4		Н	0.0%		Percent of dominant Species		
5		Н	0.0%		That Are OBL, FACW, or FAC: 60.0% (A/B)		
6		$\vdash$	0.0%				
7		Н	0.0%		Prevalence Index worksheet:		
8		$\sqcup$	0.0%		Total % Cover of: Multiply by:		
Sapling-Sapling/Shrub Stratum (Plot size: 15	) -50 :	= To	otal Cover	•	0BL speci es x 1 = 0		
1 Ulmus americana	10	<b>V</b>	100.0%	FACW	FACW species 30 x 2 = 60		
2	0		0.0%		FAC species <u>40</u> x 3 = <u>120</u>		
3			0.0%		FACU speci es $\frac{20}{100}$ x 4 = $\frac{80}{100}$		
4			0.0%		UPL species $\frac{10}{}$ x 5 = $\frac{50}{}$		
5	_		0.0%		Column Totals: 100 (A) 310 (B)		
6	_		0.0%		Prevalence Index = B/A = 3.100		
7	_		0.0%		,		
8			0.0%		Hydrophytic Vegetation Indicators:		
9	_		0.0%		Rapid Test for Hydrophytic Vegetation		
10		П	0.0%		✓ Dominance Test is > 50%		
		 = To	otal Cover		Prevalence Index is ≤3.0 ¹		
Shrub Stratum (Plot size:)			0.0%		Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)		
1		Н			Problematic Hydrophytic Vegetation 1 (Explain)		
2		Н	0.0%				
3	_	Н	0.0%		Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.		
4		$\exists$	0.0%		Definition of Vegetation Strata:		
5		$\exists$	0.0%		Four Vegetation Strata:		
6		Н	0.0%		Tree stratum – Consists of woody plants, excluding vines, 3		
7	0_	Ч	0.0%		in. (7.6 cm) or more in diameter at breast height (DBH),		
Herb Stratum (Plot size: 15	:		otal Cover	•	regardless of height. Sapling/shrub stratum – Consists of woody plants, excluding		
1 _ Microstegium vimineum	40	<b>✓</b>	100.0%	FAC	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.		
2	0	Ш	0.0%		Herb stratum – Consists of all herbaceous (non-woody)		
3			0.0%		plants, regardless of size, and all other plants less than 3.28		
4	0	Ш	0.0%		ft tall. Woody vines – Consists of all woody vines greater than 3.28		
5	0	Ш	0.0%		ft in height.		
6	0_	Ш	0.0%		Five Vegetation Strata:		
7	0	Ш	0.0%		Tree - Woody plants, excluding woody vines, approximately		
8	0	Ш	0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in		
9	0		0.0%		diameter at breast height (DBH).  Sapling stratum – Consists of woody plants, excluding		
10	0	Ш	0.0%		woody vines, approximately 20 ft (6 m) or more in height and		
11	0	Ш	0.0%		less than 3 in. (7.6 cm) DBH.		
12	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.		
Woody Vine Stratum (Plot size:)	40 :	= T	otal Cover	•	Herb stratum – Consists of all herbaceous (non-woody)		
1	0		0.0%		plants, including herbaceous vines, regardless of size, and		
2.	0		0.0%		woody species, except woody vines, less than approximately 3 ft (1 m) in height.		
3	0		0.0%		Woody vines – Consists of all woody vines, regardless of		
4			0.0%		height.		
5			0.0%				
			0.0%		Hydrophytic Vegetation		
h		_					
6	0	= T	otal Cove	r	Present? Yes V No		

Soil Sampling Point: 5-1 Up PASA

	ription: (D		the depth				onfirm the	absence of indicators.)	
Depth (inches)	Color	Matrix (moist)	%	Color (moist)	lox Featu %	res 1	Loc2	Texture	Remarks
0-11	5YR	4/6	100					Loam	
11-13	5YR	5/6	100					Loam	
11 15	3110	3,0						Louin	
	-		_		-				
	-		_		-				
<sup>l</sup> Type: C=Con	centration.	D=Depletion	on. RM=Red	luced Matrix, CS=Cover	ed or Coat	ted Sand Gr	ains <sup>2</sup> Loc	cation: PL=Pore Lining. M=	Matrix
Hydric Soil 1	Indicators	:						Indicators for Proble	ematic Hydric Soils <sup>3</sup> :
Histosol (	A1)			☐ Dark Surface (	S7)			2 cm Muck (A10) (	-
Histic Epi	pedon (A2)			Polyvalue Belov	w Surface	(S8) (MLRA	147,148)		
☐ Black Hist	tic (A3)			☐ Thin Dark Surfa	ace (S9) (N	MLRA 147,	148)	Coast Prairie Redo (MLRA 147,148)	x (A16)
	Sulfide (A			Loamy Gleyed	Matrix (F2	)		☐ Piedmont Floodpla	in Soils (F19)
	Layers (A5)			Depleted Matri:				(MLRA 136, 147)	
	k (A10) (LR			Redox Dark Su	` '			Very Shallow Dark	Surface (TF12)
	Depleted Below Dark Surface (A11)  Depleted Dark Surface (F7)							Other (Explain in F	Remarks)
	k Surface (			Redox Depress		/E12) /I DD	N.I.		
☐ Sandy Mu MLRA 147	ıck Mineral	(S1) (LRR	N,	☐ Iron-Manganes MLRA 136)	e Masses	(F12) (LRK	IN,		
	eyed Matrix	(\$4)		Umbric Surface	e (F13) (M	LRA 136, 12	22)		
Sandy Re		(31)		☐ Piedmont Floor				<sup>3</sup> Indicators of	hydrophytic vegetation and
	Matrix (S6)			Red Parent Ma					rology must be present, sturbed or problematic.
					•				
Restrictive L	ayer (if ob	served):							
Type:								Hydric Soil Present?	Yes ○ No •
Depth (inc	thes):							nyune son rresent.	163 0 110 0
Remarks:									



Photo File: IN	MG_5338.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting:	77°30'45.939"	Lat/Northing: 38°43'52.314"
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

Datum:   NAD   Datu	Section, Township, Range: S	Matt Neely   Section, Township, Range: S   T   R	westigator(s): Matt Neely   Section, Township, Range: S   T   R
Addrorm (hillslope, terrace, etc.): Hillside Local relief (concave, convex, none): fiat Slope: 5,0% / pregion (LRR or MLRA): MLRA 148 in LRR S Lat.: 38°43'38.068"N Long.: 77°30'38.264"W Datum: NAD I Map Unit Name: Dulles silt loam NWI classification: verification of the site typical for this time of year? Yes No (If no, explain in Remarks.)    Map Unit Name: Dulles silt loam NWI classification: verification of the site typical for this time of year? Yes No (If no, explain in Remarks.)   Vegetation	adform (hillslope, terrace, etc.): Hillside   Local relief (concave, convex, none): filat   Slope:   5,0%   / 2, 2 pregion (LRR or MLRA):   MLRA 148 in LRR S   Lat.: 38°43'38.068'N   Long.:   77°30'38.264"W   Datum:   NAD 83   May Unit Name:   Dulles sit! Ioam   NWI classification:	Addrorm (hillslope, terrace, etc.): Hillside	Addrorm (hilstope, terrace, etc.): Hillside
Map Unit Name   Dulles silt loam   Datum:   NAD	region (LRR or MLRA): MLRA 148 in LRR S	Map Unit Name   Dulles silt loam	region (LRR or MLRA): MLRA 148 in LRR S
Map Unit Name: Dulles silt loam	Map Unit Name: Dulles slit loam	Map Unit Name: Dulles silt loam	Map Unit Name: Dulles silt loam
Map Unit Name: Dulles slit loam	Map Unit Name: Dulles Silt loam	Map Unit Name: Dulles Silt loam	Map Unit Name: Dulles silt loam
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)	climatic/hydrologic conditions on the site typical for this time of year? Yes No Itino, explain in Remarks.)  Vegetation	climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation  , Soil  , or Hydrology  significantly disturbed?  Are "Normal Circumstances" present?  Yes  No  Vegetation   , Soil  , or Hydrology	Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   No  (If needed, explain any answers in Remarks.)   No  (If needed, explain any answers in Remarks.)
Vegetation	Vegetation	Vegetation	Vegetation
Vegetation	Vegetation	Vegetation	Vegetation
Immary of Findings - Attach site map showing sampling point locations, transects, important features, proposition of the property of the posits (B1)	Immary of Findings - Attach site map showing sampling point locations, transects, important features, et vidrophytic Vegetation Present? Yes \ No \ vidric Soil Cracks (B6) \ Depth (inches): Secondary Indicators (minimum of two required) Sourface Soil Cracks (B6) \ Depth (inches): Secondary Indicators (minimum of two required) Sourface Soil Cracks (B6) \ Depth (inches): Secondary Indicators (minimum of two required) Sourface Soil Cracks (B6) \ Depth (inches): Secondary Indicators (minimum of two required) Sourface Soil Cracks (B6)	Immary of Findings - Attach site map showing sampling point locations, transects, important features, vidrophytic Vegetation Present? Yes	Immary of Findings - Attach site map showing sampling point locations, transects, important features, proposition of the property of the prope
Addrophytic Vegetation Present? Yes No Proposition (C1)	Is the Sampled Area within a Wetland?    Ves	Is the Sampled Area within a Wetland?  Ves No No No Saturation (A3)	Advice Soil Present?  Yes No   No   Is the Sampled Area within a Wetland?  Yes No   No   No   Is the Sampled Area within a Wetland?  Yes No   No   No   No   Is the Sampled Area within a Wetland?  Yes No   No   No   No   No   No   No   No
Is the Sampled Area within a Wetland?   Yes   No	Is the Sampled Area within a Wetland?  Ves No	Addic Soil Present?  Yes No  No  Is the Sampled Area within a Wetland?  No  No  No  No  No  No  No  No  No  N	Is the Sampled Area within a Wetland?  Yes No   No   No   Is the Sampled Area within a Wetland?  Yes No   No   No   No   No   No   No   No
Address of Present?  Yes No	retaind Hydrology Present?    Ves   No   Is the Sampled Area within a Wetland?   Ves   No   Is the Sampled	Is the Sampled Area within a Wetland?  Yes No No No Saturation (Area)  No Saturation (Area)  No Saturation (Area)  No Saturation (Area)  No N	retand Hydrology Present?  Yes No ●
Veriand Hydrology Present?   Ves   No   Within a Wetland?   Ves   No   Wetland Hydrology Indicators:   Within a Wetland?   Ves   No   Wetland Hydrology Indicators:   Within a Wetland?   Ves   No   Wetland Hydrology Indicators:   Within a Wetland?   Wetland?   Wetland?   Wetland?   Wetland Hydrology Indicators:   Within a Wetland?   Within a Wetland?   Wetland?   Wetland?   Wetland Hydrology Indicators:   Within a Wetland?   Wetland?   Wetland?   Wetland Hydrology Indicators:   Wetland Hydrology Indicators:   Within a Wetland?   Wetland?   Wetland Hydrology Indicators:   Within a Wetland?   Wetland Hydrology Indicators:   Wetlan	temarks:    Vydrology   Vetland Hydrology Indicators:	Vertaind Hydrology Present?   Yes   No   No   Within a Wetland?   Yes   No   Within a Wetland?   Yes   No   Wetland Hydrology Present?   Yes   No   Depth (inches):   Depth (inches):   Depth (inches):   Depth (inches):   Depth (inches):   Depth (i	etland Hydrology Present? Yes No No No Within a Wetland?    Vydrology   Netland Hydrology Indicators:   Secondary Indicators (minimum of two required)
Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface (Mark (Mark (B1))   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Iron Deposits (B5)   Mater Marka (B1)   Depth (inches):	Interpretation   Inte	Interest    Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Drainage Patterns (B10)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Sutration Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stuntator (D3)   Stuntator (D3)   Sedimonation Visible on Aerial Imagery (B7)   Shallow Aquitard (D3)   Mater Shallow Aquatic Fauna (B13)   Depth (inches):	
Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Drainage Patterns (B10)   Drainage Patterns (B10)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Geomorphic Position (D2)   Inundation Visible on Aerial Imagery (B7)   Mater-Stained Leaves (B9)   Microtopographic Relief (D4)   Aquatic Fauna (B13)   Depth (inches):   Water Table Present?   Yes   No	Secondary Indicators (minimum of two required)   Surface Soil Cracks (86)	Secondary Indicators (minimum of two required)   Surface Soil Cracks (86)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Water Marks (B1)   Presence of Reduced Iron (C4)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Inundation Visible on Aerial Imagery (B7)   Shallow Aquitard (D3)   Microtopographic Relief (D4)   Aquatic Fauna (B13)   FAC-neutral Test (D5)   Depth (inches):   Water Table Present?   Yes   No  Depth (inches):   Wetland Hydrology Present?   Yes   No  Depth (inches):   Yes   Yes	Vectiand Hydrology Indicators:   Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Water Marks (B1)   Presence of Reduced Iron (C4)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Sturtador Of Stressed Plants (D1)   Inundation Visible on Aerial Imagery (B7)   Shallow Aquitard (D3)   Water-Stained Leaves (B9)   Microtopographic Relief (D4)   FAC-neutral Test (D5)   Significate Water Present?   Yes   No  Depth (inches):
Vetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Indudation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Water Table (Present?  Yes  No  Depth (inches):  Water Algal Hydrology Indicators (minimum of two required)  Secondary Indicators (minimum of two required)  Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Surface Soil Cracks (B6)  Surface Soil Cracks (B6)  Drianage Patterns (B10)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Drianage Patterns (B10)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Drianage Patterns (B10)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  To prianage Patterns (B10)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  To prianage Patterns (B10)  Surface Valet Table (C2)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (B7)  Shallow Aquatard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Water-Stained Leaves (B9)  Motorotopographic Relief (D4)  FAC-neutral Test (D5)	Vetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	Vetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	Vetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Sediment Deposits (B2)  Presence of Reduced Iron (C4)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inon Deposits (B5)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)  Drainage Patterns (B10)  Drainage Patterns (B10)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  FAC-neutral Test (D5)
Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Water Marks (B1)  Present?  Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Soil Cracks (B6)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B1)  Presence of Reduced Iron (C4)  Recent Iron Reduction in Tilled Soils (C6)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Water Table Present?  Yes No  Depth (inches):  Depth (inches):  Water Table Present?  Water Marks (B1)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)  Drainage Pat	Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Uron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Teld Observations:  Surface Valter Present?  Yes  No  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)
Surface Water (A1)	Surface Water (A1)	Surface Water (A1)	Surface Water (A1)
High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Sediment Deposits (B2)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Water Table (A2)  Hydrogen Sulfide Odor (C1)  Drightogoto (C1)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  FAC-neutral Test (D5)  Water Table Present?  Yes  No  Depth (inches):  Water Hydrology Present?  Water Hydrology Present?  Water Burden Hydrology Present?  Water Burden Hydrology Present?	High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Pesh No  Depth (inches):  Depth (inches):  Drainage Patterns (B10)  Noidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Depth (inches):	High Water Table (A2)	High Water Table (A2)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Sediment Deposits (B2)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Hydrogen Sulfide Odor (C1)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)
Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Test Observations:  Urface Water Present?  Water Table Present?  Ves No  Oxidized Rhizospheres along Living Roots (C3)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitand (D1)  Shallow Aquitand (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Water Table Present?  Yes No  Depth (inches):  Water Table Present?  Water Table Present?  Water Bresent?  Water Present?  Water Bresent?  Water Present?  Water Bresent?  Water Present?  Water Bresent?  Water	Saturation (A3)	Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Aquatic Fauna (B13)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Depth (inches):  Water Table Present?  Yes No  Depth (inches):	Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Droposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Saturation Visible on Aerial Imagery (D4)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)
Water Marks (B1)	Water Marks (B1)	Water Marks (B1)	Water Marks (B1)
Sediment Deposits (B2)	Sediment Deposits (B2)	Sediment Deposits (B2)	Sediment Deposits (B2)
Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	Algal Mat or Crust (B4)
☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Sield Observations:  Surface Water Present? Yes ○ No ● Depth (inches): ☐ Water Table Present? Yes ○ No ● Depth (inches): ☐ Depth (in	☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5)	Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Fact-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?	☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Shallow Aquitard (D3) ☐ FAC-neutral Test (D5) ☐ FA
☐ Inundation Visible on Aerial Imagery (B7) ☐ Water-Stained Leaves (B9) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Water Table Present? ☐ Ves  No  Depth (inches): ☐ Water Table Present? ☐ Water Table	☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Steld Observations:  Surface Water Present? Yes ○ No ○ Depth (inches):  Water Table Present? Yes ○ No ○ Depth (inches):  Saturation Present? Yes ○ No ○ Depth (inches):  Saturation Present? Yes ○ No ○ Depth (inches):	Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Factor of the present of	☐ Inundation Visible on Aerial Imagery (B7) ☐ Water-Stained Leaves (B9) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Water-Stained Leaves (B9) ☐ Depth (inches):
Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Facility of the present o	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Present?	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Surface Water Present?  Microtopographic Relief (D4)  FAC-neutral Test (D5)
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Depth (inches):  Depth (inches):  Water Table Present?  Water Table Present?  Water Table Present?  Water Table Present?	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Seturation Present?  Yes No Depth (inches):  Seturation Present?  Yes No Depth (inches):	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Yes No Depth (inches):
Field Observations: Surface Water Present?  Yes No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Depth (inches):  Watland Hydrology Present?  Westland Hydrology Present?	Field Observations: Surface Water Present?  Ves No Depth (inches):  Vater Table Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Field Observations:  Surface Water Present? Yes No Depth (inches):  Vater Table Present? Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Wetland Hydrology Present? Yes No Depth (inches):	Field Observations: Surface Water Present?  Yes No Depth (inches):
Vater Table Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Westland Hydrology Present? Yes No Depth (inches):	Surface Water Present? Yes No Depth (inches):	Furface Water Present?  Yes No Depth (inches):  Vater Table Present?  Yes No Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present? Yes No O	Surface Water Present? Yes No Depth (inches):
Westland Hydrology Procent? Yes ( ) No ( •)	Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No logology No logology Present? Yes No logology Present?	Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No logology No logology Present? Yes No logology Present? Yes No logology Present? Yes No logology Present?	Visit T.H. D. 1992
Westland Hydrology Procent? Yes ( ) No ( •)	Saturation Present?  (includes capillary fringe)  Yes No Depth (inches):  Wetland Hydrology Present? Yes No O	Saturation Present? (includes capillary fringe)  Yes No Depth (inches):  Wetland Hydrology Present? Yes No O	Water Table Present? Yes V NO V Denth (inches):
	includes capillary frilinger	includes capillary fringe)	Wetland Hydrology Procent3 VSC ( ) NO ( ● )
includes capillary tringer	Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	Pescribe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	includes capillary fringe)

			ominant oecies? _		Sampling Point: <u>15-1 up</u>
	Absolute	Re	el.Strat.	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 30 )	% Cover	_		Status	Number of Dominant Species
1 Carya tomentosa	30	<b>✓</b>	100.0%	UPL	That are OBL, FACW, or FAC: (A)
2	0		0.0%		Total Number of Dominant
3	0	Ш	0.0%		Species Across All Strata: 3 (B)
4	0	Ш	0.0%		
5	0		0.0%		Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)
6	0		0.0%		That are obt., Facw, or Fac.
7	0		0.0%		Prevalence Index worksheet:
8	0		0.0%		Total % Cover of: Multiply by:
Diet size:	30 =	= T	otal Cove	r	0BL speci es0 x 1 =0
Sapling-Sapling/Shrub Stratum (Plot size:			75.00/	LIDI	FACW species x 2 =0
1 Carya tomentosa		<b>✓</b>	75.0%	UPL	FAC species0_ x 3 =0_
2. Cornus florida		<b>✓</b>	25.0%	FACU	FACU species $\frac{5}{}$ x 4 = $\frac{20}{}$
3			0.0%		45 225
4			0.0%		of L species
5	0		0.0%		Column Totals:
6			0.0%		Prevalence Index = $B/A = 4.900$
7	0		0.0%		Hydrophytic Vegetation Indicators:
8	0		0.0%		Rapid Test for Hydrophytic Vegetation
9	0		0.0%		Dominance Test is > 50%
10	0		0.0%		Prevalence Index is ≤3.0 ¹
Shrub Stratum (Plot size:)	20 :	= T	otal Cove	r	Morphological Adaptations <sup>1</sup> (Provide supporting
1	0		0.0%		data in Remarks or on a separate sheet)
2.			0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
3		$\Box$	0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4	_	$\overline{\Box}$	0.0%		be present, unless disturbed or problematic.
5.		$\overline{\Box}$	0.0%		Definition of Vegetation Strata:
-		П	0.0%		Four Vegetation Strata:
6		$\Box$	0.0%		Tree stratum – Consists of woody plants, excluding vines, 3
7		ш - т	otal Cove		in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Herb Stratum (Plot size:)				•	Sapling/shrub stratum – Consists of woody plants, excluding
1			0.0%		vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2			0.0%		Herb stratum – Consists of all herbaceous (non-woody)
3			0.0%		plants, regardless of size, and all other plants less than 3.28
4			0.0%		ft tall.   Woody vines – Consists of all woody vines greater than 3.28
5	0	$\sqcup$	0.0%		ft in height.
6	0	$\sqcup$	0.0%		Five Vegetation Strata:
7	0		0.0%		Tree - Woody plants, excluding woody vines, approximately
8	0		0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9	0		0.0%		diameter at breast height (DBH).
10	0		0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
11			0.0%		less than 3 in. (7.6 cm) DBH.
12	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody
Woody Vine Stratum (Plot size:)		= T	otal Cove	r	vines, approximately 3 to 20 ft (1 to 6 m) in height.
	0		0.0%		Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and
1		Н			woody species, except woody vines, less than approximately
2			0.0%		3 ft (1 m) in height.
3			0.0%		Woody vines – Consists of all woody vines, regardless of height.
4			0.0%		ļ_ ~
5	0		0.0%		Hydrophytic
6.	0	Ш	0.0%		Vegetation
					Present? Yes V No V
	0	= T	otal Cove	IF.	Tresenc.

Soil Sampling Point: 15-1 up

Profile Descr	ription: (De	escribe to	the depth	needed to documen	t the indic	cator or co	onfirm the	absence of indicators.)	•
Depth		Matrix			dox Featu				
(inches)		(moist)	%	Color (moist)	%	Type 1	Loc2	Texture	Remarks
0-5	10YR	4/6						Silt Loam	
5-12	7.5YR	4/6						Loam	
	-							-	
-									
	-				-			-	
								-	
<sup>1</sup> Type: C=Con	centration.	D=Depletio	n. RM=Red	uced Matrix, CS=Cover	ed or Coate	ed Sand Gr	ains <sup>2</sup> Loc	ation: PL=Pore Lining. M=I	Matrix
Hydric Soil 1	Indicators:	ŀ						Indicators for Proble	ematic Hydric Soils <sup>3</sup> :
Histosol (	(A1)			☐ Dark Surface (	S7)			2 cm Muck (A10) (	-
Histic Epi	pedon (A2)			Polyvalue Belo	w Surface (	S8) (MLRA	147,148)		
☐ Black Hist	tic (A3)			☐ Thin Dark Surf	ace (S9) (M	ILRA 147, 1	148)	Coast Prairie Redox (MLRA 147,148)	x (A16)
Hydrogen	n Sulfide (A4	1)		Loamy Gleyed	Matrix (F2)			Piedmont Floodpla	in Soils (F19)
Stratified	Layers (A5)	)		Depleted Matri	x (F3)			(MLRA 136, 147)	11 3013 (1 13)
2 cm Muc	k (A10) (LR	R N)		Redox Dark Su	rface (F6)			Very Shallow Dark	Surface (TF12)
☐ Depleted	Below Dark	Surface (A	11)	Depleted Dark	Surface (F	7)		Other (Explain in F	
	rk Surface (A	-	•	Redox Depress	ions (F8)				
Sandy Mu	uck Mineral (	(S1) (LRR N	l,	☐ Iron-Manganes	se Masses (	F12) (LRR	N,		
MLRA 147		. , .	•	MLRA 136)					
Sandy Gle	eyed Matrix	(S4)		Umbric Surface	e (F13) (ML	.RA 136, 12	22)	3*	is also de les constantes and
Sandy Re	edox (S5)			Piedmont Floo	dplain Soils	(F19) (MLI	RA 148)	Indicators of I wetland hyd	nydrophytic vegetation and rology must be present,
Stripped I	Matrix (S6)			Red Parent Ma	iterial (F21)	) (MLRA 12	7, 147)		turbed or problematic.
Restrictive L	aver (if oh	served):							
Type:	ayei (ii ob	serveu):							
Depth (inc	choc):							Hydric Soil Present?	Yes ○ No •
. ,	lies)							-	
Remarks:									



Photo File: IM	IG_3401.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°30'38.264"	Lat/Northing: 38°43'38.068"N
Description:			

Photo File: N	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

Section, Township, Range: S T R  If the striptor of the street of the st	bregion (LRR or MLRA): MLRA 148 in LR  oil Map Unit Name: Rowland silt loam  re climatic/hydrologic conditions on the site re Vegetation	typical for this time of year rology significantly prology naturally prology naturally prology No	Section, Township, Rang ocal relief (concave, conv 38°43'38.498"N  ar? Yes No (2) disturbed? Are "No oblematic? (If nee ampling point local is the Sampled Al	ge: S T R  vex, none): concave Slope: 0.0% / Long.: 77°30'37.29"W Datum: NAD 8  NWI classification:  (If no, explain in Remarks.)  ormal Circumstances" present? Yes No Oeded, explain any answers in Remarks.)  ations, transects, important features,  area Yes No Oeded.
dform (hillslope, terrace, etc.): Floodplain   Local relief (concave, convex, none): Concave   Slope: 0,0% / 0,0   region (LRR or MLRA): MLRA 148 in LRR S	Indiform (hillslope, terrace, etc.): Floodplatoregion (LRR or MLRA): MLRA 148 in LR is Map Unit Name: Rowland silt loam  Is climatic/hydrologic conditions on the site is Vegetation , Soil , or Hydrology , soil , or Hydrology , or Hydrology , or Hydrology , or Hydrology	typical for this time of year rology significantly prology naturally prology naturally prology No	ocal relief (concave, convasted of the concave) are 'Yes No (1) oblematic? (If nee ampling point local is the Sampled A	Long.: 77°30'37.29"W Datum: NAD 8  NWI classification:  (If no, explain in Remarks.)  ormal Circumstances" present? Yes No Oadded, explain any answers in Remarks.)  ations, transects, important features,  Area Yes No O
region (LRR or MLRA): MLRA 148 in LRR S	region (LRR or MLRA): MLRA 148 in LR  Map Unit Name: Rowland silt loam  climatic/hydrologic conditions on the site  Vegetation , Soil , or Hydrologic conditions on the site  Vegetation , Soil , or Hydrologic conditions on the site  vegetation , Soil , or Hydrologic conditions on the site  vegetation , Soil , or Hydrologic conditions on the site  region (LRR or MLRA): A site of the site o	typical for this time of year rology significantly prology naturally prology naturally prology No	38°43'38.498"N  ar? Yes No (in the control of the c	Long.: 77°30'37.29"W  NWI classification:  (If no, explain in Remarks.)  ormal Circumstances" present? Yes  No  eded, explain any answers in Remarks.)  ations, transects, important features,  Area Yes  No  No
Map Unit Name: Rowland slit loam	Map Unit Name: Rowland silt loam  climatic/hydrologic conditions on the site  Vegetation , Soil , or Hydrology  regetation , Soil , or Hydrology  regetation Present? Yes	typical for this time of year rology significantly rology naturally project map showing satisfies No	ar? Yes No (in disturbed? Are "No oblematic? (If nee ampling point located in the Sampled A	NWI classification:  (If no, explain in Remarks.)  ormal Circumstances" present? Yes No ormal Circumstances in Remarks.)  ations, transects, important features,  area Yes No ormal Circumstances in Remarks.)
Map Unit Name: Rowland slit loam	climatic/hydrologic conditions on the site  Vegetation	typical for this time of year rology significantly rology naturally project map showing satisfies No	ar? Yes No (in disturbed? Are "No oblematic? (If nee ampling point located in the Sampled A	NWI classification:  (If no, explain in Remarks.)  ormal Circumstances" present? Yes  No  eded, explain any answers in Remarks.)  ations, transects, important features,  Area Yes  No
Colimatic/hydrologic conditions on the site typical for this time of year? Yes	climatic/hydrologic conditions on the site  Vegetation	rology   significantly rology   naturally prology   naturally prology   significantly prology   site map showing satisfies   No   No   No   No   site map showing satisfies   No   site map showing satisfies   significantly prology   significantly significantly   significantly significantly   significantly significantly   significantly significantly   significantly significantly   significantly significantly   significantly significantl	oblematic? (If nee ampling point loca Is the Sampled A	If no, explain in Remarks.)  ormal Circumstances" present? Yes No ormal Circumstances present? Yes No ormal Circumstances in Remarks.)  ations, transects, important features,  Area Yes No ormalized
Vegetation       , Soll       , or Hydrology       significantly disturbed?       Are "Normal Circumstances" present?       Yes ● No ○         Vegetation       , Soil       , or Hydrology       naturally problematic?       (If needed, explain any answers in Remarks.)         Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc         drophytic Vegetation Present?       Yes ● No ○       Is the Sampled Area within a Wetland?       Yes ● No ○         dric Soil Present?       Yes ● No ○       Is the Sampled Area within a Wetland?       Yes ● No ○         Eland Hydrology Present?         Policy Present?         Policy Present?       Yes ● No ○         Is the Sampled Area within a Wetland?         Yes ● No ○         User Soil Cracks (Bis)         Yes ● No ○         Vegetation Present?         Yes ● No ○         Vegetation Present?         Yes ● No ○         Vegetation Present?         Yes ● No ○         No ○         Is the Sampled Area within a Wetland?         Yes ● No ○         No ○         Yes ● No ○ <th>Vegetation , Soil , or Hyde Vegetation , Soil , or Hyde Immary of Findings - Attach si Idrophytic Vegetation Present? Yes Idric Soil Present? Yes Idric Soil Present? Yes Idrand Hydrology Present? Idrand Hydrology Present? Idrand Hydrology Indicators: Idrand Hydrology Indicator</th> <th>rology   significantly rology   naturally prology   naturally prology   significantly prology   site map showing satisfies   No   No   No   No   site map showing satisfies   No   site map showing satisfies   significantly prology   significantly significantly   significantly significantly   significantly significantly   significantly significantly   significantly significantly   significantly significantly   significantly significantl</th> <th>oblematic? (If nee ampling point loca Is the Sampled A</th> <th>ormal Circumstances" present? Yes No Oeded, explain any answers in Remarks.) ations, transects, important features, area Yes No O</th>	Vegetation , Soil , or Hyde Vegetation , Soil , or Hyde Immary of Findings - Attach si Idrophytic Vegetation Present? Yes Idric Soil Present? Yes Idric Soil Present? Yes Idrand Hydrology Present? Idrand Hydrology Present? Idrand Hydrology Indicators: Idrand Hydrology Indicator	rology   significantly rology   naturally prology   naturally prology   significantly prology   site map showing satisfies   No   No   No   No   site map showing satisfies   No   site map showing satisfies   significantly prology   significantly significantly   significantly significantly   significantly significantly   significantly significantly   significantly significantly   significantly significantly   significantly significantl	oblematic? (If nee ampling point loca Is the Sampled A	ormal Circumstances" present? Yes No Oeded, explain any answers in Remarks.) ations, transects, important features, area Yes No O
Vegetation	Vegetation , Soil , or Hydromary of Findings - Attach signature of Findings - Attach signatur	red; check all that apply)	oblematic? (If nee ampling point loca Is the Sampled A	ations, transects, important features,  Area Yes No
Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc prophytic Vegetation Present? Yes  No  Is the Sampled Area within a Wetland? Yes  No  Wetland Hydrology Present? Yes  No  No  Secondary Indicators:    Vemarks:	Attach si Adrophytic Vegetation Present? Yes Adric Soil Present?  Advic Soil Pres	ite map showing sa	ampling point loca	ations, transects, important features,
Is the Sampled Area within a Wetland?  Ves No No Is the Sampled Area within a Wetland?  Ves No No Is the Sampled Area within a Wetland?  Ves No No No Is the Sampled Area within a Wetland?  Ves No	Adrophytic Vegetation Present?  Adric Soil Present?  Adric Soil Present?  Adric Soil Present?  Adric Soil Present?  Yes  Yes  Yes  Yes  Yes  Yes  Yes  Ye	No N	Is the Sampled A	Area Yes  No
Is the Sampled Area within a Wetland?  Ves No	etland Hydrology Present?  Remarks:  Iydrology  Wetland Hydrology Indicators:  Primary Indicators (minimum of one requir  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Water Marks (B1)	No O No O	Is the Sampled A within a Wetland	i? Tes © NO C
Is the Sampled Area within a Wetland?  Ves No	rdric Soil Present?  etland Hydrology Present?  temarks:  Aydrology  Vetland Hydrology Indicators:  Primary Indicators (minimum of one required Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Water Marks (B1)	No O	Is the Sampled A within a Wetland	i? Tes © NO C
etland Hydrology    Netland Hydrology Indicators:   Secondary Indicators (minimum of two required)   Primary Indicators (minimum of one required; check all that apply)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Sediment Deposits (B3)   Presence of Reduced Iron (C4)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunded or Stressed Plants (D1)   FAC-neutral Test (D5)   Macer Table Present?   Yes   No   Depth (inches):   No   Depth (inches):   Wetland Hydrology Present?   Yes   No   Depth (inches):   Wetland Hydrol	etland Hydrology Present?  Remarks:  Iydrology  Wetland Hydrology Indicators:  Primary Indicators (minimum of one requir  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Water Marks (B1)	No O	within a Wetland	i? Tes © NO C
Interest	Acemarks:  Iydrology  Wetland Hydrology Indicators:  Primary Indicators (minimum of one requir  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Water Marks (B1)	red; check all that apply)		
Secondary Indicators (minimum of two required)   Surface Soll Cracks (B6)	Vetland Hydrology Indicators:  Primary Indicators (minimum of one requir  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Water Marks (B1)			
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Water Saturation Present?  Water Water Present?  Yes  No  Depth (inches):  Depth (inches):  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)	Primary Indicators (minimum of one requirement of some sequence of some se			
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  True Aquatic Plants (B14)  Sparsely Vegetated Concave Surface (B8)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Depth (inches):  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drift deposits (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Dry Season Water Table (C2)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Wetland Hydrology Present?  Yes  No  Depth (inches):  Saturation Present?  Yes  No  Depth (inches):  Saturation Present?  Yes  No  Depth (inches):  De	Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1)			Secondary Indicators (minimum of two required)
High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Presence of Reduced Iron (C4)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Recent Iron Reduction in Tilled Soils (C6)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Hydrogen Sulfide Odor (C1)  Presence of Reduced Iron (C4)  Presence o	High Water Table (A2)  Saturation (A3)  Water Marks (B1)	True Aquatic Plant		
✓ Saturation (A3)       Oxidized Rhizospheres along Living Roots (C3)       Moss Trim Lines (B16)         Water Marks (B1)       Presence of Reduced Iron (C4)       Dry Season Water Table (C2)         Sediment Deposits (B2)       Recent Iron Reduction in Tilled Soils (C6)       ✓ Crayfish Burrows (C8)         Drift deposits (B3)       Thin Muck Surface (C7)       ✓ Saturation Visible on Aerial Imagery (C9)         Algal Mat or Crust (B4)       Other (Explain in Remarks)       Stunted or Stressed Plants (D1)         Iron Deposits (B5)       Geomorphic Position (D2)         Inundation Visible on Aerial Imagery (B7)       Shallow Aquitard (D3)         ✓ Water-Stained Leaves (B9)       Microtopographic Relief (D4)         Aquatic Fauna (B13)       ✓ FAC-neutral Test (D5)         Field Observations:       Depth (inches):         Vater Table Present?       Yes No Depth (inches):         Vater Table Present?       Yes No Depth (inches):         Vaturation Present?       Yes No Depth (inches):     Wetland Hydrology Present? Yes No On One Depth (inches):	Saturation (A3) Water Marks (B1)		s (B14)	
Water Marks (B1)	Water Marks (B1)		• ,	
Sediment Deposits (B2)	¬ ` ´			
Drift deposits (B3)	Sediment Deposits (BZ)		` '	
Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Fac-neutral Test (D5)  Depth (inches):  Vater Table Present?  Ves No  Depth (inches):  Sturface Water Present?  Yes No  Depth (inches):  Depth	Drift deposits (B3)		` ,	
☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Shallow Aquitard (D3) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ FAC-neutral Tes	_ ` ` ` ´		• •	
Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Yes No Depth (inches):  A Wetland Hydrology Present?  Yes No Depth (inches):  Wetland Hydrology Present?	Iron Deposits (B5)		,	✓ Geomorphic Position (D2)
Aquatic Fauna (B13)  Field Observations: Surface Water Present?  Water Table Present?  Yes No Depth (inches): Saturation Present? Includes capillary fringe)  Yes No Depth (inches):  Yes No Depth (inches):  Depth (inches):  Yes No Depth (inches):	_			Shallow Aquitard (D3)
Field Observations: Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Yes No Depth (inches):  Depth (inches):  Yes No Depth (inches):  Depth (inches):  Yes No Depth (inches):	_			
urface Water Present? Yes No Depth (inches):				FAC-neutral Test (D5)
Vater Table Present? Yes No Depth (inches):	\ \ \	Depth (inches):		
Saturation Present?  Yes No Depth (inches): 4  Wetland Hydrology Present? Yes No Depth (inches): 4				
includes capillary fringe)  Yes No Depth (inches): 4		- op ().	Wetlan	nd Hydrology Present? Yes   No
	includes capillary fringe) Yes No			

Shrub Stratum   (Plot size:				ominant		Sampling Point: <u>15-2 wet</u>
1. Asar rubrum			Re	el.Strat.		Dominance Test worksheet:
1. Asec robrown    4	Tree Stratum (Plot size: 30 )	% Cover	Co	over :	Status	Number of Dominant Species
1	1 Acer rubrum	40	✓	100.0%	FAC	<u>'</u>
3	2	0		0.0%		Total North of Devices in
4	3	0		0.0%		
Section	4	0		0.0%		
6.				0.0%		
Sapiling-Sapiling/Shrub Stratum   (Plot size: 15   15   10   10   10   10   10   10		_		0.0%		That Are OBL, FACW, or FAC: 100.0% (A/B)
8				0.0%		Prevalence Index worksheet:
Sapiling-Sapiling/Shrub Stratum   (Plot size: 15   )   40   = Total Cover				0.0%		Total % Cover of: Multiply by:
		40	= T	otal Cover		OBL species 50 x 1 = 50
1. Vascintum commbosum 2. 0 0 0.0% 3. 0 0.0% 4. 0 0 0.0% 5. 0 0.0% 6. 0 0 0.0% 6. 0 0 0.0% 6. 0 0 0.0% 6. 0 0 0.0% 6. 0 0 0.0% 7. 0 0 0.0% 8. 0 0 0.0% 8. 0 0 0.0% 9. 0 0.0% 9. 0 0 0.0% 9. 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 9. 0 0 0.0% 1. Indicators of hydric coll and wetland hydrology muse be present, unless disturbed or problematic. 5. 0 0 0.0% 6. 0 0 0.0% 1. Indicators of hydric coll and wetland hydrology muse be present, unless disturbed or problematic. 9. 0 0.0% 1. Indicators of hydric coll and wetland hydrology muse be present, unless disturbed or problematic. 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus 9. 0 0.0% 1. Total Cover 1. Saururus cernuus	Sapling-Sapling/Shrub Stratum (Plot size: 15	)				
2.	1 Vaccinium corymbosum	5	<b>V</b>	100.0%	FACW	· · · · · · · · · · · · · · · · · · ·
1	2			0.0%		•
1	3		Ш	0.0%		l ·
0	4			0.0%		
7.	5			0.0%		Column Totals: 95 (A) 180 (B)
8	6			0.0%		Prevalence Index = B/A = 1.895
8	7			0.0%		Hydrophytic Vegetation Indicators:
9	8	0		0.0%		
10.     0   0.0%				0.0%		1
Shrub Stratum   (Plot size:     )	10.	0		0.0%		
			= T	otal Cover		
2				0.0%		
3			$\Box$			I —
4.			П			
Definition of Vegetation Strata:   Four Vegetation Strata:   Four Vegetation Strata:   Four Vegetation Strata:   Four Vegetation Strata:   Tree stratum Consists of woody plants, excluding vines in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.   Tree stratum Consists of woody plants, excluding vines in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.   Tree stratum Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) ta   Herb stratum Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3. ft tall.   Woody vines Consists of all woody vines greater than 3.   Woody vines Consists of all woody vines greater than 3.   Tree Stratum Consists of all woody vines greater than 3.   Tree Stratum Consists of all woody vines greater than 3.   Tree Stratum Consists of woody plants, excluding woody vines Consists of all woody vines Greater than 3.   Tree Stratum Consists of woody plants, excluding woody vines Consists of all woody vines Greater than 3.   Tree Stratum Consists of woody plants, excluding woody vines Greater theight (DBH).   Sapling stratum Consists of woody plants, excluding woody vines greater than 3.   Tree Stratum Consists of woody plants, excluding woody vines greater than 3.   Tree Stratum Consists of woody plants, excluding woody vines greater than 3.   Tree Stratum Consists of woody plants, excluding woody vines greater than 3.   Tree Stratum Consists of woody plants, excluding woody vines greater than 3.   Tree Stratum Consists of woody plants, excluding woody vines greater than 3.   Tree Stratum Consists of all woody vines, less than approximate young the stratum Consists of all woody vines, regardless of size, and the stratum Consists of all woody vines, regardless of size, and the stratum Consists of all woody vines, regardless of height.   Tree Stratum Consists of all woody vines woody species, except woody vines, regardless of size, and the stratum Consist			Н			
Company   Com			Н			Definition of Vegetation Strata:
Tree stratum Consists of woody plants, excluding vines in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.  1. Saururus cernuus  onsists of all herbaceous (non-woody) plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height and 3 in. (7.6 cm) DBH.  1. Saurus cernuus consists of all herbaceous (non-woody) plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height and 2 in. (7.6 cm) DBH.  1. Saurus cernuus ce			Н			_
Herb Stratum						
Sapting/shrub stratum	7		Ш			in. (7.6 cm) or more in diameter at breast height (DBH),
1. Saururus cernuus 2.	Herb Stratum (Plot size: 15 )					-
3.	1 Saururus cernuus	50	✓	100.0%	OBL	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
3.	2			0.0%		Horb stratum - Consists of all borbassous (non woody)
4				0.0%		plants, regardless of size, and all other plants less than 3.28
5.				0.0%		14 44
7.	5			0.0%		
7	6			0.0%		Five Vegetation Strata:
8.	7	0		0.0%		
9.				0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
10		0		0.0%		1
11.	10.	0		0.0%		
12.				0.0%		
Moody Vine Stratum   (Plot size:)   50	12			0.0%		Shrub stratum – Consists of woody plants, excluding woody
1.			= T	otal Cover		, , ,
2.				0.00%		plants, including herbaceous vines, regardless of size, and
3.			Н			woody species, except woody vines, less than approximately
4	•					
4.						
6. Hydrophytic Vegetation Vegetation Ves						ļ
6	5			0.0%		Hydrophytic
0 = Total Cover   Present? 165 C NO C	6		Ш	0.0%		Vegetation
		0	= T	otal Cover		Present? 165 C NO C
Remarks: (Include photo numbers here or on a separate sheet.)	Remarks: (Include photo numbers here or on a separate	e sheet.)				

Soil Sampling Point: 15-2 wet

Profile Descr	iption: (Describe to the	e depth need	led to documen	t the indic	ator or co	nfirm the	absence of indicators.)		
Depth	Matrix			lox Featu					
(inches)	Color (moist)	%	Color (moist)	%	Type 1	Loc <sup>2</sup>	Texture	Rem	arks
0-2	10YR 2/1						Silt Loam		
2-12	N 4/						Silt Loam	gley indic	ates prolonged
							-		
						-			
				-			-		
<sup>1</sup> Type: C=Cond	centration, D=Depletion, I	RM=Reduced	Matrix, CS=Cover	ed or Coate	ed Sand Gra	ains <sup>2</sup> Loc	ation: PL=Pore Lining. M=	Matrix	
Hydric Soil I			Hadrix, CS-COVCI	ca or coate	a Sana Gr	JIII3 LOC			3
Histosol (A		Γ	Dark Surface (	S7)			Indicators for Probl	-	c Soils':
·	pedon (A2)		Polyvalue Belov	,	S8) (MI DA	147 148)	2 cm Muck (A10)	(MLRA 147)	
Black Hist			Thin Dark Surfa				Coast Prairie Redo	x (A16)	
	Sulfide (A4)		Loamy Gleyed		LNA 177, 1	<del>1</del> 0)	(MLRA 147,148)		
	Layers (A5)		Depleted Matri				Piedmont Floodpla (MLRA 136, 147)	ain Soils (F19)	
	k (A10) (LRR N)		Redox Dark Su	` '			_ ` ' '	C ( TE12	
		. [	Depleted Dark		7)		☐ Very Shallow Dark	-	2)
	Below Dark Surface (A11)	)	Redox Depress		)		Other (Explain in	Remarks)	
	k Surface (A12)		Iron-Manganes		=12\ /I DD 1	J			
□□ Sandy Mu MLRA 147	ick Mineral (S1) (LRR N, 7, 148)		MLRA 136)	e masses (i	12) (LIKK I	٧,			
	eyed Matrix (S4)		Umbric Surface	e (F13) (ML	RA 136, 12	2)			
Sandy Red			Piedmont Floor				<sup>3</sup> Indicators of	hydrophytic ve	getation and
	Matrix (S6)		Red Parent Ma					drology must b sturbed or pro	
				teriai (i 21)	(11210112	,, 117,	unicos un	starbea or pro-	olematic:
Restrictive La	ayer (if observed):								
Туре:									
Depth (incl	hes):						Hydric Soil Present?	Yes 💿	No O
Remarks:									



Photo File: IM	IG_3400.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°30'37.29"W	Lat/Northing: 38°43'38.498"N
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

Section, Township, Range: S T R   R	westigator(s): Matt Neely   Section, Township, Range: S   T   R	westigator(s): Matt Neely   Section, Township, Range: S   T   R	nudform (hillslope, terrace, etc.):	al Airport							
drorm (hillslope, terrace, etc.): Hillside   Local relief (concave, convex, none): Convex   Slope: 7,0% / 4,0   pregion (LRR or MLRA): MLRA 148 in LRR S   Lat.: 38°43'42.946"N   Long.: 77°30'41.291"W   Datum: NAD 83   Map Unit Name: Panorama silt loam   NWI classification:   climatic/hydrologic conditions on the site typical for this time of year? Yes  No  Are "Normal Circumstances" present? Yes  No  No  No  Normal Circumstances" present? Yes  No  No  Normal Circumstances" present? Yes  No  No  Normal Circumstances   converted to the state of year? Yes  No  No  Normal Circumstances   converted to the state of year? Yes  No  No  Normal Circumstances   converted to the state of year? Yes  No  Normal Circumstances   converted to the state of year? Yes  No  Normal Circumstances   converted to the state of year? Yes  Normal Circumstances   converted to the state of year? Yes  Normal Circumstances   converted to the state of year? Yes  Normal Circumstances   converted to the year   converted to the state of year? Yes  Normal Circumstances   converted to the year   converted	ndform (hillslope, terrace, etc.): Hillside	ndform (hillslope, terrace, etc.): Hillside	ndform (hillslope, terrace, etc.):					State: VA		Sampling Po	int: 16-1 up
region (LRR or MLRA): MLRA 148 in LRR S	Map Unit Name:   Panorama silt loam   Null Ra 148 in LRR   Lat:   38°43'42.946"N   Long:   77°30'41.291"W   Datum:   NAD 83   Map Unit Name:   Panorama silt loam   NWI classification:   Climatic/hydrologic conditions on the site typical for this time of year?   Yes   No   (If no, explain in Remarks.)   Vegetation   , soil   , or Hydrology   significantly disturbed?   Are "Normal Circumstances" present?   Yes   No   O	Map Unit Name   Panorama silt loam				Sec	ction, Townsh	ip, Range: S	;	т	R
Map Unit Name: Panorama silt loam	Map Unit Name: Panorama silt loam	Map Unit Name: Panorama silt loam	region (LRR or MLRA): MIRA	Hillside		Loca	l relief (conca	ve, convex, i	none):	convex	Slope: 7.0% /
Map Unit Name: Panorama silt loam	Map Unit Name: Panorama silt loam	Map Unit Name: Panorama silt loam		148 in LRR	 S	 Lat.: 38°4	13'42.946"N	Lor	1 <b>a.:</b> 77	7°30'41.291"W	Datum: NAD 8
climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation	climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation  , Soil  , or Hydrology  significantly disturbed?  Are "Normal Circumstances" present?  Yes  No    Vegetation  , Soil  , or Hydrology	Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   Vegetation	Map Unit Name: Panorama sil	loam							 1:
Vegetation	Vegetation	Vegetation	climatic/hydrologic conditions o	n the site ty	nical for th	is time of year?	Yes   No.	O (If no	evnlai	n in Remarks \	
Vegetation	Vegetation	Vegetation								•	Yes ⊙ No ○
Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc prophytic Vegetation Present? Yes \ No \ \circ \ No \ \	Immary of Findings - Attach site map showing sampling point locations, transects, important features, or property Veg to No   Is the Sampled Area within a Wetland?  Ves  No   Is the Sa	Immary of Findings - Attach site map showing sampling point locations, transects, important features, proposition of the property of the position (B2) and proposits (B3)		•		-				•	•••
Is the Sampled Area within a Wetland?   Yes   No    No    Is the Sampled Area within a Wetland?   Yes   No    No    Is the Sampled Area within a Wetland?   Yes   No    No    Is the Sampled Area within a Wetland?   Yes   No    No    Is the Sampled Area within a Wetland?   Yes   No    No    Is the Sampled Area within a Wetland?   Yes   No    Is the Sampled Area within a Wetland Present?   Yes   No    Is the Sampled Area within a Wetland?   Yes   No    Is the Sampled Area within a Wetland?   Yes   No    Is the Sampled Area within a Wetland?   Yes   No    Is the Sampled Area within a Wetland?   Yes   No    Is the Sampled Area within a Wetland?   Yes   No    Is the Sampled Area within a Wetland Present?   Yes   No    Is the Sampled Area within a Wetland?   Yes   No    Is the Sampled Area within a Wetland?   Yes   No    Is the Sampled Area within a Wetland?   Yes   No    Is the Sampled Area within a Wetland?   Yes   No    Is the Sampled Area wi	Is the Sampled Area within a Wetland?  Ves No vertice Soil Present? Yes No vertice Soil Present?  Ves No vertice Soil Present? Yes No vertice Soil Soil Present? Yes No vertice Soil Present?	Addrophytic Vegetation Present? Yes No    Is the Sampled Area within a Wetland? Yes No    Is the Sample Area within a Wetland? Yes No    Is the Sample Area within a Wetland? Yes No    Is the Sample Area within a Wetland? Yes No    Is the Sample Area within a Wetland? Yes No    Is the Sample Area within a Wetland? Yes No    Is the Sample Area within a Wetland? Yes No    Is the Sample Area within a Wetland? Yes N	Vegetation, Soil	, or Hydrol	ogy 🗀	naturally proble	ematic?	(If needed,	explair	any answers in	Remarks.)
Is the Sampled Area within a Wetland?  Ves No No No No No Wetland Hydrology Present?  No Ves No	Is the Sampled Area within a Wetland?  Ves No   No   No   No   No   No   No   No	Is the Sampled Area within a Wetland?   Yes   No    No	ımmary of Findings - A	ttach site	e map sł	nowing sam	pling poin	t locatio	ns, tr	ansects, imp	portant features,
within a Wetland?  Yes No   wetland Hydrology Present?  Yes No   wetlan	etland Hydrology Present? Yes No  within a Wetland? Yes No  vithin a Wetland Hydrology Present? Yes No  vithin a Wetland? Yes No  vithin a Wetland Hydrology Present? Yes No  vithin a Wetland?	within a Wetland?  Yes No within a Wetland?	drophytic Vegetation Present?	Yes O	No 💿						
Indicators   Primary Indicators   Secondary	Vers   No   Within a Wetland?   Tes   No   Within a Wetland?   Tes   No   Within a Wetland?   Tes   No   Wetland Hydrology	Vetland Hydrology Present?   Yes   No   Within a Wetland?   Yes   No   Depth (inches):   Water Table Present?   Yes   No   Depth (inches):   Water Table Present?   Yes   No   Depth (inches):   Water Table Present?   Yes   No   Water Table Present?   Water Table Pr	dric Soil Present?	Yes 🔾	No 💿		Is the Sai	npled Area	V (	No 📵	
Netland Hydrology   Netland Hydrology Indicators:   Secondary Indicators (minimum of two required)	Netland Hydrology   Netland Hydrology Indicators:   Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Iron Deposits (B5)   Geomorphic Position (D2)   Mater-Stained Leaves (B9)   Microtopographic Relief (D4)   FAC-neutral Test (D5)   FAC-neutral Test (D5)   Saturation Present?   Yes   No  Depth (inches):   Wetland Hydrology Present?   Yes   No  Saturation Present?   Yes   No  Depth (inches):   Wetland Hydrology Present?   Yes   No  Saturation Present?   Yes   No  Depth (inches):   Wetland Hydrology Present?   Yes   No  Depth (inches):   Yes   Y	Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Iron Deposits (B5)   Geomorphic Position (D2)   Inundation Visible on Aerial Imagery (B7)   Shallow Aquitard (D3)   Mater-Stained Leaves (B9)   Microtopographic Relief (D4)   FAC-neutral Test (D5)   FAC-neutral Test (D5)   Mater Table Present?   Yes   No		Yes 🔾	No 💿				res	J NO S	
Secondary Indicators (minimum of two required)   Surface Soll Cracks (B6)	Vetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	Vetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Priff deposits (B3)  Thin Muck Surface (C7)  Iron Deposits (B3)  Iron Deposits (B4)  Water-Stained Leaves (B9)  Aquatic Plants (B1)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Secondary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Inondation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Refeld Observations:  Surface Water Present?  Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):	,			-					
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Trinh Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Water Marks (B1)  Presence of Reduced Iron (C4)  Drainage Patterns (B10)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drainage Patterns (B10)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Drother (Explain in Remarks)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Ves  No  Depth (inches):  Wetland Hydrology Present?  Ves  No  Depth (inches):  Wetland Hydrology Present?  Ves  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Water Table Present?  Yes No  Depth (inches):  Depth (inches):  Water Hydrology Bases 22  Ves No	lydrology								
Surface Water (A1)	Surface Water (A1)	Surface Water (A1)	Vetland Hydrology Indicators:						Seco	ndarv Indicators (n	ninimum of two required)
High Water Table (A2)	High Water Table (A2)	High Water Table (A2)  Saturation (A3)  Water Marks (B1)  Sediment Deposits (B2)  Drift deposits (B3)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Water Table (A2)  Hydrogen Sulfide Odor (C1)  Dry Season Water Table (C2)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes  No  Depth (inches):  Water Advance (C7)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Depth (inches):  Depth (inches):  Water Table Present?  Water Alake National Mudaelagu Present?  Water Present?  No  No  No  No  No  No  No  No  No  N	Primary Indicators (minimum of	one required	d; check all	that apply)				Surface Soil Cracks	(B6)
Saturation (A3)	Saturation (A3)	Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Sield Observations:  Factorial Test (D5)  Water Table Present?  Yes  No  Depth (inches):  Water Table Present?  Water Bresent?  Water B	_ ` `				,				
Water Marks (B1)	Water Marks (B1)	Water Marks (B1)	¬ • · · ·			-	. ,				
Sediment Deposits (B2)	Sediment Deposits (B2)	Sediment Deposits (B2)	¬ ` ´			•	-	oots (C3)		•	•
Drift deposits (B3)	Drift deposits (B3)	Drift deposits (B3)	_ ` ´				` ,	C6)			
Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	_ ' ' '				,	(6)			•
Iron Deposits (B5)	Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No   Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Saturation Present?	Iron Deposits (B5)  ☐ Inundation Visible on Aerial Imagery (B7)  ☐ Water-Stained Leaves (B9)  ☐ Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Depth (inches):  Water Table Present?	_ ` ` ` ′			` '	,				• , , ,
Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Persent?  Saturation Present?  Yes No Persent?	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Depth (inches):  Water Table Present?	Iron Deposits (B5)							Geomorphic Position	n (D2)
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Water Table Present?  Water Table Present?  Water Table Present?  Water Table Present?		gery (B7)							•
Field Observations:  Surface Water Present?  Yes No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Field Observations:  Surface Water Present?  Yes No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):	Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Water Hydrology Present?  Westland Hydrology Present?  Yes No Depth (inches):	_								` '
Furface Water Present?  Yes No Depth (inches):  Vater Table Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):  No Depth (inches):  Depth (inches):	Furface Water Present?  Yes No Depth (inches):  Vater Table Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):  Wetland Hydrology Present?	Vater Table Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Westland Hydrology Present?  Yes No Depth (inches):  Westland Hydrology Present?  Yes No Depth (inches):							F	-AC-neutral Test (D	5)
Water Table Present? Yes No Depth (inches):	Water Table Present? Yes No Depth (inches):	Water Table Present? Yes No Depth (inches):		O No ⊙	De	pth (inches):					
Saturation Present?  Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches):	Saturation Present?  Yes No Depth (inches):  Wetland Hydrology Present? Yes No Popth (inches):	Wetland Hydrology Procent2 VAS ( ) NO ( •)				· · · —					
includes capillary fringe)	includes capillary fringe)	Dalui dulli Fi CSCIIL:				-		Wetland Hy	drology	/ Present? Ye	es O No 💿
	Acceribo Docardad Data (etroam gaugo, monitoring wall, agrial photos, provious inspections), if availables	includes capillary frilinge)	includes capillary fringe)								

			ominant pecies?	Sampling Point: 16-1 up
Tree Stratum (Plot size: 30 )	Absolute % Cover	Re	el.Strat. Indicate	Dominance rese worksheeti
1 Carya tomentosa	40	<b>V</b>		Number of Dominant Species That are OBL, FACW, or FAC:  (A)
2 Acer rubrum	10		16.7% FAC	
3 Ouercus alba	10		16.7% FACU	Total Number of Dominant Species Across All Strata: 2 (B)
4			0.0%	= Species across all strate
5			0.0%	Percent of dominant Species
6			0.0%	That Are OBL, FACW, or FAC: 0.0% (A/B)
7	_		0.0%	Prevalence Index worksheet:
8			0.0%	Total % Cover of: Multiply by:
/Plot size: 45	60	= To	otal Cover	0BL species0 x 1 =0
Sapling-Sapling/Shrub Stratum (Plot size: 15	_/	<b>✓</b>	100.00/ FACIL	FACW species0 x 2 =0
1 Juniperus virginiana	5			FAC species 10 x 3 = 30
2			0.0%	FACU speciles $\frac{15}{}$ x 4 = $\frac{60}{}$
3			0.0%	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
4			0.0%	Column Totals: 65 (A) 290 (B)
5	_		0.0%	
6			0.0%	Prevalence Index = B/A = 4.462
7			0.0%	Hydrophytic Vegetation Indicators:
8	•		0.0%	Rapid Test for Hydrophytic Vegetation
9			0.0%	☐ Dominance Test is > 50%
10			0.0%	Prevalence Index is ≤3.0 <sup>1</sup>
<u>Shrub Stratum</u> (Plot size:)		= 10	otal Cover	☐ Morphological Adaptations ¹ (Provide supporting
1	0	Ц	0.0%	data in Remarks or on a separate sheet)
2		Ц	0.0%	Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
3			0.0%	Indicators of hydric soil and wetland hydrology must
4	0		0.0%	be present, unless disturbed or problematic.
5	0		0.0%	Definition of Vegetation Strata:
6	0		0.0%	Four Vegetation Strata:
7	0		0.0%	Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH),
Herb Stratum (Plot size:)	0	= To	otal Cover	regardless of height.
1,	0		0.0%	Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2.	_		0.0%	
3			0.0%	Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28
Δ	0		0.0%	ft tall.
5	0		0.0%	Woody vines – Consists of all woody vines greater than 3.28   ft in height.
6	0		0.0%	Five Vegetation Strata:
7			0.0%	
8			0.0%	Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9.	0		0.0%	diameter at breast height (DBH).
10	0		0.0%	Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
11			0.0%	less than 3 in. (7.6 cm) DBH.
12	0		0.0%	Shrub stratum – Consists of woody plants, excluding woody
Woody Vine Stratum (Plot size:)	0	= To	otal Cover	vines, approximately 3 to 20 ft (1 to 6 m) in height.  Herb stratum – Consists of all herbaceous (non-woody)
	0		0.0%	plants, including herbaceous vines, regardless of size, and
1				woody species, except woody vines, less than approximately
2			0.0%	3 ft (1 m) in height.
3	^			Woody vines – Consists of all woody vines, regardless of height.
4			0.0%	-
5			0.0%	Hydrophytic
6			0.0%	Vegetation Present? Yes ○ No ●
	0	= 1	otal Cover	FIESCHE:
Remarks: (Include photo numbers here or on a separate s	heet.)			

Soil Sampling Point: 16-1 up

Profile Descri	iption: (Describe	to the depth	needed to documen	t the indic	ator or co	nfirm the	absence of indicators.)		
Depth	Matri			lox Featur					
(inches)	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc2	Texture	Remarks	
0-5	2.5Y 4/3	100					Silt Loam		
5-13	2.5Y 6/4	100					Silt Loam		
				-					
1 Tymou C-Cone	contration D Donle	tion DM_Dad	used Matrix CC Cover	od or Coots	- Cand Cr	nina 21 aa	entions DI — Doro Lining M—N	Antuis	
		etion. KM=Kea	uced Matrix, CS=Cover	ed or Coate	a Sana Gr	ains ²Loc	cation: PL=Pore Lining. M=N		
Hydric Soil I							Indicators for Proble	matic Hydric Soils <sup>3</sup> :	
Histosol (A	•		☐ Dark Surface (	•			2 cm Muck (A10) (I	MLRA 147)	
	pedon (A2)		Polyvalue Belov				Coast Prairie Redox	(A16)	
Black Histi			☐ Thin Dark Surfa		LRA 147, 1	.48)	(MLRA 147,148)	,	
	Sulfide (A4)		Loamy Gleyed				Piedmont Floodplai	n Soils (F19)	
	Layers (A5)		Depleted Matrix				(MLRA 136, 147)		
	k (A10) (LRR N)		Redox Dark Su	. ,	_		☐ Very Shallow Dark		
	Below Dark Surface	(A11)	Depleted Dark		)		Other (Explain in R	emarks)	
Thick Dark	k Surface (A12)		Redox Depress	` '					
Sandy Mu MLRA 147	ck Mineral (S1) (LR ', 148)	R N,	Iron-Manganes MLRA 136)						
Sandy Gle	eyed Matrix (S4)		Umbric Surface	(F13) (ML	RA 136, 12	2)	2		
Sandy Red	dox (S5)		Piedmont Floor	lplain Soils	(F19) (MLF	RA 148)	<sup>3</sup> Indicators of h	ydrophytic vegetation and rology must be present,	
Stripped M	Matrix (S6)		Red Parent Ma	terial (F21)	(MLRA 12	7, 147)		turbed or problematic.	
Restrictive La	ayer (if observed)	):							
Type:		<i>-</i>							
Depth (inch							Hydric Soil Present?	Yes 🔾 No 💿	
	1103)1								
Remarks:									



Photo File: IN	IG_3402.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°30'41.291"	Lat/Northing: 38°43'42.946"N
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

Mail New   Manuscase Regional Airport   State   Mail New   Section, Township, Range: S T   R   Mail New   Section, Township, Range: S T   R   Mail New   Section, Township, Range: S T   R   Mail New   Mail Ne	oject/Site: Manassas Regional A	Airport	City/County:	Manassas	Sampling	g Date: 25-Oct-16
and form (hillslope, terrace, etc.): Hillside   Local relief (concave, convex, none): flat   Slope:   5,0%   / 2,0	plicant/Owner: Manassas Regio	onal Airport		State: VA	Sampling Point:	:17-2 up
region (LRR or MLRA): MLRA 148 in LRR S	estigator(s): Matt Neely		Section, Towns	hip, Range: S	т	R
Map Unit Name: Arcola slit loam	dform (hillslope, terrace, etc.)	: Hillside	Local relief (cond	cave, convex, none)	flat S	Slope: 5.0% / 2.9
Map Unit Name: Arcola Silt loam	region (LRR or MLRA): MLF	RA 148 in LRR S	 Lat.: 38°43'42.946"N	Long.: 7	77°30'41.291"W	Datum: NAD 83
climatic/hydrologic conditions on the site typical for this time of year? Yes ● No ○ (If no, explain in Remarks.)  Vegetation						
Vegetation	•		his time of year? Yes • N	O (If no eynl	-	
Vegetation					-	Yes   No
Immary of Findings - Attach site map showing sampling point locations, transects, important features, et vidrophytic Vegetation Present? Yes			significantly disturbed?		•	
Is the Sampled Area within a Wetland?   Yes	Vegetation, Soil	, or Hydrology	naturally problematic?	(If needed, expla	in any answers in Ren	narks.)
Is the Sampled Area within a Wetland?    Ves	ımmary of Findings	Attach site map s	howing sampling poi	nt locations, t	ransects, impo	rtant features, etc
within a Wetland?  Wetland Hydrology Present? Yes No   within a Wetland?  Wetland Hydrology Indicators:  Primary Indicators (minimum of two required)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Drintage Patterns (B10)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Drint deposits (B5)  In nundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Recent Present?  Yes No   Depth (inches):  Water Table Present?  Yes No  Depth (inches):  Wetland Hydrology Present?  Yes No  Depth (inches):	drophytic Vegetation Present	? Yes O No 💿				
within a Wetland?  Ves No version No version within a Wetland?  Version No ve	dric Soil Present?	Yes O No 💿	Is the S	ampled Area	O N - O	
Interpretation   Inte		Yes O No 💿			∪ No ♥	
Vetland Hydrology Indicators:    Secondary Indicators (minimum of two required)						
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Torayfish Burrows (C8)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Trough Aquatic Fauna (B13)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):	 lydrology					
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Trink Aquatice (C7)  Algal Mat or Crust (B4)  Trink Deposits (B5)  Unimidation Visible on Aerial Imagery (B7)  Mater-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Wetland Hydrology Present?  Wetland Hydrology Present?  Yes  No  Depth (inches):	Wetland Hydrology Indicators:			Sec	ondary Indicators (minir	mum of two required)
Surface Water (A1)	Primary Indicators (minimum o	of one required; check al	l that apply)			
Saturation (A3)	Surface Water (A1)	Tru	e Aquatic Plants (B14)			•
Water Marks (B1)	High Water Table (A2)	□ Нус	drogen Sulfide Odor (C1)		Drainage Patterns (B10	)
Sediment Deposits (B2)	Saturation (A3)	Oxi	dized Rhizospheres along Living F	Roots (C3)	` '	
Drift deposits (B3)	_ ` ` '	Pre	sence of Reduced Iron (C4)			e (C2)
Algal Mat or Crust (B4)	_ ' ' '			(C6)		
Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No   Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):	_ ` ` ` `		• •			• , , ,
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):		☐ Oth	er (Explain in Remarks)			• •
Water-Stained Leaves (B9) Aquatic Fauna (B13)  No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	_	nagery (B7)				2)
Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Water-Stained Leaves (B9)	- / . /			. ,	: (D4)
Surface Water Present? Yes No Depth (inches):	Aquatic Fauna (B13)				FAC-neutral Test (D5)	
Vater Table Present? Yes No Depth (inches):						
Saturation Present?  Yes No Depth (inches):  Wetland Hydrology Present? Yes No O	Surface Water Present? Ye		epth (inches):			
includes capillary fringe)  Yes No Depth (inches):	Water Table Present? Ye	s O No 💿 D	epth (inches):			O O
includes capillary fringe)	VA	s O No O D	epth (inches):	Wetland Hydrolog	gy Present? Yes	
Describe Recorded Bata (Stream gauge, monitoring well, derial photos, previous inspections), il available.	includes capillary fringe)			ections) if available	٠.	
	7000.00 11000.000 2000 (00.00.	gaage,eeg .re.	., ac p	concret, in available	-	
	cinario.					
Citation.						
Citatios.						
Citation.						
CHAINS.						
Remarks:						

		Dominant Species?			Sampling Point: <u>17-2 up</u>		
Tree Stratum (Plot size: 30 )	Absolute % Cover	Re	.Strat.	Indicator Status	Dominance Test worksheet:		
	40	<b>V</b>	61.5%	FACU	Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)		
Juniperus virginiana     Pinus virginiana		<b>V</b>	30.8%	UPL	That are obt, FACW, of FAC.		
3. Nyssa sylvatica		n.	7.7%	FAC	Total Number of Dominant		
4		$\Pi$	0.0%		Species Across All Strata:3(B)		
5		$\overline{\Box}$	0.0%		Percent of dominant Species		
6			0.0%		That Are OBL, FACW, or FAC: 33.3% (A/B)		
7			0.0%		Prevalence Index worksheet:		
8			0.0%		Total % Cover of: Multiply by:		
•	65	= To	tal Cove	r	0BL species 0 x 1 = 0		
Sapling-Sapling/Shrub Stratum (Plot size:					FACW species x 2 =		
1	0	Ц.	0.0%		FAC species 30 x 3 = 90		
2		Ц.	0.0%		FACU species 40 x 4 = 160		
3			0.0%	-	20 100		
4		Ц.	0.0%		1 · ·		
5		Ц.	0.0%		Column Totals: 90 (A) 350 (B)		
6		Ц.	0.0%		Prevalence Index = B/A = 3.889		
7		님-	0.0%		Hydrophytic Vegetation Indicators:		
8		Ц.	0.0%		Rapid Test for Hydrophytic Vegetation		
9		Ц.	0.0%		☐ Dominance Test is > 50%		
10		Ш_	0.0%		Prevalence Index is ≤3.0 ¹		
Shrub Stratum (Plot size:)		= To	tal Cove	r	Morphological Adaptations <sup>1</sup> (Provide supporting		
1	0		0.0%		data in Remarks or on a separate sheet)		
2			0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)		
3	0		0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must		
4	0		0.0%		be present, unless disturbed or problematic.		
5	0		0.0%		Definition of Vegetation Strata:		
6	0		0.0%		Four Vegetation Strata:		
7	0		0.0%		Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH),		
Herb Stratum (Plot size: 15 )	0	= To	tal Cove	r	regardless of height.		
1. Microstegium vimineum	25	<b>V</b>	100.0%	FAC	Sapling/shrub stratum - Consists of woody plants, excluding		
2.			0.0%		vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.		
3			0.0%		Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28		
4	0		0.0%		ft tall.		
5			0.0%		Woody vines – Consists of all woody vines greater than 3.28 ft in height.		
6	0		0.0%				
7.			0.0%		Five Vegetation Strata:		
8	0		0.0%		Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in		
9			0.0%		diameter at breast height (DBH).		
10			0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and		
11			0.0%		less than 3 in. (7.6 cm) DBH.		
12	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody		
Woody Vine Stratum (Plot size:)	25	= To	tal Cove	r	vines, approximately 3 to 20 ft (1 to 6 m) in height.  Herb stratum – Consists of all herbaceous (non-woody)		
1	0	П	0.0%		plants, including herbaceous vines, regardless of size, and		
			0.0%		woody species, except woody vines, less than approximately 3 ft (1 m) in height.		
2		7	0.0%		Woody vines – Consists of all woody vines, regardless of		
3			0.0%		height.		
4			0.0%				
5					Hydrophytic		
6			0.0%		Vegetation   Present?   Yes ○ No ●		
	0	- 10	ıaı cove		I and the second		

Soil Sampling Point: 17-2 up

Profile Descr	iption: (Describe to	the depth i	needed to documen	t the indic	cator or co	onfirm the	absence of indicators.)		
Depth	Matrix			lox Featu					
(inches)	Color (moist)		Color (moist)	%	Type 1	Loc2	Texture	Rem	arks
0-12	5YR 4/6	100					Clay Loam		
				-			-		
						-	,		
							-		
<sup>1</sup> Type: C=Cond	rentration D=Denletic	n RM=Redu	ced Matrix CS=Cover	ed or Coate	ed Sand Gr	ains 21 oc	ation: PL=Pore Lining. M=I	Matrix	
Hydric Soil I		on. Ki-i-kedu	ced Matrix, CS=Cover	ed of coats	a Sana Gi	airis Loc			2
Histosol (A			Dark Surface (	57)			Indicators for Proble	_	c Soils <sup>3</sup> :
`	pedon (A2)		Polyvalue Belov	•	CO) (MI DA	147 140)	2 cm Muck (A10) (	MLRA 147)	
Black Histi			Thin Dark Surfa				Coast Prairie Redox	x (A16)	
	Sulfide (A4)					.40)	(MLRA 147,148)		
	Layers (A5)		Loamy Gleyed				Piedmont Floodpla	in Soils (F19)	
	k (A10) (LRR N)		Depleted Matri:  Redox Dark Su				(MLRA 136, 147)	o ( (TE4)	.,
			Depleted Dark	` ,	7)		☐ Very Shallow Dark		2)
	Below Dark Surface (A	A11)	Redox Depress		′)		Other (Explain in F	Remarks)	
	k Surface (A12)		☐ Iron-Manganes		F12\ (I RR I	N			
MLRA 147	ck Mineral (S1) (LRR i , 148)	N,	MLRA 136)	c masses (	1 12) (LICI	ν,			
☐ Sandy Gle	yed Matrix (S4)		Umbric Surface	e (F13) (ML	.RA 136, 12	.2)	2		
Sandy Red	dox (S5)		☐ Piedmont Floor	dplain Soils	(F19) (MLI	RA 148)	<sup>3</sup> Indicators of I	nydrophytic ve rology must b	getation and
Stripped N	latrix (S6)		Red Parent Ma	terial (F21)	(MLRA 12	7, 147)		turbed or prol	
Postrictive I	ayer (if observed):								
Type:	ayer (ii observeu).								
Depth (incl							Hydric Soil Present?	Yes 🔾	No 💿
	165)								
Remarks:									



Photo File: IN	IG_3403.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting:	77°30'41.291"	Lat/Northing: 38°43'42.946"N
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

ibregion (LRR or MLRA): MLRA 148  ill Map Unit Name: Hatboro silt loam  re climatic/hydrologic conditions on the re Vegetation , Soil , or re Vegetation , Soil , or  summary of Findings - Attace  Hydrophytic Vegetation Present? Ye  Hydric Soil Present?	Illside in LRR S Lat e site typical for this time o r Hydrology significa r Hydrology naturall ch site map showing es No	f year? Yes No (If no antly disturbed? Are "Norma y problematic? (If needed,	S T R	/
Indform (hillslope, terrace, etc.): Hill bregion (LRR or MLRA): MLRA 148 If Map Unit Name: Hatboro silt loam e climatic/hydrologic conditions on the e Vegetation , Soil , or e Vegetation , Soil , or ummary of Findings - Attacydrophytic Vegetation Present?	e site typical for this time or Hydrology anaturall ch site map showing so No	Local relief (concave, convex,  t.: 38°43'51.898"N Lo  f year? Yes No (If no antly disturbed? Are "Norma y problematic? (If needed,	none): flat  Slope: 0.0%  NWI classification:  o, explain in Remarks.)  al Circumstances" present?  Yes  No  No  No  No  No  No  No  No  No  N	AD 83
region (LRR or MLRA): MLRA 148  Map Unit Name: Hatboro silt loam  climatic/hydrologic conditions on the  Vegetation , Soil , on  Vegetation , Soil , on  Immary of Findings - Attact  drophytic Vegetation Present? Year  ydric Soil Present?	e site typical for this time or Hydrology anaturall ch site map showing so No	t.: 38°43'51.898"N Lo  f year? Yes No (If no ently disturbed? Are "Norma y problematic? (If needed,	ong.: 77°30'47.144"W  NWI classification:  o, explain in Remarks.)  al Circumstances" present?  Yes  No , explain any answers in Remarks.)	AD 83
Map Unit Name: Hatboro silt loam  climatic/hydrologic conditions on the  Vegetation , Soil , on  Vegetation , Soil , on  mmary of Findings - Attace  drophytic Vegetation Present? Year  dric Soil Present?	e site typical for this time or Hydrology Significar Hydrology naturall ch site map showing so No	f year? Yes No (If no nntly disturbed? Are "Normay problematic? (If needed,	NWI classification:  o, explain in Remarks.)  al Circumstances" present? Yes No , explain any answers in Remarks.)	0
Map Unit Name: Hatboro silt loam  climatic/hydrologic conditions on the  Vegetation , Soil , or  Vegetation , Soil , or  mmary of Findings - Attace  drophytic Vegetation Present? Ye  dric Soil Present?	e site typical for this time or Hydrology Significar Hydrology naturall ch site map showing so No	f year? Yes No (If no nntly disturbed? Are "Normay problematic? (If needed,	NWI classification:  o, explain in Remarks.)  al Circumstances" present? Yes No , explain any answers in Remarks.)	0
climatic/hydrologic conditions on the Vegetation , Soil , on Vegetation , Soil , on Immary of Findings - Attace Idrophytic Vegetation Present? Yes	r Hydrology    significar r Hydrology    naturall ch site map showing es    No    o	antly disturbed? Are "Norma y problematic? (If needed,	o, explain in Remarks.)  al Circumstances" present? Yes   No , explain any answers in Remarks.)	
Vegetation , Soil , on Vegetation , Soil , on Vegetation , Soil , on Immary of Findings - Attacked Att	r Hydrology    significar r Hydrology    naturall ch site map showing es    No    o	antly disturbed? Are "Norma y problematic? (If needed,	al Circumstances" present? Yes No , explain any answers in Remarks.)	
Vegetation , Soil , on , on , soil , on , o	r Hydrology	y problematic? (If needed,	, explain any answers in Remarks.)	
ummary of Findings - Attac ydrophytic Vegetation Present? Ye ydric Soil Present? Ye	ch site map showing			
ydrophytic Vegetation Present? Ye ydric Soil Present? Ye	es O No 💿	g sampling point locatio	ons, transects, important feature	
ydric Soil Present?				es, etc
rdric Soil Present?	O O			
V	es 🔾 No 🖲	Is the Sampled Area		
etialia nyurology Presentr	es O No 💿	within a Wetland?	Yes ○ No •	
lemarks:				
lydrology				
Vetland Hydrology Indicators:				
Primary Indicators (minimum of one	required: check all that ann	ulv)	Secondary Indicators (minimum of two required	<u>d)</u>
Surface Water (A1)	True Aquatic I		☐ Surface Soil Cracks (B6) ☐ Sparsely Vegetated Concave Surface (B8)	
☐ High Water Table (A2)	Hydrogen Sulf	` '	Drainage Patterns (B10)	
Saturation (A3)		ospheres along Living Roots (C3)	Moss Trim Lines (B16)	
Water Marks (B1)	Presence of R	educed Iron (C4)	Dry Season Water Table (C2)	
Sediment Deposits (B2)	Recent Iron R	eduction in Tilled Soils (C6)	Crayfish Burrows (C8)	
Drift deposits (B3)	☐ Thin Muck Sui	• ,	Saturation Visible on Aerial Imagery (C9)	
Algal Mat or Crust (B4) Iron Deposits (B5)	U Other (Explain	n in Remarks)	☐ Stunted or Stressed Plants (D1) ☐ Geomorphic Position (D2)	
Inundation Visible on Aerial Imagery (	(B7)		Shallow Aquitard (D3)	
Water-Stained Leaves (B9)			Microtopographic Relief (D4)	
Aquatic Fauna (B13)			FAC-neutral Test (D5)	
Field Observations:	(2)			
Surface Water Present? Yes	No Depth (inche	es):		
Water Table Present? Yes	No   Depth (inche	es):	vidralasis Brasanta Ves No 🔍	
VAC	No   Depth (inche	es):	ydrology Present? Tes O NO O	
	ge, monitoring well, aerial p	hotos, previous inspections), if av	vailable:	
	No Depth (inche	Wetland Hy	,	No •

	Dominant Species?			Sampling Point: 18-1 up		
	Absolute	Re	el.Strat.	Indicator	Dominance Test worksheet:	
Tree Stratum (Plot size: 30 )	% Cover		over	Status	Number of Dominant Species	
1_ Juglans nigra	10	<b>✓</b>	50.0%	FACU	That are OBL, FACW, or FAC:1(A)	
2 Ailanthus altissima	10	<b>V</b>	50.0%	FACU	Total Number of Dominant	
3	0		0.0%		Species Across All Strata:6(B)	
4	0		0.0%			
5	0		0.0%		Percent of dominant Species That Are OBL FACW or FAC: 16.7% (A/B)	
6	0		0.0%		That Are OBL, FACW, or FAC: 16.7% (A/B)	
7	0		0.0%		Prevalence Index worksheet:	
8	0		0.0%		Total % Cover of: Multiply by:	
Sanling-Sanling/Shrub Stratum (Plot size: 15	20:	= T	otal Cove	r	0BL species0 x 1 =0	
			<b>50.00</b> /	E4.011	FACW species 0 x 2 = 0	
1 Juglans nigra		<b>✓</b>	50.0%	FACU	FAC species	
2. Quercus velutina		<b>✓</b>	50.0%	UPL	FACU species $35 \times 4 = 140$	
3			0.0%		10 50	
4			0.0%		or species X 5 -	
5			0.0%		Column Totals: 120 (A) 415 (B)	
6			0.0%		Prevalence Index = $B/A = \underline{3.458}$	
7		Ц	0.0%		Hydrophytic Vegetation Indicators:	
8	0	Ш	0.0%		Rapid Test for Hydrophytic Vegetation	
9	0		0.0%		Dominance Test is > 50%	
0	0		0.0%		Prevalence Index is ≤3.0 ¹	
Shrub Stratum (Plot size:)		= T	otal Cove	r	Morphological Adaptations <sup>1</sup> (Provide supporting	
1	0		0.0%		data in Remarks or on a separate sheet)	
2.	0		0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)	
3			0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must	
4	_	$\overline{\Box}$	0.0%		be present, unless disturbed or problematic.	
5.		$\Box$	0.0%		Definition of Vegetation Strata:	
		П	0.0%		Four Vegetation Strata:	
6	0	$\Box$	0.0%		Tree stratum – Consists of woody plants, excluding vines, 3	
7		 _ T/	otal Cove		<ul> <li>in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.</li> </ul>	
Herb Stratum (Plot size: 15 )					Sapling/shrub stratum – Consists of woody plants, excluding	
1. Microstegium vimineum		$\checkmark$	100.0%	FAC	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.	
2			0.0%		Herb stratum – Consists of all herbaceous (non-woody)	
3		$\sqcup$	0.0%		plants, regardless of size, and all other plants less than 3.28	
4			0.0%		ft tall.   Woody vines – Consists of all woody vines greater than 3.28	
5	0		0.0%		ft in height.	
6	0		0.0%		Five Vegetation Strata:	
7	0	$\sqcup$	0.0%		Tree - Woody plants, excluding woody vines, approximately	
8	0		0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in	
9	0		0.0%		diameter at breast height (DBH).	
0	0		0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and	
1	0		0.0%		less than 3 in. (7.6 cm) DBH.	
2	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.	
Woody Vine Stratum (Plot size: 15 )	75:	= To	otal Cove	r	Herb stratum – Consists of all herbaceous (non-woody)	
1 Lonicera japonica	5	<b>v</b>	100.0%	FACU	plants, including herbaceous vines, regardless of size, and	
	0	$\overline{\Box}$	0.0%	77.00	woody species, except woody vines, less than approximately 3 ft (1 m) in height.	
2			0.0%		` '	
3			-		Woody vines – Consists of all woody vines, regardless of height.	
4			0.0%			
5			0.0%		Hydrophytic	
	0	Ш	0.0%		Vegetation Present? Yes ○ No ●	
6	5		otal Cove		Present? Yes UNO U	

Soil Sampling Point: 18-1 up

Profile Description: (Describe to the de	epth needed to documer	t the indicator or o	onfirm the	absence of indicators.)	•
Depth <u>Matrix</u>		dox Features			
(inches) Color (moist) %	Color (moist)		Loc2	Texture	Remarks
0-12 10YR 4/6				Clay Loam	
				-	
				P	
		-			
				-	
				-	
				-	
<sup>1</sup> Type: C=Concentration. D=Depletion. RM=	=Reduced Matrix CS=Cove	red or Coated Sand G	rains 21 oc	ation: PI =Pore Lining M=I	Matrix
	-Reduced Matrix, CS-Cove	rea or coatea sana c	rairis Loc		
Hydric Soil Indicators:	Dark Surface (	(C7)		Indicators for Proble	ematic Hydric Soils <sup>3</sup> :
Histosol (A1) Histic Epipedon (A2)		,57) w Surface (S8) (MLR.	\ 147 140\	2 cm Muck (A10) (	(MLRA 147)
Black Histic (A3)	_ ′	ace (S9) (MLRA 147,	, ,	Coast Prairie Redox	x (A16)
Hydrogen Sulfide (A4)			140)	(MLRA 147,148)	
Stratified Layers (A5)	Loamy Gleyed Depleted Matr			Piedmont Floodpla	in Soils (F19)
2 cm Muck (A10) (LRR N)	Redox Dark Su	` '		(MLRA 136, 147)	0.5 (7740)
	Depleted Dark	` '		☐ Very Shallow Dark	, ,
Depleted Below Dark Surface (A11)	Redox Depress			Other (Explain in F	Remarks)
Thick Dark Surface (A12)		se Masses (F12) (LRF	N		
Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)	MLRA 136)	SC 11033C3 (1 12) (LIV	IV,		
Sandy Gleyed Matrix (S4)	Umbric Surfac	e (F13) (MLRA 136, 1	22)		
Sandy Redox (S5)	☐ Piedmont Floo	dplain Soils (F19) (M	RA 148)	<sup>3</sup> Indicators of I	hydrophytic vegetation and
Stripped Matrix (S6)		aterial (F21) (MLRA 1			rology must be present, sturbed or problematic.
			. ,		
Restrictive Layer (if observed):					
Type:				Hydric Soil Present?	Yes ○ No •
Depth (inches):				nyuric son Present?	Yes ○ No ●
Remarks:					
soils in this area consist of heavily com	pacted coarse fill materi	als most likely due	to constru	ction fill for the sewer lin	e right of way.



Photo File: IN	IG_3405.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting:	77°30'47.144"	Lat/Northing: 38°43'51.898
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

Section, Township, Range: S T R   R	setigator(s): Matt Neely   Section, Township, Range: S   T   R      Idform (hillslope, terrace, etc.): Swale   Local relief (concave, convex, none):   Concave   Slope:   0,0%   / 0,0     Pregion (LRR or MLRA): MLRA 148 in LRR S   Lat.: 38°43′51.898″N   Long: 7°30′47.144″W   Datum: NAD 83     IMap Unit Name: Hatboro silt loam   WNI classification:   NAM     Idea   MLRA 148 in LRR S   Lat.: 38°43′51.898″N   Long: 7°30′47.144″W   Datum: NAD 83     IMap Unit Name: Hatboro silt loam   WNI classification:   NAM     Idea   MLRA 148 in LRR S   Lat.: 38°43′51.898″N   Long: 7°30′47.144″W   Datum: NAD 83     IMap Unit Name: Hatboro silt loam   WNI classification:   NAM     Idea   MLRA 148 in LRR S   Lat.: 38°43′51.898″N   Long: 7°30′47.144″W   Datum: NAD 83     IMap Unit Name: Hatboro silt loam   WNI classification:   NAM     Idea   MIRA 148 in LRR S   Lat.: 38°43′51.898″N   Long: 7°30′47.144″W   Datum: NAD 83     IMap Unit Name: Hatboro silt loam   WNI classification:   NAM     Idea   MIRA 148 in LRR S   Lat.: 38°43′51.898″N   Long: 7°30′47.144″W   Datum: NAD 83     Imap Unit Name: Hatboro silt loam   NAM     Idea   MIRA 148 in LRR S   Lat.: 38°43′51.898″N   Long: 7°30′47.144″W   Datum: NAD 83     Imap Unit Name: Hatboro silt loam   WNI classification:   NAM     Idea   MNI classification:   NAM   NAM   NAM     Idea   MNI classification:   NAM	Manassas Regional Air	irport	City/County: Manassas	Sampling Da	ite: 26-Oct-16
dform (hillslope, terrace, etc.): Swale	ddorm (hilislope, terrace, etc.): Swale   Local relief (concave, convex, none): concave   Slope:	plicant/Owner: Manassas Region	nal Airport	State: VA	Sampling Point:	18-2 wet
region (LRR or MLRA): MLRA 148 in LRR S	region (LRR or MLRA): MLRA 148 in LRR S	estigator(s): Matt Neely		Section, Township, Range: 9	s т	R
Map Unit Name: Hatboro silt loam	Map Unit Name: Hatboro silt loam	dform (hillslope, terrace, etc.):	Swale	Local relief (concave, convex,	none): concave Slope	e:0.0%//
Map Unit Name:   Hatboro silt loam	Map Unit Name:   Hatboro silt   loam	region (LRR or MLRA): MLR/	A 148 in LRR S Lat	.: 38°43'51.898"N <b>Lo</b>	ong.: 77°30'47.144"W	Datum: NAD 83
Colimatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)   Vegetation   , Soil   , or Hydrology   significantly disturbed?	Colimatic/hydrologic conditions on the site typical for this time of year? Yes  No  If no, explain in Remarks.)   Vegetation	-		50 15 51 155 11	-	
Vegetation	Vegetation			Lucara Ves  No (If no		
Vegetation	Vegetation					/ec   No
Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc drophytic Vegetation Present? Yes No Is the Sampled Area within a Wetland? Yes No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No	Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc.  Indication of Present? Yes  No  Is the Sampled Area within a Wetland?  Ves  No  Is the Sampled Area within a Wetland?  Ves  No  Is the Sampled Area within a Wetland?  Ves  No  No  Is the Sampled Area within a Wetland?  Ves  No  No  Is the Sampled Area within a Wetland?  Ves  No  No  Is the Sampled Area within a Wetland?  Ves  No  No  No  Is the Sampled Area within a Wetland?  Ves  No  No  No  Is the Sampled Area within a Wetland?  Ves  No  No  No  Is the Sampled Area within a Wetland?  Ves  No  No  No  Is the Sampled Area within a Wetland?  Ves  No  No  No  Is the Sampled Area within a Wetland?  Ves  No  No  No  No  No  No  No  No  No  N	vegetation, Soil	, or Hydrology   significal	ntiy disturbed? Are "Norma	al Circumstances" present?	es 🔾 110 🔾
Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   No   No   No   No   No   N	Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Wetland Hydrology Present?   Yes   No   No   Wetland Hydrology Indicators:   Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Surface Water (A1)   Presence of Reduced Iron (C4)   Dry Season Water Table (B16)   Water Marks (B1)   Presence of Reduced Iron (C4)   Dry Season Water Table (C2)   Sufface Water (B8)   High Water Table (B8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Inundation Visible on Aerial Imagery (B7)   Water-Stained Leaves (B9)   Microtopographic Relief (D4)   Repair (D4)   Shallow Aquitater (D3)   Microtopographic Relief (D4)   Repair (	Vegetation, Soil	, or Hydrology 🔲 naturally	problematic? (If needed,	, explain any answers in Remark	(s.)
Advaprophytic Vegetation Present? Yes No No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No No No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No	Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Wetland Hydrology Present?   Yes   No   No   Wetland Hydrology Indicators:   Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Surface Water (A1)   Presence of Reduced Iron (C4)   Dry Season Water Table (A2)   Water Marks (B1)   Presence of Reduced Iron (C4)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Sturation Visible on Aerial Imagery (C7)   Saturation Visible on Aerial Imagery (B7)   Water-Stained Leaves (B9)   Microtopographic Relief (D4)   Repair (D4)   Shallow Aquitard (D3)   Microtopographic Relief (D4)   Repair (D	ımmarv of Findings - A	Attach site map showing	sampling point location	ons, transects, importa	nt features, etc
Is the Sampled Area within a Wetland?  Ves No	Is the Sampled Area within a Wetland?  Ves No No within a Wetland?  Ves No					
within a Wetland?  Yes No within a Wetland?  Yes No within a Wetland?  Wetland Hydrology Present?  Wetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Soil Cracks (B6)  Surface Soil Cracks (B6)  Surface Soil Cracks (B6)  Hydrogen Sulfide Odor (C1)  Drainage Patterns (B10)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Dry Season Water Table (C2)  Algal Mat or Crust (B4)  Other (Explain in Remarks)  Stunted or Stressed Plants (D1)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Fac-neutral Test (D5)  Saturation Present?  Yes No Depth (inches):  Z  Wetland Hydrology Present?  Yes No Depth (inches):  Includes capillary fringe)  Wetland Hydrology Present?  Yes No Depth (inches):  Depth (	within a Wetland?  Ves No Depth (inches):  Ves Vestland Hydrology Present?  Ves Ves No Depth (inches):  Vestland Hydrology Present?  Ves Vestland Hydrology Present?  Ves Vestland Hydrology Present?  Ves Vestland Hydrology Present?  Ves No Depth (inches):  Ves Vestland Hydrology Present?  Ves Vestland Hydrology Present?  Ves No Depth (inches):  Vestland Hydrol			T. II. G I. I. A		
Vertaind Hydrology   Vertaind Hydrology Indicators:   Secondary_Indicators (minimum of two required)   Primary Indicators (minimum of one required; check all that apply)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Vegetate More Marks (B1)   Presence of Reduced Iron (C4)   Dry Season Water Table (C2)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Iron Deposits (B5)   Microtopographic Relief (D4)   PrAC-neutral Test (D5)   Recent Present?   Yes No Depth (inches):   Zeptatern Present?   Yes No Depth (inches):   Depth (inc	Interest			uithin a Wetland?	Yes 🏵 No 🔾	
Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)	Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)	etland Hydrology Present?				
Wetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Water Marks (B1)  Presence of Reduced Iron (C4)  Drift deposits (B2)  Algal Mat or Crust (B4)  In obeposits (B5)  Water-Stained Leaves (B9)  Water-Stained Leaves (B9)  Water-Stained Leaves (B9)  Water-Stained Leaves (B9)  Water Present?  Yes  No  Depth (inches):  Surface Soil Cracks (B6)  Surface (B6)  Sparsely Vegetated Concave Surface (B8)  Driange Patterns (B10)  Moss Trim Lines (B16)  Drin Sparsely Negetated Concave Surface (B8)  Driange Patterns (B10)  Moss Trim Lines (B16)  Drin Sparsely Vegetated Concave Surface (B8)  Drint Quatier Rould Concave Surface (C3)  Moss Trim Lines (B16)  Driange Patterns (B10)  Moss Trim Lines (B16)  Drint Mock Surface (C3)  Shouts Table Present? Yes  No  Depth (inches):  Depth (inche	Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)					
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Drainage Patterns (B10)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Yes No  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  Hydrogen Sulfide Odor (C1)  Hydrogen Sulfide Odor (C1)  Water Table (A2)  Hydrogen Sulfide Odor (C1)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Teled Observations:  Surface Water Present?  Yes  No  Depth (inches):  Depth (inche	lydrology				
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  True Aquatic Plants (B14)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Water Aquatic Fauna (B13)  Pepth (inches):  Depth (inches):  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Sparsely Vegetated Concave Surface (B8)  Drift deposits (B10)  Moss Trim Lines (B16)  Drig Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  FAC-neutral Test (D5)  Wetland Hydrology Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  True Aquatic Plants (B14)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Teled Observations:  Field Observations:  Field Observations  Field Present?  Yes  No  Depth (inches):  Depth (i	Vetland Hydrology Indicators:			Secondary Indicators (minimum	of two required)
High Water Table (A2)	High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Presence of Reduced Iron (C4)  Presence of Redu	Primary Indicators (minimum of	f one required; check all that appl	y)	Surface Soil Cracks (B6)	
✓ Saturation (A3) ○ Oxidized Rhizospheres along Living Roots (C3) Moss Trim Lines (B16)   Water Marks (B1) ○ Presence of Reduced Iron (C4) ○ Dry Season Water Table (C2)   ✓ Sediment Deposits (B2) ○ Recent Iron Reduction in Tilled Soils (C6) ○ Crayfish Burrows (C8)   ○ Drift deposits (B3) ○ Thin Muck Surface (C7) ○ Saturation Visible on Aerial Imagery (C9)   ○ Algal Mat or Crust (B4) ○ Other (Explain in Remarks) ○ Stunted or Stressed Plants (D1)   ○ Iron Deposits (B5) ○ Geomorphic Position (D2)   ○ Inundation Visible on Aerial Imagery (B7) ○ Shallow Aquitard (D3)   ✓ Water-Stained Leaves (B9) ○ Microtopographic Relief (D4)   ○ Aquatic Fauna (B13) ✓ FAC-neutral Test (D5)    **Indeed Observations:  **urface Water Present?**  *Yes ○ No ○ Depth (inches):	✓ Saturation (A3) Oxidized Rhizospheres along Living Roots (C3) Moss Trim Lines (B16)   Water Marks (B1) Presence of Reduced Iron (C4) Dry Season Water Table (C2)   ✓ Sediment Deposits (B2) Recent Iron Reduction in Tilled Soils (C6) Crayfish Burrows (C8)   Drift deposits (B3) Thin Muck Surface (C7) Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4) Other (Explain in Remarks) Stunted or Stressed Plants (D1)   Iron Deposits (B5) Geomorphic Position (D2)   Inundation Visible on Aerial Imagery (B7) Shallow Aquitard (D3)   ✓ Water-Stained Leaves (B9) Microtopographic Relief (D4)   Aquatic Fauna (B13) FAC-neutral Test (D5)    **Indeed Company of the Company of t	Surface Water (A1)	True Aquatic P	lants (B14)		Surface (B8)
Water Marks (B1)	Water Marks (B1)	_ ` ′		• •		
Sediment Deposits (B2)	Sediment Deposits (B2)	¬ ` ´				_,
Drift deposits (B3)	Drift deposits (B3)	_ ' '		` '		<u>?</u> )
Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	$\neg$		, ,		Imagony (CO)
☐ Iron Deposits (B5) ☐ Shallow Aquitard (D3) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Water-Stained Leaves (B9) ☐ Depth (inches): ☐ Depth (inches): ☐ Depth (inches): ☐ Water Table Present? Yes No Depth (inches): ☐ Depth (inches): ☐ Wetland Hydrology Present? Yes No Depth (inches): ☐ O	Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Sield Observations:  Furface Water Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Solution (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Depth (inches):  Solution Present?  Yes No Depth (inches):  Solution Present?	_ ` ` ` `		• •		
Inundation Visible on Aerial Imagery (B7)  ✓ Water-Stained Leaves (B9)  Aquatic Fauna (B13)  ✓ FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches): 2  Water Table Present?  Yes No Depth (inches): 2  Staturation Present?  Yes No Depth (inches): 0  Wetland Hydrology Present?  Yes No Depth (inches): 0	Inundation Visible on Aerial Imagery (B7)  ✓ Water-Stained Leaves (B9)  Aquatic Fauna (B13)  ✓ FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches): 2  Water Table Present?  Staturation Present?  Yes No Depth (inches): 0  Wetland Hydrology Present?  Yes No Depth (inches): 0			iii Reilidiks)		,51)
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches): 2  Water Table Present?  Yes No Depth (inches): 2  Saturation Present?  Yes No Depth (inches): 0  Wetland Hydrology Present? Yes No Depth (inches): 0	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches): 2  Water Table Present?  Yes No Depth (inches):  Facturation Present?  Yes No Depth (inches):  Facturation Present?  Yes No Depth (inches):  Depth (inches):  FAC-neutral Test (D5)  Wetland Hydrology Present?  Yes No Depth (inches):	Inundation Visible on Aerial Ima	agery (B7)			
Field Observations:  Sourface Water Present? Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):  Solutration Present? Yes No Depth (inches):  Includes capillary fringe) Yes No Depth (inches):	Field Observations:  Surface Water Present? Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):  Saturation Present? Yes No Depth (inches):  Includes capillary fringe) Yes No Depth (inches):	✓ Water-Stained Leaves (B9)				•)
urface Water Present?  Yes No Depth (inches): 2  Vater Table Present?  Atturation Present?  Yes No Depth (inches):	urface Water Present?  Yes No Depth (inches): Vater Table Present?  Yes No Depth (inches): Depth (inches):  Beth (inches):  Yes No Depth (inches):  Depth (inches):  Wetland Hydrology Present? Yes No Depth (inches):  No Depth (inches):	Aquatic Fauna (B13)			FAC-neutral Test (D5)	
Vater Table Present? Yes No Depth (inches):	Vater Table Present? Yes No Depth (inches): includes capillary fringe)  Yes No Depth (inches): Depth (inches): Depth (inches):		<b></b>			
iaturation Present?  Yes No Depth (inches): 0  Wetland Hydrology Present? Yes No No Depth (inches): 0	iaturation Present?  Yes No Depth (inches): 0  Wetland Hydrology Present? Yes No		, ,	s):2		
includes capillary fringe)  Yes No Depth (inches): 0	includes capillary fringe)  Yes No Depth (inches): 0	Vater Table Present? Yes	, O No 🖭 Depth (inche	s):		No.
		VAC	● <b>No</b> Depth (inche	s):0 Wetland Hy	ydrology Present? Tes 🥯	NO C
		includes capillary milige)		notos, previous inspections), if a	vailable:	
emarks:						
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emarks:						
emarks:						

			ominant oecies? —		Sampling Point: <u>18-2 wet</u>
Tree Stratum (Plot size:)	Absolute % Cover	Re	el.Strat.	Indicator Status	Dominance Test worksheet:
1	0		0.0%		Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)
2			0.0%		
3			0.0%		Total Number of Dominant Species Across All Strata: 3 (B)
4			0.0%		Species Across Air Strata.
5.			0.0%		Percent of dominant Species
6		$\overline{\Box}$	0.0%		That Are OBL, FACW, or FAC: 100.0% (A/B)
7			0.0%		Prevalence Index worksheet:
8		$\overline{\Box}$	0.0%		Total % Cover of: Multiply by:
• •		 = To	otal Cover		0BL species 15 x 1 = 15
Sapling-Sapling/Shrub Stratum (Plot size: 15	)	_			FACW species $15 \times 2 = 30$
1 Salix nigra	15	<b>✓</b>	100.0%	OBL	
2			0.0%		
3			0.0%		FACU species $0 \times 4 = 0$
4	0		0.0%		UPL species $0 \times 5 = 0$
5	0		0.0%		Column Totals: <u>55</u> (A) <u>120</u> (B)
6	0		0.0%		Prevalence Index = $B/A = 2.182$
7	0		0.0%		Hydrophytic Vegetation Indicators:
8	0		0.0%		Rapid Test for Hydrophytic Vegetation
9	0		0.0%		✓ Dominance Test is > 50%
10	0		0.0%		✓ Prevalence Index is ≤3.0 ¹
		= To	otal Cover		
Shrub Stratum (Plot size:)	0		0.0%		Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
1		П	0.0%		Problematic Hydrophytic Vegetation 1 (Explain)
2		$\Box$	0.0%		
3		Н	0.0%		Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
4		$\vdash$			Definition of Vegetation Strata:
5		H	0.0%		Four Vegetation Strata:
6			0.0%		Tree stratum – Consists of woody plants, excluding vines, 3
7		Ш	0.0%		in. (7.6 cm) or more in diameter at breast height (DBH),
Herb Stratum (Plot size: 15 )	:	= To	otal Cover		regardless of height.
1. Microstegium vimineum	25	✓	62.5%	FAC	Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2. Boehmeria cylindrica	15	✓	37.5%	FACW	Herb stratum – Consists of all herbaceous (non-woody)
3			0.0%		plants, regardless of size, and all other plants less than 3.28
4	0		0.0%		ft tall.
5			0.0%		Woody vines – Consists of all woody vines greater than 3.28 ft in height.
6			0.0%		Five Vegetation Strata:
7	0		0.0%		_
8	0		0.0%		Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9	0		0.0%		diameter at breast height (DBH).
10			0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
11			0.0%		less than 3 in. (7.6 cm) DBH.
12			0.0%		Shrub stratum – Consists of woody plants, excluding woody
	40 :	= To	otal Cover		vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size:)	0	$\Box$	0.00/		Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and
1			0.0%		woody species, except woody vines, less than approximately
2		Н	0.0%		3 ft (1 m) in height.
3		Н	0.0%		Woody vines – Consists of all woody vines, regardless of height.
4			0.0%		
5			0.0%		Hydrophytic
6			0.0%		Vegetation Veg A No
	0	= T	otal Cover		Present? Yes S NO C
Remarks: (Include photo numbers here or on a separat	te sheet.)				

Soil Sampling Point: 18-2 wet

Profile Descri	iption: (Describe to	the depth r	eeded to documen	t the indic	cator or co	onfirm the	absence of indicators.)		
Depth	Matrix			lox Featu					
(inches)	Color (moist)		Color (moist)	%	Type 1	Loc2	Texture	Ren	narks
0-10	10YR 4/1	100					Silt Loam		
							-		
							-		
						-	,		
							-		
<sup>1</sup> Type: C=Cond	rentration D=Denletic	n RM=Redu	red Matrix CS=Cover	ed or Coate	ed Sand Gr	ains 21 oc	ation: PL=Pore Lining. M=I	Matrix	
Hydric Soil I		on. Ki-i-Kedu	ced Matrix, CS=Cover	ed of coats	a Sana Gi	airis Loc			2
Histosol (A			Dark Surface (	57)			Indicators for Proble	_	c Soils <sup>3</sup> :
`	pedon (A2)		Polyvalue Belov	•	CO) (MI DA	147 140)	2 cm Muck (A10) (	MLRA 147)	
Black Histi			Thin Dark Surfa				Coast Prairie Redox	x (A16)	
	Sulfide (A4)		Loamy Gleyed			.40)	(MLRA 147,148)		
	Layers (A5)		✓ Depleted Matri				Piedmont Floodpla	in Soils (F19)	
	k (A10) (LRR N)		Redox Dark Su				(MLRA 136, 147)	o ( (TE4	• •
		445	Depleted Dark		7)		☐ Very Shallow Dark		2)
	Below Dark Surface (A	(11)	Redox Depress		′)		Other (Explain in F	Remarks)	
	k Surface (A12)	.,	☐ Iron-Manganes		F12\ (I RR I	N			
MLRA 147	ck Mineral (S1) (LRR i , 148)	N,	MLRA 136)	C 11033C3 (	1 12) (LIKK	Ν,			
☐ Sandy Gle	yed Matrix (S4)		Umbric Surface	e (F13) (ML	.RA 136, 12	.2)	2		
☐ Sandy Red	dox (S5)		Piedmont Floor	dplain Soils	(F19) (MLI	RA 148)	<sup>3</sup> Indicators of I	nydrophytic ve rology must b	egetation and
Stripped M	latrix (S6)		Red Parent Ma	terial (F21)	(MLRA 12	7, 147)		turbed or pro	
Restrictive La	ayer (if observed):								
Type:									
Depth (inch							Hydric Soil Present?	Yes 💿	No O
	103)								
Remarks:									



Photo File: IN	IG_3404.JPG	Orientation:		-facing
Lat/Long or UTM :	Long/Easting	: 77°30'47.144"	Lat/Northing: 3	8°43'51.898
Description:				
	İ			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

Addrorm (hillslope, terrace, etc.): Terrace  Local relief (concave, convex, none): rolling  Slope: 2.0% / 1.1  Datum: NAD 83  Image (nimatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)  Vegetation , Soil , or Hydrology in aturally problematic? (If needed, explain any answers in Remarks.)  Image (nimatic/hydrologic conditions)  Vegetation , Soil , or Hydrology in aturally problematic? (If needed, explain any answers in Remarks.)  Image (nimatic/hydrologic conditions)  Vegetation , Soil , or Hydrology in aturally problematic? (If needed, explain any answers in Remarks.)  Image (nimatic/hydrologic conditions)  Vegetation , Soil , or Hydrology in aturally problematic? (If needed, explain any answers in Remarks.)  Image (nimatic/hydrologic conditions)  Vegetation , Soil , or Hydrology in aturally problematic? (If needed, explain any answers in Remarks.)  Image (nimatic/hydrologic conditions)  Vegetation , Soil , or Hydrology in aturally problematic? (If needed, explain any answers in Remarks.)  Image (nimatic/hydrologic conditions)  Image (nimatic/hydrologic conditions)  Vegetation , or Hydrology in aturally problematic? (If needed, explain any answers in Remarks.)  Image (nimatic/hydrologic conditions)  Image (nimatic/hydrologic conditions)  Vegetation , or Hydrology in aturally problematic? (If needed, explain any answers in Remarks.)  Image (nimatic/hydrologic conditions)  Image (nimatic/hydrologic conditions)  Vegetation , or Hydrology in aturally problematic? (If needed, explain any answers in Remarks.)  Image (nimatic/hydrologic conditions)  Image (nimatic/hydrologic conditions)  Vegetation	Manassas Regional Air	rport	City/County: Manassas	Sampling Dat	:e: 26-Oct-16
Local relief (concave, convex, none): rolling   Slope: 2,0% / 1,1   pregion (LRR or MLRA): MLRA 148 in LRR S	plicant/Owner: Manassas Region	nal Airport	State: VA	Sampling Point:	19-1 up
Map Unit Name:   Rowland silt loam	vestigator(s): Matt Neely		Section, Township, Range: 5	s т	R
Map Unit Name: Rowland silt loam	ndform (hillslope, terrace, etc.):	Terrace	Local relief (concave, convex,	none): rolling Slope	= 2.0% / 1.1 °
Map Unit Name:   Rowland slit loam	pregion (LRR or MLRA): MLRA	A 148 in LRR S	– ht.: 38°43'51.898"N <b>Lo</b>	ong.: 77°30'47.144"W	Datum: NAD 83
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)	-			-	
Vegetation   , Soil   , or Hydrology   significantly disturbed?   Are "Normal Circumstances" present?   Yes   No   No   No   No   No   No   No   N	•		of years. Vec ( No ( )		
Accordance   Acc					es • No
Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc prophytic Vegetation Present? Yes No was No wire Soll Present? Yes No was within a Wetland? Yes No was N		, or Hydrology Signific	antly disturbed? Are "Norma	al Circumstances" present?	3 C 140 C
Addrophytic Vegetation Present? Yes No Policy No Vest No Vest No Vest No Vest No Vest No Vest No Vest No Vest No Vest No Vest No No No No No No No No No No No No No	Vegetation, Soil	, or Hydrology 🔲 natural	ly problematic? (If needed,	, explain any answers in Remarks	5.)
Addrophytic Vegetation Present? Yes No Policy No Vest No Vest No Vest No Vest No Vest No Vest No Vest No Vest No Vest No Vest No No No No No No No No No No No No No	ummary of Findings - A	Attach site map showin	g sampling point locatio	ons, transects, importar	nt features, etc
Is the Sampled Area within a Wetland?    Secondary Indicators (minimum of two required)	vdronhytic Vegetation Present?	Yes  No		· · ·	
etland Hydrology Present? Yes No  within a Wetland? Yes No  within a W			To the Compled Area		
Secondary_Indicators (minimum of two required)   Primary Indicators (minimum of two required)   Primary Indicators (minimum of one required)   Primary Indicators (minimum of one required)   Primary Indicators (minimum of one required)   Primary Indicators (minimum of one required)   Primary Indicators (minimum of one required)   Primary Indicators (minimum of one required)   Primary Indicators (minimum of one required)   Primary Indicators (minimum of two required: (Da)   Primary Indicators (min	•		within a Wetland?	Yes ∪ No •	
Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)					
Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)					
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Drainage Patterns (B10)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Other (Explain in Remarks)  Stunted or Stressed Plants (D1)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Mater-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Water Table Present?  Yes  No  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):	Hydrology				
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drint deposits (B10)  Moss Trim Lines (B16)  Drint deposits (C2)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Saturation Present?  Yes  No  Depth (inches):  Saturation Present?  Yes  No  Depth (inches):  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Moss Trim Lines (B16)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  No  No  No  Depth (inches):  Saturation Present?  No  Depth (inches):  Surface Water Present?  No  No  No  Depth (inches):  Surface Water Present?  No  Depth (inches):  Depth (inches):	Wetland Hydrology Indicators:			Secondary Indicators (minimum	of two required)
High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):  Depth (inches):  Depth (inches):  Doepth (inches):  Doepth (inches):  Depth (inches):	Primary Indicators (minimum of	f one required; check all that ap	oly)		
Saturation (A3)	Surface Water (A1)	True Aquatic	Plants (B14)	Sparsely Vegetated Concave	Surface (B8)
Water Marks (B1)	High Water Table (A2)	Hydrogen Su	lfide Odor (C1)	Drainage Patterns (B10)	
Sediment Deposits (B2)	_ ` `				
Drift deposits (B3)	_ ` ′		• •		)
Algal Mat or Crust (B4)			, ,		magam, (CO)
☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5)  Field Observations: Surface Water Present? Yes No Depth (inches): Water Table Present? Yes No Depth (inches): Gaturation Present? Yes No Depth (inches): Gaturation Present? Yes No Depth (inches): Gaturation Present? Yes No Depth (inches): Gaturation Present? Yes No Depth (inches): Gaturation Present? Yes No Depth (inches): Gaturation Present? Yes No Depth (inches): Gaturation Present? Yes No Depth (inches): Gaturation Present? Yes No Depth (inches):	_ ` ` `		` '		
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):		Utner (Explai	n in Remarks)		<i>,</i> 1)
Water-Stained Leaves (B9) Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations: Surface Water Present? Water Table Present?  Ves No Depth (inches): Saturation Present? Includes capillary fringe)  Wetland Hydrology Present?  Wetland Hydrology Present?  Wetland Hydrology Present?  Wetland Hydrology Present?		agery (B7)			
Field Observations:  Surface Water Present?  Yes No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):	Water-Stained Leaves (B9)				
Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Aquatic Fauna (B13)			FAC-neutral Test (D5)	
Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):		0 0			
Saturation Present?  Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches):			nes):		
rincludes capillary fringe)  Yes No Depth (inches):	Water Table Present? Yes	No Depth (inch	nes):	<b>v</b> 0	No 🔘
includes capillally fillinge)	VAC	O No O Depth (inch	wetland Hy les):	ydrology Present? Yes 🔾	NO S
			photos, previous inspections), if a	vailable:	
	emarks:				
emarks:					
lemarks:					
emarks:					
lemarks:					

			ominant oecies? _		Sampling Point: <u>19-1 up</u>
	Absolute	Re	el.Strat.	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 30 )	% Cover		over	Status	Number of Dominant Species
1 Quercus montana	20	<b>V</b>	50.0%	UPL	That are OBL, FACW, or FAC:3(A)
2. Ouercus phellos	15	<b>~</b>	37.5%	FAC	Total Number of Deminant
3. Ulmus americana	5		12.5%	FACW	Total Number of Dominant Species Across All Strata:5 (B)
4	0		0.0%		
5	0		0.0%		Percent of dominant Species That Are OBL FACW or FAC: 60.0% (A/B)
6	0		0.0%		That Are OBL, FACW, or FAC: 60.0% (A/B)
7	0		0.0%		Prevalence Index worksheet:
8	0		0.0%		Total % Cover of: Multiply by:
(8)	40 :	= T	otal Cover	•	0BL speci es0 x 1 =0
Sapling-Sapling/Shrub Stratum (Plot size: 15					FACW species
1 Acer rubrum		<b>✓</b>	57.1%	FAC	FAC species 115 x 3 = 345
2. Juniperus virginiana		<b>✓</b>	42.9%	FACU	FACU species $\frac{25}{2}$ x 4 = $\frac{100}{2}$
3	0		0.0%		100
4	0		0.0%		UPL Species X 5 =
5	0	Ц	0.0%		Column Totals: <u>165</u> (A) <u>555</u> (B)
6	0	Ш	0.0%		Prevalence Index = $B/A = 3.364$
7	0	Ш	0.0%		Hydrophytic Vegetation Indicators:
8	0	Ш	0.0%		Rapid Test for Hydrophytic Vegetation
9.	0		0.0%		✓ Dominance Test is > 50%
10	0		0.0%		Prevalence Index is ≤3.0 ¹
Shrub Stratum (Plot size:)	35 :	= T	otal Cover	•	Morphological Adaptations <sup>1</sup> (Provide supporting
1	0	П	0.0%		data in Remarks or on a separate sheet)
2		$\overline{\Box}$	0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
3		$\Box$	0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
	_	П	0.0%		be present, unless disturbed or problematic.
4		$\Box$	0.0%		Definition of Vegetation Strata:
5		Н	0.0%		Four Vegetation Strata:
6		$\vdash$			Tree stratum – Consists of woody plants, excluding vines, 3
7			0.0%		in. (7.6 cm) or more in diameter at breast height (DBH),
Herb Stratum (Plot size: 15 )	:	= 10	otal Cover		regardless of height.  Sapling/shrub stratum – Consists of woody plants, excluding
1 _ Microstegium vimineum	80	✓	88.9%	FAC	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2. Lespedeza cuneata	10		11.1%	FACU	Herb stratum – Consists of all herbaceous (non-woody)
3	0		0.0%		plants, regardless of size, and all other plants less than 3.28
4	0		0.0%		ft tall. Woody vines – Consists of all woody vines greater than 3.28
5	0		0.0%		ft in height.
6	0		0.0%		Five Vegetation Strata:
7	0		0.0%		Tree - Woody plants, excluding woody vines, approximately
8	0		0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9.	0		0.0%		diameter at breast height (DBH).
10	0		0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
11			0.0%		less than 3 in. (7.6 cm) DBH.
12	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody
	90 :	= To	otal Cover		vines, approximately 3 to 20 ft (1 to 6 m) in height.
Woody Vine Stratum (Plot size:)	0		0.0%		Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and
1					woody species, except woody vines, less than approximately
2		Н	0.0%		3 ft (1 m) in height.
3			0.0%		Woody vines – Consists of all woody vines, regardless of height.
4			0.0%		
5	0_		0.0%		Hydrophytic
C	0		0.0%		Vegetation Present?  Yes No
6					

Soil Sampling Point: 19-1 up

Profile Descr	iption: (D	escribe to	the depth	needed to documen	t the indi	cator or c	onfirm the	absence of indicators.)		
Depth (inches)		Matrix			dox Featu					
(inches) 0-7	-	(moist)		Color (moist)	%	Type 1	Loc²	Texture	Remarks	
	10YR	4/4	100					Loam		
7-10	10YR	4/4	80					Silt Loam		
	10YR	4/3	_ 20					Silt Loam		
10.14	10YR	4/6						Silt Loam		
10-14	10YR	5/3						Loam		
-	10YR	4/6	_ 30					Loam		
			_		-					
			_					-		
			on. RM=Red	uced Matrix, CS=Cover	ed or Coat	ed Sand G	ains <sup>2</sup> Loc	ation: PL=Pore Lining. M=N	Matrix	
Hydric Soil I		:						Indicators for Proble	matic Hydric Soils <sup>3</sup> :	
Histosol (/	,			Dark Surface (	•	CO) (MI DA	147 140)	2 cm Muck (A10) (	MLRA 147)	
Black Hist	pedon (A2)			Polyvalue Belov				Coast Prairie Redox	(A16)	
	Sulfide (A	1)		Loamy Gleyed			- 107	(MLRA 147,148)  Piedmont Floodplai	in Soils (F19)	
	Layers (A5)			Depleted Matri				(MLRA 136, 147)	III 3013 (1 13)	
	k (A10) (LR	-		Redox Dark Su	. ,	<b>-</b> \		Very Shallow Dark	` '	
	Below Dark	•	A11)	☐ Depleted Dark☐ Redox Depress		/)		Other (Explain in R	emarks)	
	k Surface (/ ck Mineral	•	N	☐ Iron-Manganes	. ,	F12) (LRR	(LRR N			
MLRA 147		(31) (LIXIX	11,	MLRA 136)						
	eyed Matrix	(S4)		Umbric Surface			-	<sup>3</sup> Indicators of h	nydrophytic vegetation and	
	Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 148) Stripped Matrix (S6) Red Parent Material (F21) (MLRA 127, 147)				wetland hydrology must be present, unless disturbed or problematic.					
Suipped i	Matrix (30)			☐ Red Parent Ma	iteriai (FZ1	) (MLRA 12	.7, 147)	uniess dis	turbed or problematic.	
Restrictive La	ayer (if ob	served):								
Type:	hos).							Hydric Soil Present?	Yes ○ No •	
Depth (incl	nes):							•		
Remarks:										



Photo File: IN	/IG_3407.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting	: 77°30'47.144"	Lat/Northing: 38°43'51.898"
Description:			

Photo File: N	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

State: VA   Sampling Point:   20.1 wet	Section, Township, Range: S  Local relief (concave, convex, none): concave  Slope: 5.0% / 2.9  t.: 38°43'51.898"N  Long.: 77°30'47.144"W  Datum: NAD 83  NWI classification:  of year? Yes No (If no, explain in Remarks.)  antly disturbed? Are "Normal Circumstances" present? Yes No yproblematic? (If needed, explain any answers in Remarks.)  g sampling point locations, transects, important features, etc.
dform (hillslope, terrace, etc.): Toeslope	Local relief (concave, convex, none): concave Slope: 5.0% / 2.9 t.: 38°43'51.898"N Long.: 77°30'47.144"W Datum: NAD 83  NWI classification: of year? Yes No (If no, explain in Remarks.) antly disturbed? Are "Normal Circumstances" present? Yes No (If needed, explain any answers in Remarks.) by problematic? (If needed, explain any answers in Remarks.)  g sampling point locations, transects, important features, etc.
region (LRR or MLRA): MLRA 148 in LRR S	t.: 38°43'51.898"N Long.: 77°30'47.144"W Datum: NAD 83  NWI classification:  of year? Yes No (If no, explain in Remarks.)  antly disturbed? Are "Normal Circumstances" present? Yes No yeroblematic? (If needed, explain any answers in Remarks.)  g sampling point locations, transects, important features, etc.
Map Unit Name: Dulles Silt loam	NWI classification:  If year? Yes No (If no, explain in Remarks.)  In year? Yes No No (If no, explain in Remarks.)  If year? Yes No No (If no, explain in Remarks.)  If year? Yes No No (If needed, explain any answers in Remarks.)  If year? Yes No No (If needed, explain any answers in Remarks.)  If year? Yes No No (If no, explain in Remarks.)  If year? Yes No (If no, explain in Remarks.)  If year? Yes No (If no, explain in Remarks.)
Map Unit Name: Dulles silt loam	NWI classification:  If year? Yes No (If no, explain in Remarks.)  In the sampled Area No. (If no explain any answers in Remarks.)  Is the Sampled Area No. (If needed, explain any answers in Remarks.)
Climatic/hydrologic conditions on the site typical for this time of year? Yes   No   (If no, explain in Remarks.)	Is the Sampled Area
Vegetation       , Soil       , or Hydrology       significantly disturbed?       Are "Normal Circumstances" present?       Yes       No       No         Vegetation       , Soil       , or Hydrology       naturally problematic?       (If needed, explain any answers in Remarks.)         mmary of Findings - Attach site map showing sampling point locations, transects, important features, etc.         drophytic Vegetation Present?       Yes       No         dric Soil Present?       Yes       No         yet and Hydrology Present?       Yes       No         emarks:       Is the Sampled Area within a Wetland?       Yes       No         yet and Hydrology Indicators:       Present Present?       Secondary Indicators (minimum of two required)       Surface Soil Cracks (86)         Surface Water (A1)       True Aquatic Plants (814)       Sparsely Vegetated Concave Surface (88)         High Water Table (A2)       Hydrogen Sulfide Odor (C1)       Sparsely Vegetated Concave Surface (88)         Water Marks (B1)       Presence of Reduced Iron (C4)       Por Sage Patterns (B10)         Water Marks (B1)       Presence of Reduced Iron (C4)       Presence (B16)         Portific deposits (B2)       Recent Iron Reduction in Tilled Soils (C6)       Crayfish Burrows (C8)         Pinit deposits (B3)       Thin Muck Surface (C7)       Stunted or Stress	Are "Normal Circumstances" present? Yes No Or No
Vegetation	y problematic? (If needed, explain any answers in Remarks.)  g sampling point locations, transects, important features, etc
Immary of Findings - Attach site map showing sampling point locations, transects, important features, et ardrophytic Vegetation Present? Yes No Is the Sampled Area within a Wetland? Yes No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No No Is the Sampled Area within a Wetland? Yes No No No No No No No No No No No No No	g sampling point locations, transects, important features, etc
Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Wetland Hydrology Present?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   Wetland Hydrology Indicators:   No   No   No   No   No   No   No   N	Is the Sampled Area
Is the Sampled Area within a Wetland?  Ves No No within a Wetland?  Ves No No No No No No No No No No No No No	Is the Sampled Area within a Wetland? Yes  No
Is the Sampled Area within a Wetland?  Yes No No No No No No No No No No No No No	Is the Sampled Area within a Wetland? Yes  No  No
within a Wetland?  Wetland Hydrology Present?  Yes No within a Wetland?  Wetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Other (Explain in Remarks)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Wetland Hydrology Present?  Yes No Depth (inches):	within a Wetland? Yes No
Interest   Interest	
Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Geomorphic Position (D2)   Inundation Visible on Aerial Imagery (B7)   Shallow Aquatrd (D3)   Water-Stained Leaves (B9)   Microtopographic Relief (D4)   Aquatic Fauna (B13)   Depth (inches):   Wetland Hydrology Present?   Yes   No  Depth (inches):   Yes   Yes   Yes   Yes   Yes   Yes   Yes   Yes	
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Furface Water Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):	
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Trinh Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Yes  No  Depth (inches):	Cocondany Indicators (minimum of two required)
Surface Water (A1)	
High Water Table (A2)	
Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Aquatic Fauna (B13)  Depth (inches):  Vater Table Present?  Yes  No  Depth (inches):	
Sediment Deposits (B2)	
Drift deposits (B3)	educed Iron (C4) Dry Season Water Table (C2)
Algal Mat or Crust (B4)	
Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Sield Observations:  Furface Water Present?  Ves No   Depth (inches):  Facturation Present?  Yes No  Depth (inches):  Facturation Present?  Yes No  Depth (inches):  Facturation Present?  Yes No  Depth (inches):  Facturation Present?  Yes No  Depth (inches):  Facturation Present?  Yes No  Depth (inches):  Facturation Present?  Yes No  Depth (inches):  Facturation Present?  Yes No  Depth (inches):  Facturation Present?  Facturati	
Inundation Visible on Aerial Imagery (B7)  ✓ Water-Stained Leaves (B9)  ✓ Aquatic Fauna (B13)  ✓ FAC-neutral Test (D5)  Field Observations:  Furface Water Present?  Ves No Depth (inches):  Facturation Present?  Yes No Depth (inches):	
Water-Stained Leaves (B9) Aquatic Fauna (B13)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations: Furface Water Present?  Ves No Depth (inches): Facturation Present? Facturation Present	
Aquatic Fauna (B13)  Field Observations: Surface Water Present?  Ves No Depth (inches): Water Table Present?  Yes No Depth (inches): Saturation Present?  Yes No Depth (inches): Saturation Present? Includes capillary fringe)  Wetland Hydrology Present?  Yes No Depth (inches):	
urface Water Present? Yes No Depth (inches):	
Adater Table Present? Yes No Depth (inches): aturation Present? Yes No Depth (inches): No Depth (inches): Depth (inches):	
aturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No No	es):
includes capillary fringe)  Yes No Depth (inches):	es):
includes capillary fringe)	Wetland Hydrology Present? 🐧 165 🔍 NO 🔾
emarks:	
reserved bata (Stream gauge, monitoring well, dental pr	P fi o de le e

Note   Policy   Pol		Dominant Species?				Sampling Point: 20-1 wet		
1. Aser rubrum 20		Absolute			Indicator	Dominance Test worksheet:		
1. Aser photum	Tree Stratum (Plot size: 30 )	% Cover	Co	ver	Status			
2 Ulmus americane 2 0	1 Acer rubrum	20	<b>~</b>	50.0%	FAC	<u>'</u>		
3	••	20	<b>V</b>	50.0%	FACW			
1			П	0.0%				
Second   Second	<b>V</b> .		$\overline{\Box}$			Species Across All Strata:		
That Are OBL_FACW, or FAC:   100.0%   New   Prevalence Index worksheet:   100.0%   New   Total 2% Copyer of: Multibly by:			$\overline{\Box}$			Percent of dominant Species		
8	• •		$\vdash$					
8	~ **							
Sapling-Sapling /Shrub Stratum (Plot size:   0   0.0%   FACW species   0   0.7	7		Н					
Sapling/Shrub Stratum   (Plot size:   )	8		Ш					
1	Carling Carling (Church Church III) (Plot size:	, 40	= To	otal Cover		0BL speci es 0 x 1 = 0		
Company   Factor   Company		_		0.00%		FACW species <u>30</u> x 2 = <u>60</u>		
Action   Company   Comp			$\vdash$			FAC species 100 x 3 = 300		
1						FACIL species 0 v 4 - 0		
5	3					l ' o o		
6	4	0		0.0%		4-1		
7.	5	0		0.0%		Column Totals: 130 (A) 360 (B)		
8	6	0	Ш	0.0%		Prevalence Index = $B/A = 2.769$		
8	7	0		0.0%		Hydrophytic Vegetation Indicators:		
9   0				0.0%				
10		_		0.0%		1 = ' ' ' ' '		
Shrub Stratum			П	0.0%				
	•		_ - т					
2			,					
3	1	0	Ш			1 —		
4.	2	0	Ш	0.0%		Problematic Hydrophytic Vegetation (Explain)		
5.	3	0	Ш	0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must		
5.	4	0		0.0%		be present, unless disturbed or problematic.		
6.				0.0%		Definition of Vegetation Strata:		
Tree stratum - Consists of woody plants, excluding vines, especially consists of woody plants, excluding vines, especially consists of woody plants, excluding vines, especially consists of woody plants, excluding vines, especially consists of woody plants, excluding vines, especially consists of woody plants, excluding vines, especially consists of woody plants, excluding vines, especially consists of all herbaceous (non-woody) plants, excluding vines, especially consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.2 ft tall.  Tree - Woody vines - Consists of all woody vines greater than 3.2 ft tall.  Tree - Woody plants, excluding woody vines greater than 3.2 ft tall.  Tree - Woody plants, excluding woody vines greater than 3.2 ft tall.  Tree - Woody plants, excluding woody vines, approximatel 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).  Sapling stratum - Consists of all herbaceous (non-woody) plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).  Sapling stratum - Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or more in height and 3 in. (7.6 cm) or more in height and 3 in. (7.6 cm) DBH.  Sapling stratum - Consists of woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) DBH.  Sapling stratum - Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) DBH.  Sapling stratum - Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) DBH.  Sapling stratum - Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) DBH.  Sapling stratum - Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) DBH.  Sapling stratum - Consists of wo				0.0%		Four Vegetation Strata:		
Herb Stratum (Plot size: 15   )				0.0%		Tree stratum - Consists of woody plants, excluding vines, 3		
Sapling/shrub stratum - Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall vines, less than 3 in. DBH and	• •		 = T/					
1. Microstegium vimineum 2. Boehmeria cylindrica 3.	Herb Stratum (Plot size: 15					-		
3.	1 Microstegium vimineum		$\checkmark$		FAC	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.		
3.	2. Boehmeria cylindrica		Ш	11.1%	FACW	Herb stratum – Consists of all berbaceous (non-woody)		
4	3	0	Ш	0.0%		plants, regardless of size, and all other plants less than 3.28		
5.	4	0		0.0%				
7.	5	0		0.0%				
7	6.	0		0.0%		Five Vegetation Strate:		
8	7.	0		0.0%				
9.				0.0%				
Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.  Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.  Woody Vine Stratum (Plot size: )  ———————————————————————————————————			$\overline{\Box}$	0.0%				
11			$\overline{\Box}$					
Shrub stratum - Consists of woody plants, excluding wood vines, approximately 3 to 20 ft (1 to 6 m) in height.    Woody Vine Stratum   (Plot size:)   90			H					
Woody Vine Stratum (Plot size:)  1	11		Н			1		
1	12		$\Box$					
1.	Woody Vine Stratum (Plot size:)	90	= To	otal Cover		Herb stratum – Consists of all herbaceous (non-woody)		
2.	1	0		0.0%		plants, including herbaceous vines, regardless of size, and		
3.				0.0%				
4			$\overline{\Box}$					
5			$\sqcap$					
6. Hydrophytic Vegetation Yes No								
Precent Yes No U	- ·							
0 = Total Cover Present?	6		Ш					
<u></u>		0	= T	otal Cover		Present 100 0 110 0		
Remarks: (Include photo numbers here or on a separate sheet.)	Remarks: (Include photo numbers here or on a separate s	heet.)						

Soil Sampling Point: 20-1 wet

	ription: (De		the depth	needed to				onfirm the	absence of indicators.)		
Depth (inches)	Color	Matrix	%	Color		lox Featu	res1	Loc2	Toyture	D	narke
0-4	10YR	( <b>moist)</b> 3/3	100	Color (	moist)	%	iype_+	LOC <sup>2</sup> _	Texture Silt Loam	Ken	narks
4-9	10YR	5/2	80	10YR	4/6	5	_ <u>C</u>	M	Silt Loam		
	10YR	4/3	15						Silt Loam		
9-14	10YR	6/2	80	10YR	4/6	20	C	M	Silt Loam		
	-			-					-	,	
	-	-		-						,	
							_				
-	-			-	-		_		-		
	-	-		-			_			-	
<sup>1</sup> Type: C=Con	centration. [	D=Depleti	on. RM=Red	duced Matrix,	CS=Cover	ed or Coa	ted Sand G	rains <sup>2</sup> Loc	cation: PL=Pore Lining. M=	Matrix	
Hydric Soil 1	Indicators:								Indicators for Probl	ematic Hydr	ic Soils <sup>3</sup> :
Histosol (	A1)			☐ Darl	Surface (	S7)			2 cm Muck (A10)	-	
Histic Epi	pedon (A2)			Poly	value Belov	w Surface	(S8) (MLRA	4 147,148)	Coast Prairie Redo		
Black Hist	. ,			Thin	Dark Surfa	ace (S9) (I	MLRA 147,	148)	(MLRA 147,148)	X (A10)	
	Sulfide (A4				ny Gleyed	•	)		Piedmont Floodpla	ain Soils (F19)	
	Layers (A5)				eted Matri				(MLRA 136, 147)		
	2 cm Muck (A10) (LRR N) Redox Dark Surface (F6)							☐ Very Shallow Dark		2)	
□ Depleted Below Dark Surface (A11) □ Depleted Dark Surface (F7) □ Other (Explain in Remarks) □ Thick Dark Surface (A12) □ Redox Depressions (F8)											
	☐ Thick Dark Surface (A12) ☐ Redox Depressions (F8) ☐ Iron-Manganese Masses (F12) (LRR N,										
MLRA 147		(SI) (LKK	IN,		A 136)		(	,			
Sandy Gleyed Matrix (S4) Umbric Surface (F13) (MLRA 136, 122)					22)	3					
Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 148)					_RA 148)	<sup>3</sup> Indicators of wetland hyd	hydrophytic v Irology must l	egetation and oe present,			
Stripped I	Matrix (S6)			Red	Parent Ma	terial (F21	l) (MLRA 1	27, 147)		sturbed or pro	
Restrictive L	ayer (if ob	served):									
Туре:											
Depth (inc	hes):								Hydric Soil Present?	Yes 💿	No O
Remarks:									1		



Photo File: IM	IG_3410.JPG	Orientation:	-facing
.at/Long or UTM :	Long/Easting:	77°30'47.144"	Lat/Northing: 38°43'51.898"
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)     Surface Water (A1)	oject/Site: Manassas Regional Airp	ort	City/County: M	anassas	Sampling	Date: 26-Oct-16
drom (hillslope, terrace, etc.): Hillside   Local relief (concave, convex, none): fiat   Slope: 1,0% / 4,0   region (LRR or MLRA): MLRA 148 in LRR S   Lat.: 38°43'40.159"N   Long.: 77°30'39,711"W   Datum: NAD 83   Map Unit Name: Dulles silt loam   NWI classification: climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.) Vegetation   , soil   , or Hydrology   significantly disturbed? Are "Normal Circumstances" present? Yes  No    Vegetation   , soil   , or Hydrology   naturally problematic? (If needed, explain any answers in Remarks.)  Immary of Findings - Attach site map showing sampling point locations, transects, important features, etc.  Individual of the state of the site of year? Yes   No     Is the Sampled Area within a Wetland? Yes   No     Is the Sampled Area within a Wetland?  Indicators (minimum of two required) Permary Indicators (minimum of one required; check all that apply)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetade Concave Surface (B8)    High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Dry Season Water Table (C2)   Graffish Burrows (B1)    Saturation (A2)   Oxidized Rhizospheres along Living Roots (C3)   Dry Season Water Table (C2)    Agal Mat or Crust (B4)   Other (Explain in Remarks)   Stantation (Tsick) (B1)    Drift deposits (B2)   Recent from Reduction in Tilled Solis (C6)   Graffish Burrows (C3)    Agal Mat or Crust (B4)   Other (Explain in Remarks)   Stantation (Tsick) (B1)    In Jundation Visible on Aerial Imagery (B7)   Mater Table (Present? Yes   No    Depth (inches):    Water Table Present? Yes   No    Depth (inches):    Subtraction Present? Yes   No    Depth (inches):    Water Table Present? Yes   No    Depth (inches):    Water Table Present? Yes   No    Depth (inches):    Water Table Present? Yes   No    Depth (inches):    Water Table Present? Yes   No    Depth (inches):    Water Table Present? Yes   No    Depth (inches):    Water Table Present? Yes   No    Depth (inches):    Water Table Present	olicant/Owner: Manassas Regiona	ıl Airport		State: VA	Sampling Point:	20-2 up
Map Unit Name: Dulles silt loam   Dulles silt loam   NWI classification:   NWI classifi	estigator(s): Matt Neely		Section, Towns	iip, Range: S	т	R
Map Unit Name: Dulles Silt loam   Dulles Silt loam   NWI classification:   NWI classifi	dform (hillslope, terrace, etc.):	Hillside	Local relief (conc	ave, convex, none):	flat <b>S</b> l	lope: 7.0% / 4.0
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   Vegetation	region (LRR or MLRA): MLRA	148 in LRR S	Lat.: 38°43'40.159"N	<b>Long.:</b> 7	7°30'39.711"W	Datum: NAD 83
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   Vegetation	Map Unit Name: Dulles silt loan	m			NWI classification:	
Vegetation	climatic/hydrologic conditions o	on the site typical for th	uis time of year? Yes  No	(If no. expl	in in Remarks.)	
Vegetation					•	Yes   No
Interpretation Present? Yes No   Is the Sampled Area within a Wetland? Y					•	
Is the Sampled Area within a Wetland?  Ves No No No No Wetland Hydrology Present?  Ves No No No No No No No Wetland Hydrology Present?  Ves No No No No No No No No No No No No No			• •			
Ves   No   Present?   Ves   No   Present?   Ves   No   Present?   Ves   No   Present?   Ves   No   Present?   Ves   No   Present?   Ves   No   Present?   Ves   No   Present?   Ves   No   Present?   Ves   No   Present?   Ves   No   Present?   Ves   No   Present?   Ves   No   Present?   Ves   No   Present?   Ves   No   Present?   Ves   No   Present   Ves   No   Present?   Ves   No   Present   Ves   Present   V		•			, .	,
Vestland Hydrology Present?   Ves   No   No   Within a Wetland?   Vestland Hydrology Present?   Vestland Hydrology Indicators:   Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Soil Cracks (B6)   Surface Soil Cracks (B6)   Sparsely Vegetated Concave Surface (B8)   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)   Water Marks (B1)   Presence of Reduced Iron (C4)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Drift deposits (B3)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (C9)   Algal Mat or Crust (B4)   Other (Explain in Remarks)   Stunted or Stressed Plants (D1)   Iron Deposits (B5)   Shallow Aquitard (D3)   Mater-Stained Leaves (B9)   Microtopographic Relief (D4)   FAC-neutral Test (D5)     Vestiface Water Present?   Yes   No   Depth (inches):   Wetland Hydrology Present?   Yes   No   Depth (inches):   Seduration Present?   Yes   No   Depth (inches):   Wetland Hydrology Present?   Yes   No   Depth (inches):   Seduration Present?   Yes   No   Depth (inches):   Depth	dric Soil Present?	Yes 🔾 No 💿	Is the Sa	mpled Area	O No O	
Internal Remarks:   Inte		Yes O No 💿	within a	Wetland?	O NO O	
Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Teld Observations:  Surface Water Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Wetland Hydrology Present?  Yes  No  Depth (inches):	lydrology					
Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Teld Observations:  Surface Water Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Wetland Hydrology Present?  Yes  No  Depth (inches):	Vetland Hydrology Indicators:			Soc	ondary Indicators (minim	oum of two required)
Surface Water (A1)		one required; check all	that apply)			lum of two reduited)
High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Inon Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Wetland Hydrology Present?  Yes  No  Penth (inches):  Penth (inches):				_	` ,	cave Surface (B8)
Water Marks (B1)	High Water Table (A2)	☐ Hyd	rogen Sulfide Odor (C1)			
Sediment Deposits (B2)	¬ ` ´	Oxid	lized Rhizospheres along Living R	oots (C3)	Moss Trim Lines (B16)	
Drift deposits (B3)	_ ` ´		` ,		•	(C2)
Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Depth (inches):  Water Table Present?  Ves No  Depth (inches):  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Depth (inches):  Wetland Hydrology Present?  Yes No  No  Depth (inches):  Wetland Hydrology Present?  Yes No  No  No  Depth (inches):	_ ' ' '					(CO)
Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No   Depth (inches):  Depth (inches):  Saturation Present?  Yes No   Depth (inches):  Water Table Present?  Depth (inches):  Water Table Present?  Yes No   No   Depth (inches):  Water Table Present?  Yes No   No   Depth (inches):  Water Table Present?  Yes No   No   Depth (inches):  Water Table Present?  Yes No   No   Depth (inches):  Water Table Present?  Yes No   No   Depth (inches):  Water Table Present?  Yes No   No   Depth (inches):  Water Table Present?  Yes No   No   Depth (inches):  Water Table Present?  Yes No   No   Depth (inches):  Water Table Present?  Yes No   No   Depth (inches):  Water Table Present?  Yes No   No   Depth (inches):  Water Table Present?  Yes No   No   Depth (inches):  Depth (inches	_ ` ` ` ′		• •			- / . /
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Sield Observations:  Surface Water Present?  Ves No ● Depth (inches):  Saturation Present?  Ves No ● Depth (inches):  Water Table Present?  Ves No ● Depth (inches):  Wetland Hydrology Present?  Wetland Hydrology Present?  Yes No ● Depth (inches):	_	☐ Othe	er (Explain in Remarks)			` '
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations: Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Ves No Depth (inches):  Saturation Present?  Ves No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):		jery (B7)				.,
Field Observations:  Surface Water Present? Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):  Saturation Present? Yes No Depth (inches):  Wetland Hydrology Present? Yes No Depth (inches):	Water-Stained Leaves (B9)					(D4)
Ves No Depth (inches):  Ves No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Aquatic Fauna (B13)				FAC-neutral Test (D5)	
Vater Table Present? Yes No Depth (inches):		O O				
Saturation Present? Ves No Penth (inches): Wetland Hydrology Present? Yes No •						
odurduon Present? Ves ( ) No ( ) Depth (inches):			epth (inches):	Wetland Hydrolog	uy Dracant? Yes	) No ●
	VAC \	O No 💿 De	epth (inches):	Wedana Tryarolog	ly Present: 105	, 110
	Remarks:					
emarks:						
emarks:						
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emarks:						
emarks:						
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emarks:						
emarks:						
emarks:						
emarks:						

		Dominant ———Species?			Sampling Point: 20-2 up		
(Dietrize: 20	Absolute % Cover	Re	el.Strat.	Indicator Status	Dominance Test worksheet:		
Tree Stratum (Plot size: 30 )		<b>✓</b>			Number of Dominant Species		
1 Quercus falcata	40	<b>V</b>	42.1%	FACU	That are OBL, FACW, or FAC: (A)		
2 Carva tomentosa			42.1% 15.8%	FAC	Total Number of Dominant		
3. Ouercus phellos		H	0.0%	FAC	Species Across All Strata:4(B)		
4		Н	0.0%		Percent of dominant Species		
5		H	0.0%		That Are OBL, FACW, or FAC: 50.0% (A/B)		
6	_ —		-				
7		Н	0.0%		Prevalence Index worksheet:  Total % Cover of: Multiply by:		
8		ш - т	otal Cove				
Sapling-Sapling/Shrub Stratum (Plot size: 15	) — 33 .	- 10	otal Covel		0BL species		
1 Asimina triloba	10	<b>✓</b>	100.0%	FAC	FACW species 0 x 2 = 0		
2	0		0.0%		FAC speciles <u>40</u> x 3 = <u>120</u>		
3	0		0.0%		FACU speci es $\frac{40}{10}$ x 4 = $\frac{160}{200}$		
4	0		0.0%		UPL species $\frac{40}{}$ x 5 = $\frac{200}{}$		
5			0.0%		Column Totals: 120 (A) 480 (B)		
6	_		0.0%		Prevalence Index = B/A = 4.000		
7	_		0.0%		Hydrophytic Vegetation Indicators:		
8			0.0%		Rapid Test for Hydrophytic Vegetation		
9	_		0.0%		Dominance Test is > 50%		
10	0		0.0%		Prevalence Index is ≤ 3.0 ¹		
Shrub Stratum (Plot size:)	10:	= To	otal Cove	•			
1	0		0.0%		Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)		
2		П	0.0%		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)		
3		П	0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must		
	_	П	0.0%		be present, unless disturbed or problematic.		
4 5			0.0%		Definition of Vegetation Strata:		
		П	0.0%		Four Vegetation Strata:		
6	0	Н	0.0%		Tree stratum – Consists of woody plants, excluding vines, 3		
7		 _ T/	otal Cove		in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.		
Herb Stratum (Plot size: 15					Sapling/shrub stratum – Consists of woody plants, excluding		
1 _ Microstegium vimineum		<b>Y</b>	100.0%	FAC	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.		
2			0.0%		Herb stratum – Consists of all herbaceous (non-woody)		
3		$\sqcup$	0.0%		plants, regardless of size, and all other plants less than 3.28		
4			0.0%		ft tall.   Woody vines – Consists of all woody vines greater than 3.28		
5	0		0.0%		ft in height.		
6			0.0%		Five Vegetation Strata:		
7			0.0%		Tree - Woody plants, excluding woody vines, approximately		
8	0		0.0%		20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).		
9	0		0.0%		Sapling stratum – Consists of woody plants, excluding		
10			0.0%		woody vines, approximately 20 ft (6 m) or more in height and		
11	0		0.0%		less than 3 in. (7.6 cm) DBH.		
12	0	Ш	0.0%		Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.		
Woody Vine Stratum (Plot size:)	15 :	= To	otal Cove	•	Herb stratum – Consists of all herbaceous (non-woody)		
1	0		0.0%		plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately		
2	0		0.0%		3 ft (1 m) in height.		
3	0		0.0%		Woody vines – Consists of all woody vines, regardless of		
4			0.0%		height.		
5			0.0%		- Under a bodie		
6	0		0.0%		Hydrophytic Vegetation		
0	0	= T	otal Cove	r	Present? Yes O NO O		

Soil Sampling Point: 20-2 up

Profile Descr	iption: (Describe to	the depth	needed to document	the indica	tor or co	nfirm the	e absence of indicators.)	
Depth	Matrix			lox Feature			_	
(inches)	Color (moist)	%	Color (moist)		Type <sup>1</sup>	Loc <sup>2</sup>	Texture Remarks	—
0-5	10YR 4/4	100					Silt Loam	
5-9	10YR 5/6	100					Silt Loam	
9-14	7.5YR 5/6						Silt Loam	
								-
							·	_
							-	
		_					·	
1- 00	5 5 1							_
		on. RM=Red	uced Matrix, CS=Cover	ed or Coated	Sand Gra	ains <sup>2</sup> Loc	cation: PL=Pore Lining. M=Matrix	
Hydric Soil I							Indicators for Problematic Hydric Soils <sup>3</sup> :	
Histosol (A	•		Dark Surface (	•	)) (MI D A	147 140)	2 cm Muck (A10) (MLRA 147)	
	pedon (A2)		Polyvalue Belov				Coast Prairie Redox (A16)	
Black Hist	Sulfide (A4)		☐ Thin Dark Surfa		KA 147, I	40)	(MLRA 147,148)	
	Layers (A5)		Loamy Gleyed I Depleted Matrix				Piedmont Floodplain Soils (F19) (MLRA 136, 147)	
	k (A10) (LRR N)		Redox Dark Sui					
Depleted Below Dark Surface (A11)			Depleted Dark	` '			<ul><li>✓ Very Shallow Dark Surface (TF12)</li><li>✓ Other (Explain in Remarks)</li></ul>	
	k Surface (A12)	A11)	Redox Depressi					
☐ Sandy Mu	ck Mineral (S1) (LRR	N,	Iron-Manganes MLRA 136)	. ,	.2) (LRR N	١,		
MLRA 147	•		Umbric Surface	(E13) (MI D	۸ 136 13	2)		
Sandy Redox (S5)						<sup>3</sup> Indicators of hydrophytic vegetation and		
			☐ Piedmont Floodplain Soils (F19) (MLRA 148) ☐ Red Parent Material (F21) (MLRA 127, 147)			wetland hydrology must be present,		
Stripped is	Matrix (20)		☐ Red Parent Ma	teriai (F21) (	MLKA 12	, 147)	unless disturbed or problematic.	
Restrictive La	ayer (if observed):							
Type:							Hydric Soil Present? Yes ○ No ●	
Depth (incl	hes):						Hydric 3011 Fresent: 165 C NO S	
Remarks:								



Photo File: IM	IG_3411.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting:	77°30'39.711"	Lat/Northing: 38°43'40.159"N
Description:			

Photo File: N	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

Section, Township, Range: S T R  dform (hillslope, terrace, etc.): Hillside Local relief (concave, convex, none): flat Slope: 7,0% / 4,0  fregion (LRR or MLRA): MLRA 148 in LRR S Lat.: 38943'40.159"N Long.: 77°30'39.71!"W Datum: NAD 83  Map Unit Name: Dulles silt loam NWI classification: Unitarity of this time of year? Yes No (If no, explain in Remarks.)  Vegetation , soil , or Hydrology in aturally problematic? (If needed, explain any answers in Remarks.)  Wegetation , soil , or Hydrology in naturally problematic? (If needed, explain any answers in Remarks.)  Wegetation Present? Yes No   drir Soil Present? Yes No   within a Wetland?  Wetland Hydrology Indicators:  Vegetation Present? Yes No   wetland Hydrology Indicators:  Wetland Hydrology Indicators:  Wetland Hydrology Indicators:  Wetland Hydrology Indicators (minimum of one required; check all that apply) Surface Water (A1) Aguatic Plants (B14) Sparsely Vegetated Concave Surface (B8)  High Water Table (A2) Mose Recent from Reduction in Titled Soils (C6) Present (B16)  Saturation (A3) Oxidized Rhizospheres along Living Roots (C3) Moss Trim Lines (B16)  Water Marks (B1) Presence of Reduced Iron (C4) Sediment Deposits (B2) Agail Mat or Crust (B4) Startage (C7) Startage (C7)  Agail Mat or Crust (B4) Present? Yes No   Agail Mat or Crust (B4) Depth (inches):  Vater Table Present? Yes No   Depth (inches): Wetland Hydrology Present? Yes No   Depth (inches): Wetland Hydrology Present? Yes No   Depth (inches): Startage (C7) Present? Yes No   Depth (inches): Startage (C7) Present? Yes No   Depth (inches): Startage (C7) Present? Yes No   Depth (inches): Startage (C7) Present? Yes No   Depth (inches): Startage (C7) Present? Yes No   Depth (inches): Startage (C7) Present? Yes No   Depth (inches): Startage (C7) Present? Yes No   Depth (inches): Startage (C7) Present? Yes No   Depth (inches): Startage (C7) Present? Yes No   Depth (inches): Startage (C7) Present? Yes No   Depth (inches): Startage (C7) Present? Yes No   Depth (inches): Startage (C7) Present? Yes No   Depth	Matt Neely   Section, Township, Range: S   T   R	Matt Neely   Section, Township, Range: S   T   R	vestigator(s): Matt Neely Section, Township, Range: S T R R Indiform (hillslope, terrace, etc.): Hillside Local relief (concave, convex, none): flat Slope: 7.0 bregion (LRR or MLRA): MLRA 148 in LRR S Lat.: 38°43′40.159″N Long.: 77°30′39.711″W Datum il Map Unit Name: Dulles silt loam NWI classification: e climatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.) e Vegetation  , Soil  , or Hydrology	0% / 4.0 n: NAD 83
region (LRR or MLRA): MLRA 148 in LRR S	Addrom (hillslope, terrace, etc.): Hillside   Local relief (concave, convex, none): flat   Slope: 7,0%   1 4, bregion (LRR or MLRA): MLRA 148 in LRR S   Lat.: 38°43'40.159"N   Long.: 77°30'39.711"W   Datum: NAD 83	Addrorm (hillslope, terrace, etc.): Hillside	Adform (hillslope, terrace, etc.): Hillside	No O
region (LRR or MLRA): MLRA 148 in LRR S	region (LRR or MLRA): MLRA 148 in LRR	region (LRR or MLRA): MLRA 148 in LRR S	region (LRR or MLRA): MLRA 148 in LRR S	No O
Map Unit Name: Dulles silt loam	Map Unit Name: Dulles Silt loam	Map Unit Name: Dulles slit loam	Map Unit Name: Dulles silt loam	No O
Map Unit Name: Dulles Silt loam	Map Unit Name: Dulles Silt loam	Map Unit Name: Dulles silt loam	Map Unit Name: Dulles silt loam	No O
Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)   Vegetation	climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation  , Soil  , or Hydrology  significantly disturbed?  Are "Normal Circumstances" present?  Yes  No  No  No  No  No  No  No  No  No  N	Climatic/hydrologic conditions on the site typical for this time of year?   Yes	climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation  , Soil  , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes    Vegetation  , Soil  , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)  Immary of Findings - Attach site map showing sampling point locations, transects, important feature for the first sampled for the first samp	
Vegetation	Vegetation	Vegetation	Vegetation	
Vegetation	Vegetation	Vegetation	Vegetation	
mmary of Findings - Attach site map showing sampling point locations, transects, important features, etc drophytic Vegetation Present? Yes	Immary of Findings - Attach site map showing sampling point locations, transects, important features, endrophytic Vegetation Present? Yes  No   Is the Sampled Area within a Wetland Hydrology Present? Yes  No   Is the Sampled Area within a Wetland Hydrology Present? Yes  No   Is the Sampled Area within a Wetland? Yes  No   Is the Sampled Area within a Wetland? Yes  No   Is the Sampled Area within a Wetland? Yes  No   Is the Sampled Area within a Wetland? Yes  No   Is the Sampled Area within a Wetland? Yes  No   Is the Sampled Area within a Wetland? Yes	Immary of Findings - Attach site map showing sampling point locations, transects, important features, reproperties of the property of the prop	Immary of Findings - Attach site map showing sampling point locations, transects, important feature of the production of	atures, etc
drophytic Vegetation Present? Yes No ● dric Soil Present? Yes No ●  Wetland Hydrology Present? Yes No ●  Wetland Hydrology Indicators:  Permarks:    Vestand Hydrology Indicators:	rdrophytic Vegetation Present? Yes	Is the Sampled Area within a Wetland?  Ves No  No  No  No  No  No  No  No  No  No	Addroic Soil Present?  Yes No  No  No  No  No  No  No  No  No  No	atures, etc
Is the Sampled Area within a Wetland?  Yes No No Vetrand Hydrology Present?  Vetrand Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)	Addric Soil Present?  Yes No  No  No  No  No  No  No  No  No  No	Addic Soil Present?  Yes No  No  Is the Sampled Area within a Wetland?  No  No  No  No  No  No  No  No  No  N	Avdric Soil Present?  Yes No  No  No  No  No  No  No  No  No  No	
Is the Sampled Area within a Wetland?  Yes No No Vetrand Hydrology Present?  Vetrand Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)	Is the Sampled Area within a Wetland?  Ves No   No   No   No  No  No  No  No  No	Is the Sampled Area within a Wetland?  Ves No   No   Is the Sampled Area within a Wetland?  Ves No   No   No   No   No   No   No   No	Addric Soil Present?  Yes No  No  No  No  No  No  No  No  No  No	
etland Hydrology Present? Yes No  within a Wetland? Yes No  within a W	within a Wetland?  Ves No vithin a Wetland?  Wetland Hydrology Present? Yes No Depth (inches):  Wetland Hydrology Present? Yes No Person Water Pable (Pable Sillar)  Wetland Hydrology Present? Yes No Person Pable (Pable Sillar)  Wetland Hydrology Present? Yes No Person Pable (Pable Sillar)  Wetland Hydrology Present? Yes No Pepth (inches):	Vetland Hydrology   Ves   No   No   Within a Wetland?   Ves   No   Wetland   Ves   Ves   Ves   No   Wetland   Ves   Ves   Ves   Ves   No   Wetland   Ves   Ve	Within a Wetland?   Yes   No   Within a Wetland?   No   Within a Wetland?   Yes   No   Wetland   Yes   No   Wetl	
ydrology  Vetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)	Interpretation   Inte	Interest   Interest	Secondary Indicators (minimum of two reprimery Indicators (minimum of two reprimery Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)    Moss Trim Lines (B16)	
Vetland Hydrology Indicators:  Secondary Indicators (minimum of two required)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Iron Deposits (B5)  Water Table (A2)  Iron Deposits (B5)  Water Table (A2)  Sediment Deposits (B5)  Drift deposits (B4)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Ves  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):	Secondary Indicators (minimum of two required)	Secondary Indicators (minimum of two required)   Secondary Indicators (minimum of two required)	Secondary Indicators (minimum of two repaired; check all that apply)   Surface Soil Cracks (B6)   Surface Water (A1)   True Aquatic Plants (B14)   Sparsely Vegetated Concave Surface   High Water Table (A2)   Hydrogen Sulfide Odor (C1)   Drainage Patterns (B10)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Moss Trim Lines (B16)	
Wetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	Vetland Hydrology Indicators:    Secondary Indicators (minimum of one required; check all that apply)   Surface Soil Cracks (B6)	Vetland Hydrology Indicators:  Secondary Indicators (minimum of two required)  Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Prim Muck Surface (C7)  Algal Mat or Crust (B4)  True Aquatic Plants (B14)  Sparsely Vegetated Concave Surface (B8)  Moss Trim Lines (B16)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Drift deposits (B3)  Thin Muck Surface (C7)  Saturation Visible on Aerial Imagery (C9)  Algal Mat or Crust (B4)  Tron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  Depth (inches):	Wetland Hydrology Indicators:       Secondary Indicators (minimum of two reprimary Indicators (minimum of two reprimary Indicators (minimum of one required; check all that apply)       Secondary Indicators (minimum of two reprimary Indicators (minimum of two	
Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Water Marks (B1)  Sediment Deposits (B2)  Drift deposits (B3)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drift deyosits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (B7)  Shallow Aquitard (D3)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Drift deyosits (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D1)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Steld Observations:  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Dry Drift deposits (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Saturation (A3)  Saturation (A3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Prifit deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water (A1)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Prival Aquatic Plants (B14)  Doxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Yes No   Depth (inches):  Wetland Hydrology Present? Yes No   Depth (inches):  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial	Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Water Marks (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Soil Cracks (B6)  Surface Soil Cracks (B6)  Sprasely Vegetated Concave Surface (B8)  Prive Aquatic Plants (B14)  Dry Drainage Patterns (B10)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Yes No Depth (inches):  Wetland Hydrology Present? Yes No Faculty (inches):  Saturation Present?  Yes No Depth (inches):  Surface Water Privation (C1)  Wetland Hydrology Present? Yes No Faculty (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  School True Aquatic Plants (B14)  Sparsely Vegetated Concave Surface  Variance Patterns (B10)  Moss Trim Lines (B16)	
Surface Water (A1)	Surface Water (A1)	Surface Water (A1)	Surface Water (A1)  High Water Table (A2)  Sparsely Vegetated Concave Surface  Hydrogen Sulfide Odor (C1)  Saturation (A3)  True Aquatic Plants (B14)  Hydrogen Sulfide Odor (C1)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)	eduired)
High Water Table (A2)	High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Saturation Visible on Aerial Imagery (C9)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Find Observations:  Find Observations  Find Observation (Description (Description))  Depth (inches):	High Water Table (A2)	High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Hydrogen Sulfide Odor (C1)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)	· (B8)
Saturation (A3)	Saturation (A3) Oxidized Rhizospheres along Living Roots (C3) Moss Trim Lines (B16)  Water Marks (B1) Presence of Reduced Iron (C4) Dry Season Water Table (C2) Recent Iron Reduction in Tilled Soils (C6) Crayfish Burrows (C8) Saturation Visible on Aerial Imagery (C9) Algal Mat or Crust (B4) Dtift deposits (B5) Inundation Visible on Aerial Imagery (B7) Aquatic Fauna (B13) Water-Stained Leaves (B9) Aquatic Fauna (B13) Depth (inches): Water Table Present? Yes No Depth (inches): Depth (inches): Depth (inches): Depth (inches): Depth (inches): Depth (inches): Depth (inches): Depth (inches): Depth (inches): Depth (inches):	Saturation (A3)	Saturation (A3) Oxidized Rhizospheres along Living Roots (C3) Moss Trim Lines (B16)	(50)
Sediment Deposits (B2)	Sediment Deposits (B2)	Sediment Deposits (B2)	Water Marks (B1) Presence of Reduced Iron (C4) Dry Season Water Table (C2)	
Drift deposits (B3)	Drift deposits (B3)	Drift deposits (B3)		
Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	Sediment Deposits (B2) Recent Iron Reduction in Tilled Soils (C6) Crayfish Burrows (C8)	
Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Fac-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No ● Depth (inches):  Water Table Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):  Wetland Hydrology Present?  Yes No ● Depth (inches):	☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Water Present? Yes ☐ No ⑥ Depth (inches): ☐ Water Table Present? Yes ☐ No ⑥ Depth (inches): ☐ Water Table Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ⑥ Depth (inches): ☐ Yes ☐	Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Peth (inches):  Saturation Present?		(C9)
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Vater Table Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):	☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Steld Observations:  Surface Water Present? Yes ○ No ○ Depth (inches):  Water Table Present? Yes ○ No ○ Depth (inches):  Gaturation Present? Yes ○ No ○ Depth (inches):  Gaturation Present? Yes ○ No ○ Depth (inches):  Gaturation Present? Yes ○ No ○ Depth (inches):  Gaturation Present? Yes ○ No ○ Depth (inches):	Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Steld Observations:  Surface Water Present?  Vater Table Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):  Saturation Present?  Yes No ● Depth (inches):	otici (Explain in remarks)	
Water-Stained Leaves (B9) Aquatic Fauna (B13)  Microtopographic Relief (D4) FAC-neutral Test (D5)  Field Observations: Surface Water Present?  Ves No Depth (inches): Saturation Present? Facturation Present? Facturation Present? FYes No Depth (inches): Saturation Present? FYes No Depth (inches): Saturation Present? FAC-neutral Test (D5)  Wetland Hydrology Present? FYes No Depth (inches): Saturation Present? FYes No Depth (inches): Saturation Present? FYes No Depth (inches): Saturation Present? FYes No Depth (inches): Saturation Present? FYes No Depth (inches): Saturation Present? FYes No Depth (inches): Saturation Present? FYes No FYES No FYES No FYES No FYES No FYES No FYES No FYES No FYES No FYES NO	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Seturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Seturation Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Present?	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Present?		
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Ves No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Yes No Depth (inches):  Depth (inches):  Yes No Depth (inches):  Yes No Depth (inches):		
Field Observations:  Surface Water Present? Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):  Saturation Present? Yes No Depth (inches):  Saturation Present? Yes No Depth (inches):  Saturation Present? Yes No Depth (inches):	Field Observations: Surface Water Present?  Yes No Depth (inches):  Vater Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Field Observations:  Gurface Water Present? Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):  Gaturation Present? Yes No Depth (inches):  Gaturation Present? Yes No Depth (inches):  Depth (inches):  Wetland Hydrology Present? Yes No Depth (inches):		
Vater Table Present? Yes No Depth (inches):	Vater Table Present? Yes No Depth (inches):	Vater Table Present? Yes No Depth (inches): includes capillary fringe) Yes No Depth (inches): Depth (inches):		
Saturation Present?  Includes capillary fringe)  Yes No Depth (inches):  Wetland Hydrology Present? Yes No No Depth (inches):	Saturation Present? Includes capillary fringe)  Yes No Depth (inches):  Wetland Hydrology Present?  Yes No Depth (inches):	Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No location No location Present? Yes No location No	Surface Water Present? Yes No Depth (inches):	
Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches):	Saturation Present? Yes No Depth (inches):	Saturation Present? Yes No Depth (inches):	Water Table Present? Yes No Depth (inches):	
includes capillarly fillinge)	includes capillary fittinge)	includes capillary fininge)	Wotland Hydrology Procent2 YPS \ / NO \*	)
	rescribe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	includes capillary fillige)	

Tree Stratum	
ACE rubrum   30	ndicator Dominance Test worksheet:
2. Carva tomentosa 3.	Number of Dominant Species
3.	That are OBL, FACW, or FAC: 2 (A)  JPL
4.	Total Number of Dominant
5.	Species Across All Strata: 4 (B)
6.	Percent of dominant Species
7.	That Are OBL, FACW, or FAC: 50.0% (A/B)
Sapling-Sapling/Shrub Stratum	Prevalence Index worksheet:
Sapling-Sapling/Shrub Stratum         (Plot size: 15         )         55         = Total Cover           1. Carya tomentosa         10         ✓ 100.0%           2.         0         0.0%           3.         0         0.0%           4.         0         0.0%           5.         0         0.0%           6.         0         0.0%           7.         0         0.0%           8.         0         0.0%           9.         0         0.0%           10.         0         0.0%           8.         0         0.0%           9.         0         0.0%           10.         = Total Cover           1.         = Total Cover           2.         0         0.0%           3.         0         0.0%           4.         0         0.0%           5.         0         0.0%           6.         0         0.0%           7.         0         0.0%           8.         0         0.0%           9.         0         0.0%           1.         Microsteqium vimineum         20         ✓     <	Total % Cover of: Multiply by:
Sapling-Sapling/Shrub Stratum   Plot size: 15	0BL species 0 x 1 = 0
2.	FACW species $0 \times 2 = 0$
3.	JPL
4.	
5 0	FACU speciles $\frac{2}{25}$ x 4 = $\frac{8}{175}$
6.	UPL speciles — 35 x 5 = — 175
7.       0       0.0%         8.       0       0.0%         9.       0       0.0%         10.       0       0.0%         5hrub Stratum (Plot size:)       10       = Total Cover         1.       0       0.0%         2.       0       0.0%         3.       0       0.0%         5.       0       0.0%         6.       0       0.0%         7.       0       0.0%         4.       0       0.0%         7.       0       0.0%         4.       0       0.0%         5.       0       0.0%         4.       0       0.0%         5.       0       0.0%         4.       0       0.0%         5.       0       0.0%         4.       0       0.0%         5.       0       0.0%         4.       0       0.0%         5.       0       0.0%         6.       0       0.0%         7.       0       0.0%         8.       0       0.0%         9.       0       0.0%     <	Column Totals: <u>89</u> (A) <u>339</u> (B)
8.	Prevalence Index = B/A = 3.809
9.	Hydrophytic Vegetation Indicators:
10.	Rapid Test for Hydrophytic Vegetation
Shrub Stratum (Plot size:)       10 = Total Cover         1.       0	Dominance Test is > 50%
1	Prevalence Index is ≤3.0 ¹
1.	Morphological Adaptations <sup>1</sup> (Provide supporting
2.       0       0.0%         3.       0       0.0%         4.       0       0.0%         5.       0       0.0%         6.       0       0.0%         7.       0       0.0%         Herb Stratum (Plot size: 15 )       0       = Total Cover         1. Microstegium vimineum       20       ✓ 90.9%         2. Polystichum acrostichoides       2       9.1%         3.       0       0.0%         4.       0       0.0%         5.       0       0.0%         6.       0       0.0%         7.       0       0.0%         8.       0       0.0%         9.       0       0.0%         10.       0       0.0%         11.       0       0.0%         12.       0       0.0%         12.       0       0.0%         15.       0       0.0%         17.       0       0.0%         10.       0.0%       0.0%         11.       0       0.0%         12.       0       0.0%         12.       0       0.0% <tr< td=""><td>data in Remarks or on a separate sheet)</td></tr<>	data in Remarks or on a separate sheet)
3.	Problematic Hydrophytic Vegetation 1 (Explain)
4.	<sup>1</sup> Indicators of hydric soil and wetland hydrology must
5.	be present, unless disturbed or problematic.
6.	Definition of Vegetation Strata:
7.	Four Vegetation Strata:
Herb Stratum       (Plot size: 15 )       0 = Total Cover         1. Microstegium vimineum       20	Tree stratum – Consists of woody plants, excluding vines, 3
Merb Stratum       (Plot size: 15)         1. Microstegium vimineum       20       ✓ 90.9%         2. Polystichum acrostichoides       2       9.1%         3.       0       0.0%         4.       0       0.0%         5.       0       0.0%         6.       0       0.0%         7.       0       0.0%         8.       0       0.0%         9.       0       0.0%         10.       0       0.0%         11.       0       0.0%         12.       0       0.0%         Woody Vine Stratum (Plot size: 15)       )       22       = Total Cover         1. Smilax rotundifolia       2       100.0%	in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
2. Polystichum acrostichoides  3.	Sapling/shrub stratum – Consists of woody plants, excluding
3.	vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
4 0 □ 0.0% 5 0 □ 0.0% 6 0 □ 0.0% 7 0 □ 0.0% 8 0 □ 0.0% 9 0 □ 0.0% 10 0 □ 0.0% 11 0 □ 0.0% 12 0 □ 0.0% 12 0 □ 0.0% Woody Vine Stratum (Plot size: 15 ) 22 = Total Cover 1 Smilax rotundifolia 2 □ 100.0%	Herb stratum – Consists of all herbaceous (non-woody)
5.	plants, regardless of size, and all other plants less than 3.28 ft tall.
6.	Woody vines – Consists of all woody vines greater than 3.28
7.	ft in height.
8.	Five Vegetation Strata:
9	Tree - Woody plants, excluding woody vines, approximately
10.	20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).
11	Sapling stratum – Consists of woody plants, excluding
12	woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.
Woody Vine Stratum         (Plot size: 15 )         22 = Total Cover           1 _ Smilax rotundifolia         2 100.0%	Shrub stratum – Consists of woody plants, excluding woody
1 Smilax rotundifolia 2 100.0%	vines, approximately 3 to 20 ft (1 to 6 m) in height.
	Herb stratum – Consists of all herbaceous (non-woody)
20 0.0%	plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately
	3 ft (1 m) in height.
3	Woody vines – Consists of all woody vines, regardless of
4	height.
5	Hydrophytic
6	Vegetation
2 = Total Cover	Present? Yes No •
Remarks: (Include photo numbers here or on a separate sheet.)	<u> </u>

Soil Sampling Point: 21-1 up

Profile Descr	iption: (De	escribe to	the depth	needed to documen	t the indic	ator or co	onfirm the	absence of indicators.)	
Depth		Matrix			lox Featu				
(inches)	-	(moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc2	Texture	Remarks
0-5	10YR	4/6	100					Silt Loam	
5-10	10YR	4/4	100					Silt Loam	
10-14	10YR	5/6	100					Silt Loam	
	-				-				
	-				-			-	
		-						-	
<sup>1</sup> Type: C=Cond	centration. I	D=Denleti	on. RM=Rec	luced Matrix, CS=Cover	ed or Coate	ed Sand Gr	ains 21 oc	ation: PL=Pore Lining. M=N	Matrix
Hydric Soil I		•	on. Ref-Rec	ideed Flactix, C5=Cover	ca or coat	ca Sana Gr	ums Loc		
Histosol (A				☐ Dark Surface (	57)			Indicators for Proble	•
l — `	pedon (A2)			Polyvalue Belov	•	S8) (MLRA	147.148)	2 cm Muck (A10) (I	MLRA 147)
Black Hist				☐ Thin Dark Surfa	•	, ,		Coast Prairie Redox (MLRA 147,148)	(A16)
	Sulfide (A4	+)		Loamy Gleyed			ŕ	Piedmont Floodplai	n Soils (E10)
Stratified	Layers (A5)	ı		Depleted Matrix				(MLRA 136, 147)	11 30115 (1 13)
2 cm Mucl	k (A10) (LR	R N)		Redox Dark Su	rface (F6)			Very Shallow Dark	Surface (TF12)
☐ Depleted	Below Dark	Surface (	A11)	Depleted Dark	Surface (F	7)		Other (Explain in R	emarks)
☐ Thick Darl	k Surface (A	A12)		Redox Depress	. ,				
Sandy Mu MLRA 147	ck Mineral ( ', 148)	(S1) (LRR	N,	☐ Iron-Manganes MLRA 136)	e Masses (	F12) (LRR	N,		
_	yed Matrix	(S4)		Umbric Surface	(F13) (ML	RA 136, 12	22)	2	
Sandy Red		. ,		Piedmont Floor	lplain Soils	(F19) (ML	RA 148)	<sup>3</sup> Indicators of h	ydrophytic vegetation and rology must be present,
Stripped N	Matrix (S6)			Red Parent Ma	terial (F21)	(MLRA 12	7, 147)	unless dis	turbed or problematic.
Restrictive La	ayer (if ob	served):							
Туре:									
Depth (incl	hes):							Hydric Soil Present?	Yes O No 🗨
Remarks:								,	



Photo File: IM	IG_3412.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting:	77°30'39.711"	Lat/Northing: 38°43'40.159"N
Description:			

Photo File: No	one.bmp	Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

ibregion (LRR or MLRA): MLRA 148  il Map Unit Name: Dulles silt loam  re climatic/hydrologic conditions on the Vegetation , Soil , of ve Vegetation , Soil , of the Vegetation Present?	illside B in LRR S Lat ne site typical for this time of or Hydrology  significa or Hydrology  naturally	ryear? Yes No (If no ntly disturbed? Are "Norma	S T R  none): flat Slope: 8.0% /  ong.: 77°30'41.203"W Datum: NAD  NWI classification:  o, explain in Remarks.)  al Circumstances" present? Yes No  ons, transects, important feature	
ndform (hillslope, terrace, etc.): Hibregion (LRR or MLRA): MLRA 148 il Map Unit Name: Dulles silt loam e climatic/hydrologic conditions on the Vegetation , Soil , one vegetation , one vegetation , Soil , one vegetation , one vegetation , Soil , one vegetation ,	in LRR S  Late the site typical for this time of the site typical for this time of the result of the site of the s	Local relief (concave, convex,  :: 38°43'40.958"N Lo  i year? Yes No (If no ntly disturbed? Are "Norma ntly disturbed? (If needed, sampling point location  Is the Sampled Area	none): flat Slope: 8.0% /  ong.: 77°30'41.203"W Datum: NAI  NWI classification:  o, explain in Remarks.)  al Circumstances" present? Yes No  n, explain any answers in Remarks.)  ons, transects, important feature	D 83
region (LRR or MLRA): MLRA 148  Map Unit Name: Dulles silt loam  climatic/hydrologic conditions on th  Vegetation , Soil , o  Vegetation , Soil , o  Immary of Findings - Attace  drophytic Vegetation Present? Y  dric Soil Present? Y  etland Hydrology Present?	in LRR S  Late the site typical for this time of the site typical for this time of the result of the site of the s	i: 38°43'40.958"N Lo  Fyear? Yes No (If no ntly disturbed? Are "Norma y problematic? (If needed, y sampling point location  Is the Sampled Area	ng.: 77°30'41.203"W Datum: NAL NWI classification:  o, explain in Remarks.)  al Circumstances" present? Yes No ( , explain any answers in Remarks.)  ons, transects, important feature	D 83
Map Unit Name: Dulles silt loam  climatic/hydrologic conditions on th  Vegetation , Soil , o  Vegetation , Soil , o  Immary of Findings - Attace  rdrophytic Vegetation Present? Y  rdric Soil Present? Y  etland Hydrology Present? Y	ne site typical for this time of or Hydrology significator Hydrology naturally ch site map showing ses No o	i year? Yes No (If no ntly disturbed? Are "Norma problematic? (If needed, sampling point location Is the Sampled Area	NWI classification:  o, explain in Remarks.)  al Circumstances" present? Yes No  , explain any answers in Remarks.)  ons, transects, important feature	)
Map Unit Name: Dulles silt loam  climatic/hydrologic conditions on th  Vegetation , Soil , o  Vegetation , Soil , o  Immary of Findings - Attace  rdrophytic Vegetation Present? Y  rdric Soil Present? Y  etland Hydrology Present? Y	ne site typical for this time of or Hydrology significator Hydrology naturally ch site map showing ses No o	i year? Yes No (If no ntly disturbed? Are "Norma problematic? (If needed, sampling point location Is the Sampled Area	NWI classification:  o, explain in Remarks.)  al Circumstances" present? Yes No  , explain any answers in Remarks.)  ons, transects, important feature	)
climatic/hydrologic conditions on the Vegetation , Soil , o Vegetation , Soil , o Immary of Findings - Attacked and the Attacked of the Vegetation Present? Yes a vegetation Present? Yes a vegetation Present? Yes a vegetation Present? Yes a vegetation Present? Yes a vegetation Present? Yes a vegetation Present? Yes a vegetation Present? Yes a vegetation Present?	or Hydrology  significator Hydrology  naturally  naturally  steep showing  see  No	ntly disturbed? Are "Norma , problematic? (If needed,  sampling point location  Is the Sampled Area	o, explain in Remarks.) al Circumstances" present? Yes No ( , explain any answers in Remarks.) ons, transects, important feature	
Vegetation , Soil , o  Vegetation , Soil , o  Immary of Findings - Attace  Addrophytic Vegetation Present? Y  Addric Soil Present? Y  etland Hydrology Present? Y	or Hydrology  significator Hydrology  naturally  naturally  steep showing  see  No	ntly disturbed? Are "Norma , problematic? (If needed,  sampling point location  Is the Sampled Area	al Circumstances" present? Yes No ( , explain any answers in Remarks.)  ons, transects, important feature	
Vegetation , Soil , o  Immary of Findings - Attace  Addrophytic Vegetation Present? Y  Addric Soil Present? Y  etland Hydrology Present?	ch site map showing  Yes No  No  No  No  No  No  No  No  No  No	y problematic? (If needed, y sampling point location Is the Sampled Area	, explain any answers in Remarks.) ons, transects, important feature	
ummary of Findings - Attac ydrophytic Vegetation Present? Y ydric Soil Present? Y etland Hydrology Present? Y	ch site map showing  'es O No O  'es O No O	sampling point location	ons, transects, important feature	s, etc
ydrophytic Vegetation Present? Y ydric Soil Present? Y etland Hydrology Present? Y	'es ○ No ● 'es ○ No ●	Is the Sampled Area		s, etc
ydric Soil Present?  etland Hydrology Present?	′es O No 🗨		Yes ○ No ●	
rdric Soil Present?  Yetland Hydrology Present?			Yes ○ No •	
etland Hydrology Present?			Yes ∪ No ♥	
ctiana rryarology r resent.	- 1.0			
temarks:				
lydrology				
Vetland Hydrology Indicators:			Cocondan, Indicators (minimum of this required	
Primary Indicators (minimum of one	required: check all that appl	(v)	Secondary Indicators (minimum of two required  Surface Soil Cracks (B6)	<u>.)                                    </u>
Surface Water (A1)	True Aquatic P		Sparsely Vegetated Concave Surface (B8)	
High Water Table (A2)	Hydrogen Sulf	ide Odor (C1)	✓ Drainage Patterns (B10)	
Saturation (A3)	Oxidized Rhizo	spheres along Living Roots (C3)	Moss Trim Lines (B16)	
Water Marks (B1)	Presence of Re	educed Iron (C4)	Dry Season Water Table (C2)	
Sediment Deposits (B2)	Recent Iron Re	eduction in Tilled Soils (C6)	Crayfish Burrows (C8)	
☐ Drift deposits (B3) ☐ Algal Mat or Crust (B4)	☐ Thin Muck Sur	. ,	Saturation Visible on Aerial Imagery (C9)	
Iron Deposits (B5)	U Other (Explain	in Remarks)	☐ Stunted or Stressed Plants (D1) ☐ Geomorphic Position (D2)	
Inundation Visible on Aerial Imagery	(B7)		Shallow Aquitard (D3)	
Water-Stained Leaves (B9)			Microtopographic Relief (D4)	
Aquatic Fauna (B13)			FAC-neutral Test (D5)	
Field Observations:	(2)			
Surface Water Present? Yes	No Depth (inche	s):		
Water Table Present? Yes	No O Depth (inche	S):	vdrology Present? Yes O No 💿	
VAC	No Depth (inche	s):	ydrology Present? 165 C NO C	
	ge, monitoring well, aerial ph	notos, previous inspections), if a	vailable:	
	No Depth (inche	wetland Hy	, e.e.g,	○ No ●

			ominant ecies? _		Sampling Point: 22-1 up
Tree Stratum (Plot size: <u>30</u> )	Absolute % Cover	Re	l.Strat.	Indicator Status	Dominance Test worksheet:
1 Carya tomentosa	25	<b>V</b>	50.0%	UPL	Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)
2 Acer rubrum	25	<b>~</b>	50.0%	FAC	
3			0.0%		Total Number of Dominant Species Across All Strata: 6 (B)
4			0.0%		Species Across Air Strata.
5	_		0.0%		Percent of dominant Species
6			0.0%		That Are OBL, FACW, or FAC: 50.0% (A/B)
7			0.0%		Prevalence Index worksheet:
8.	0		0.0%		Total % Cover of: Multiply by:
(8)	50	= To	tal Cove	r	0BL species 0 x 1 = 0
Sapling-Sapling/Shrub Stratum (Plot size: 15					FACW species 10 x 2 = 20
1 Carya tomentosa		<b>V</b>	33.3%	UPL	FAC species 42 x 3 = 126
2. Ulmus americana		<b>✓</b>	66.7%	FACW	FACU species $\frac{5}{}$ x 4 = $\frac{20}{}$
3			0.0%		UPL species $\frac{30}{30}$ x 5 = $\frac{150}{30}$
4			0.0%		of Lapecies A 5 -
5	_	$\vdash$	0.0%		Column Totals: <u>87</u> (A) <u>316</u> (B)
6	_	$\vdash$	0.0%		Prevalence Index = $B/A = 3.632$
7		Н	0.0%		Hydrophytic Vegetation Indicators:
8	_	Н	0.0%		Rapid Test for Hydrophytic Vegetation
9.		Н	0.0%		☐ Dominance Test is > 50%
10		Ш	0.0%		Prevalence Index is ≤3.0 <sup>1</sup>
Shrub Stratum (Plot size:)	15	= To	otal Cove	r	☐ Morphological Adaptations ¹ (Provide supporting
1	0		0.0%		data in Remarks or on a separate sheet)
2	0		0.0%		Problematic Hydrophytic Vegetation 1 (Explain)
3	0		0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4	0		0.0%		be present, unless disturbed or problematic.
5	0		0.0%		Definition of Vegetation Strata:
6	0		0.0%		Four Vegetation Strata:
7	0		0.0%		Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH),
Herb Stratum (Plot size:)	0	= To	otal Cove	r	regardless of height.
1	0		0.0%		Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2.	_		0.0%		
3			0.0%		Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28
4			0.0%		ft tall.
5	0		0.0%		Woody vines - Consists of all woody vines greater than 3.28   ft in height.
6	0		0.0%		Five Vegetation Strata:
7	0		0.0%		
8	0		0.0%		Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9	0		0.0%		diameter at breast height (DBH).
10	0		0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
11			0.0%		less than 3 in. (7.6 cm) DBH.
12	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody
Woody Vine Stratum (Plot size: 15 )	0	= To	otal Cove	r	vines, approximately 3 to 20 ft (1 to 6 m) in height.  Herb stratum – Consists of all herbaceous (non-woody)
1 Lonicera japonica	5	<b>v</b>	22.7%	FACU	plants, including herbaceous vines, regardless of size, and
2. Smilax rotundifolia	15	<b>✓</b>	68.2%	FAC	woody species, except woody vines, less than approximately   3 ft (1 m) in height.
O Comments weatherns			9.1%	FAC	Woody vines – Consists of all woody vines, regardless of
3. Campsis radicans 4		$\exists$	0.0%		height.
5			0.0%		
56.			0.0%		Hydrophytic
U			o.o% otal Cove		Vegetation   Present?   Yes ○ No ●

Soil Sampling Point: 22-1 up

Profile Descr	iption: (De	escribe to	the depth	needed to documen	t the indic	ator or co	onfirm the	absence of indicators.)	•
Depth		Matrix			lox Featu				
(inches)	-	(moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc2	Texture	Remarks
0-5	5YR	3/4	100					Loam	
5-8	10YR	5/4	100					Coarse Sandy Loam	
8-14	10YR	5/3	50					Silt Loam	
	10YR	5/6	_ 50					Silt Loam	
	-							,	
								-	
	-							-	
		_			-			-	
<sup>1</sup> Type: C=Con	centration.	D=Depletio	on. RM=Red	luced Matrix, CS=Cover	ed or Coate	ed Sand Gr	ains <sup>2</sup> Loc	ation: PL=Pore Lining. M=I	Matrix
Hydric Soil I								Indicators for Proble	ematic Hydric Soils <sup>3</sup> :
Histosol (	,			Dark Surface (	•			2 cm Muck (A10) (	MLRA 147)
☐ Histic Epip☐ Black Hist	bedon (A2)			Polyvalue Belov	•	, ,		Coast Prairie Redox	x (A16)
	Sulfide (A4	1)		☐ Thin Dark Surfa			140)	(MLRA 147,148)	
l — ' -	Layers (A5)	•		Depleted Matrix				Piedmont Floodpla (MLRA 136, 147)	in Soils (F19)
	k (A10) (LR			Redox Dark Su	. ,			Very Shallow Dark	Surface (TF12)
☐ Depleted	Below Dark	Surface (A	A11)	Depleted Dark	Surface (F	7)		Other (Explain in F	, ,
☐ Thick Dar	k Surface (A	A12)		Redox Depress	ions (F8)				,
Sandy Mu MLRA 147	ck Mineral ( 7, 148)	(S1) (LRR	N,	Iron-Manganes MLRA 136)	e Masses (	F12) (LRR	N,		
Sandy Gle	eyed Matrix	(S4)		Umbric Surface	(F13) (ML	RA 136, 12	22)	3	
Sandy Re	dox (S5)			Piedmont Floor	lplain Soils	(F19) (ML	RA 148)	Indicators of I wetland hyd	hydrophytic vegetation and rology must be present,
Stripped I	Matrix (S6)			Red Parent Ma	terial (F21)	) (MLRA 12	7, 147)		sturbed or problematic.
Restrictive L	ayer (if ob	served):							
Type:								Hydric Soil Present?	Yes ○ No •
Depth (inc	hes):							Tryune Son Tresent:	165 C 110 C
Remarks:									he survey area. A data point
was taken he	re to confi	rm the w	ater move	s through the area af	ter storm	events a	nd does no	ot sit long saturating the	profile.

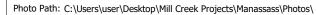




Photo File: IMG\_3413.JPG Orientation: -facing

Lat/Long or UTM: Long/Easting: 77°30'41.203" Lat/Northing: 38°43'40.958"N

Description:



Photo File: IMG\_3415.JPG Orientation: -facing

Lat/Long or UTM: Long/Easting: 0 Lat/Northing: 0

Description:

Description   Company   March   Marc	Section, Township, Range: S T R   R	Mott Neely   Section, Township, Range: S   T   R     Indicators   In	Independent of the second of t	Section, Township, Range:	S T R	)
and form (hillslope, terrace, etc.): Hillslide	and form (hillslope, terrace, etc.): Hillside	And form (hillslope, terrace, etc.): Hillside   Local relief (concave, convex, none): flat   Slope: 7,0%   4,0	ndform (hillslope, terrace, etc.): Hillside Lecture bregion (LRR or MLRA): MLRA 148 in LRR S Lat.: 3	ocal relief (concave, convex,		
Map Unit Name:   Hatboro Silt   loam	Map Unit Name:   Hatboro Silt   oam	Map Unit Name:   Hatboro silt loam   Name:   Na	region (LRR or MLRA): MLRA 148 in LRR S Lat.: 3		none): flat Slope:7.0%/	
Map Unit Name: Hatboro silt loam:    Map Unit Name: Hatboro silt loam:   NWI classification:	Map Unit Name: Hatboro slit loam	Map Unit Name: Hatboro silt loam		88°43'51.811"N Lo		4.0
Map Unit Name: Hatboro silt loam	Map Unit Name: Hatboro silt loam	Map Unit Name: Hatboro silt loam			ong.: 77°30'47.894"W	D 83
climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation  , Soil  , or Hydrology  significantly disturbed?  Are "Normal Circumstances" present?  Yes  No  No  No  No  No  No  No  No  No  N	climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  Vegetation  , Soil  , or Hydrology    significantly disturbed?	Climatic/hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)	Map Unit Name: Hatboro silt loam			
Vegetation	Vegetation	Vegetation	climatic/hydrologic conditions on the site typical for this time of year	ur? Yes • No O (If no	o evolain in Remarks \	
Vegetation   , Soil   , or Hydrology   naturally problematic? (If needed, explain any answers in Remarks.)	Vegetation	Vegetation			· · · · · · · · · · · · · · · · · · ·	$\sim$
Immary of Findings - Attach site map showing sampling point locations, transects, important features, expropriets of Findings - Attach site map showing sampling point locations, transects, important features, expropriets of the property o	Immary of Findings - Attach site map showing sampling point locations, transects, important features, or property of the prope	Information of Findings - Attach site map showing sampling point locations, transects, important features, et prophytic Vegetation Present? Yes No Important Seatures, et al. In the Sampled Area within a Wetland? Yes No Important Seatures, et al. In the Sampled Area within a Wetland? Yes No Important Seatures, et al. In the Aquation Present? Yes No Important Seatures, et al. In the Aquation Sea			ar enreament present.	
Is the Sampled Area within a Wetland?   Yes   No   No   No   Is the Sampled Area within a Wetland?   Yes   No   No   No   No   No   No   No   N	Is the Sampled Area within a Wetland?   Yes   No   No   Is the Sampled Area within a Wetland?   Yes   No   Is the Sampled Area within a Wetland Pytrology Present?   Yes   No   Is the Sampled Area within a Wetland?   Yes   No   Is the Sampled Area within a Wetland?   Yes   No   Is the Sampled Area within a Wetland?   Yes   No   Is the Sampled Area within a Wetland?   Yes   No   Is the Sampled Area within a Wetland?   Yes   No   Is the Sampled Area within a Wet	Is the Sampled Area within a Wetland?   Yes   No    No    Is the Sampled Area within a Wetland?   Yes   No    No    Is the Sampled Area within a Wetland?   Yes   No    No    Is the Sampled Area within a Wetland?   Yes   No    No    Is the Sampled Area within a Wetland?   Yes   No    No    Is the Sampled Area within a Wetland?   Yes   No    Is the Sampled Area within a Wetland?	Vegetation . , Soil . , or Hydrology . naturally pro	oblematic? (If needed,	, explain any answers in Remarks.)	
Addric Soil Present?  Yes No  No  No  No  No  No  No  No  No  No	Is the Sampled Area within a Wetland?  Ves No   No   No   No   No   No   No   No	Is the Sampled Area within a Wetland?    Ves   No   Ves	ımmary of Findings - Attach site map showing sa	mpling point location	ons, transects, important features	s, etc
retaind Hydrology Present?    Yes   No   Is the Sampled Area within a Wetland?   Yes   No   Is the Sampled Area within a Wetland Hydrology Present?   Yes   No   Is the Sampled Area within a Wetland Hydrology Present?   Yes   No   Is the Sampled Area within a Wetland Hydrology Present?   Yes   No   Is the Sampled Area within a Wetland?   Yes   No   Is the Sampled Area within a Wetland?   Yes   No   Is the Sampled Area within a Wetland?   Yes   No   Is the Sampled Area within a Wetland?   Yes   No   Is the Sampl	remarks:    Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)   Surface Vater (A1)   True Aquatic Plants (B14)   Surface Vater (A1)   Presence of Reduced Iron (C4)   Dry Season Water Table (A2)   Saturation (A3)   Oxidized Rhizospheres along Living Roots (C3)   Dry Season Water Table (C2)   Sediment Deposits (B2)   Recent Iron Reduction in Tilled Soils (C6)   Crayfish Burrows (C8)   Algal Mat or Crust (B4)   Thin Muck Surface (C7)   Saturation Visible on Aerial Imagery (B7)   Water-Stained Leaves (B9)   Microtopographic Relief (D4)   FAC-neutral Test (D5)   Siduration Newscore (B8)   Depth (inches):   Wetland Hydrology Present?   Yes   No	Addic Soil Present?  Yes No   No   Is the Sampled Area within a Wetland?  Yes No   No   No   No   Is the Sampled Area within a Wetland?  Yes No   No   No   No   No   No   No   No	drophytic Vegetation Present? Yes No •			-
within a Wetland?    Veriand Hydrology Present?   Ves   No   No   Within a Wetland?   Veriand Hydrology Indicators:	within a Wetland?  Vers No No No Within a Wetland?  Vers No No No No No No No No No No No No No	Wetland Hydrology Present?   Yes   No   Within a Wetland?   No   Wetland   Yes   Yes   No   Depth (inches):   Wetland   Yes   Yes   No   Depth (inches):   Wetland   Yes   Yes   No   Depth (inches):   Wetland   Yes   Yes   No   Wetland   Yes   Yes   Yes   Yes   No   Wetland   Yes   Yes   Yes   No   Wetland   Yes   Y	· · · · · · · · · · · · · · · · · · ·	Is the Sampled Area		
Interest   Interest	Interest   Interest	Interest   Interest	Vac Ala 🔘		Yes ○ No ●	
Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)	Secondary Indicators (minimum of two required)   Surface Soil Cracks (B6)	Netland Hydrology Indicators:   Secondary Indicators (minimum of two required)	cuma rryarotogy r resent.			
Vetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	Vetland Hydrology Indicators:    Secondary Indicators (minimum of two required)	Vetland Hydrology Indicators:  Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Water Table Present?  Yes  No  Depth (inches):  Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	vdrology			
Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  High Water Table (A2)  High Water Table (A2)  Water Marks (B1)  Sediment Deposits (B2)  Drift deposits (B3)  Trin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Test No  Depth (inches):  Water Marks (Plants (B14)  Sparsely Vegetated Concave Surface (B8)  Drift deyosits (C1)  Drainage Patterns (B10)  Moss Trim Lines (B16)  Drift Mess Trim Lines (B16)  Drift Agoots (C3)  Moss Trim Lines (B16)  Drift Agoots (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Crayfish Burrows (C8)  Saturation Visible on Aerial Imagery (C9)  Saturation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Shallow Aquitard (D3)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Feld Observations:  Wetland Hydrology Present? Yes No  Depth (inches):  Wetland Hydrology Present? Yes No  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Water (A1)  High Water Table (A2)  Water Marks (B1)  Presence of Reduced Iron (C4)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Staturation Present?  Water Table Present?  Yes  No  Depth (inches):  Depth (inches):  Surface Water Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Sparsely Vegetated Concave Surface (B8)  Sparsely Vegetated Concave Surface (B8)  Mos Strim Lines (B10)  Moss Trim Lines (B16)  Drift Algal Moss Trim Lines (B16)  Drift Algal Moss Trim Lines (B16)  Drift Algal Moss Trim Lines (B16)  Drift Algal Mater Crust (B4)  Sturtation Visible on Aerial Imagery (C9)  Stunted or Stressed Plants (D1)  Geomorphic Position (D2)  Inundation Visible on Aerial Imagery (B7)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  FAC-neutral Test (D5)  Wetland Hydrology Present?  Yes  No  Depth (inches):  Wetland Hydrology Present?  Yes  No  No  No  Depth (inches):	Primary Indicators (minimum of one required; check all that apply)  Surface Soil Cracks (B6)  Surface Water (A1)  High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Water Marks (B1)  Presence of Reduced Iron (C4)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Saturation Visible on Aerial Imagery (C9)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Sield Observations:  Surface Water Present?  Yes  No  Depth (inches):  Depth (inches):  Water Table Present?  Yes  No  Depth (inches):  Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:				
Surface Water (A1)	Surface Water (A1)	Surface Water (A1)				)
High Water Table (A2)	High Water Table (A2)	High Water Table (A2)  Hydrogen Sulfide Odor (C1)  Saturation (A3)  Oxidized Rhizospheres along Living Roots (C3)  Moss Trim Lines (B16)  Dry Season Water Table (C2)  Sediment Deposits (B2)  Recent Iron Reduction in Tilled Soils (C6)  Drift deposits (B3)  Thin Muck Surface (C7)  Algal Mat or Crust (B4)  Iron Deposits (B5)  Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Water Present?  Yes  No  Depth (inches):  Depth (inches):  Saturation Present?  Yes  No  Depth (inches):  Depth (inch		(R14)		
Saturation (A3)	Saturation (A3)	Saturation (A3)		• ,		
Sediment Deposits (B2)	Sediment Deposits (B2)	Sediment Deposits (B2)	7, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3,	` '		
Drift deposits (B3)	Drift deposits (B3)	Drift deposits (B3)				
Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	Algal Mat or Crust (B4)	Sediment Deposits (B2) Recent Iron Reduct	tion in Tilled Soils (C6)	Crayfish Burrows (C8)	
☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Water Table Present? Yes ○ No ② Depth (inches): ☐ Vater Table Present? Yes ○ No ③ Depth (inches): ☐ Saturation Present? Yes ○ No ④ Depth (inches): ☐ Section of the Capital Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ Wetland Hydrology Present? Yes ○ No ④ Depth (inches): ☐ Staturation Present? Yes ○ No ④ Depth (inches): ☐ Wetland Hydrology Present? Yes ○ No ④	☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Sield Observations:  Surface Water Present? Yes ○ No ② Depth (inches): ☐ Vater Table Present? Yes ○ No ③ Depth (inches): ☐ Saturation Present? Yes ○ No ④ Depth (inches): ☐ Wetland Hydrology Present? Yes ○ No ④ Depth (inches): ☐ Saturation Present? Yes ○ No ④ Depth (inches): ☐ Saturation Present? Yes ○ No ④ Depth (inches): ☐ Saturation Present? Yes ○ No ④ Depth (inches): ☐ Saturation Present? Yes ○ No ④ Depth (inches): ☐ Saturation Present? Yes ○ No ④ Depth (inches): ☐ Saturation Present? Yes ○ No ④ Depth (inches): ☐ Shallow Aquitard (D3) ☐ Shallow Aquitard (D3) ☐ Microtopographic Relief (D4) ☐ FAC-neutral Test (D5) ☐ F	☐ Iron Deposits (B5) ☐ Geomorphic Position (D2) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Shallow Aquitard (D3) ☐ Water-Stained Leaves (B9) ☐ Microtopographic Relief (D4) ☐ Aquatic Fauna (B13) ☐ FAC-neutral Test (D5) ☐ Water Present? Yes ☐ No ☐ Depth (inches): ☐ Water Table Present? Yes ☐ No ☐ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ☐ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ☐ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ☐ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ☐ Depth (inches): ☐ Wetland Hydrology Present? Yes ☐ No ☐ Depth (inches): ☐ Yescribe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		(C7)	Saturation Visible on Aerial Imagery (C9)	
Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Sield Observations:  Surface Water Present?  Vater Table Present?  Yes ○ No ○ Depth (inches):  Saturation Present?  Yes ○ No ○ Depth (inches):  Saturation Present?  Yes ○ No ○ Depth (inches):  Saturation Present?  Yes ○ No ○ Depth (inches):  Saturation Present?  Yes ○ No ○ Depth (inches):  Saturation Present?  Yes ○ No ○ Depth (inches):  Saturation Present?  Yes ○ No ○ Depth (inches):	Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Sield Observations:  Surface Water Present?  Vater Table Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Depth (inches):  Saturation Present?  Yes No  Saturation Present?	Inundation Visible on Aerial Imagery (B7)  Water-Stained Leaves (B9)  Aquatic Fauna (B13)  Inundation Visible on Aerial Imagery (B7)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Inundation Visible on Aerial Imagery (B7)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Inundation Visible on Aerial Imagery (B7)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Inundation Visible on Aerial Imagery (B7)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Inundation Visible on Aerial Imagery (B7)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Inundation Visible on Aerial Imagery (B7)  Microtopographic Relief (D4)  FAC-neutral Test (D5)  Inundation Visible on Aerial Imagery (B7)  FAC-neutral Test (D5)  Inundation Visible on Aerial Imagery (B7)  FAC-neutral Test (D5)  Inundation Visible on Aerial Imagery (B7)  FAC-neutral Test (D5)  Inundation Visible on Aerial Imagery (B7)  FAC-neutral Test (D5)  Inundation Visible on Aerial Imagery (B7)  FAC-neutral Test (D5)  Inundation Visible on Aerial Imagery (B7)  FAC-neutral Test (D5)  No   Depth (inches):  Wetland Hydrology Present?  Yes  No   No   No   Depth (inches):  Packer Table Present?  Yes  No   Depth (inches):  No   No   No   No   No   No   No   No		emarks)		
Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Seturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):	Water-Stained Leaves (B9)  Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):  Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):	Water-Stained Leaves (B9) Aquatic Fauna (B13)  No Depth (inches):  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Persont (inches):  Saturation Prese				
Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):	Aquatic Fauna (B13) FAC-neutral Test (D5)  Field Observations:  Surface Water Present? Yes No Depth (inches):  Water Table Present? Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Depth (inches):  Depth (inches):	Aquatic Fauna (B13)  FAC-neutral Test (D5)  Field Observations:  Surface Water Present?  Water Table Present?  Yes No Depth (inches):  Saturation Present?  Yes No Depth (inches):  Securitation Present?  Yes No Persont (inches):  Securitation Present?  Yes No Persont (inches):  Securitation Present?  Yes No Persont (inches):  Securitation Present?  Yes No Persont (inches):  Securitation Present?  Yes No Persont (inches):				
Surface Water Present? Yes No Depth (inches):	Surface Water Present? Yes No Depth (inches):	Surface Water Present? Yes No Depth (inches):				
Vater Table Present? Yes No Depth (inches):	Vater Table Present? Yes No Depth (inches):	Vater Table Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No escribe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	ield Observations:			
Saturation Present?  Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches):	Saturation Present?  Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (inches):	Saturation Present? Yes No Depth (inches): Wetland Hydrology Present? Yes No Depth (includes capillary fringe)  Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	Surface Water Present? Yes O No O Depth (inches):			
includes capillary fringe)  Yes No Depth (inches):	includes capillary fringe)  Yes No Depth (inches):	Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	Nater Table Present? Yes No Depth (inches):			
includes capitally fillinger	includes capillary fringe)	Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	Saturation Present? Ves No ( Depth (inches):	Wetland H	ydrology Present? Yes O No •	
Acception Proceeded Data (etroam gauge, monitoring well, acrial photos, provious inspections), if availables	rescribe Necorded Data (Stream gauge, monitoring weil, aerial priotos, previous inspections), il available.		includes capillary fringe)	s provious inspections) if a	vailable	
emarks:						
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Remarks:						

			ominant oecies? –		Sampling Point: 23-1 up
Tree Stratum (Plot size: 30)	Absolute % Cover	Re	el.Strat.	Indicator Status	Dominance Test worksheet:
4 B	20	<b>✓</b>	40.0%	FACU	Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)
Prunus serotina     Juniperus virginiana		<ul><li>✓</li></ul>	40.0%	FACU	That are OBL, FACW, or FAC: (A)
		<ul><li>✓</li></ul>	20.0%	FACU	Total Number of Dominant
		$\Box$	0.0%	TACO	Species Across All Strata: 4 (B)
4 5		П	0.0%		Percent of dominant Species
6		$\overline{\Box}$	0.0%		That Are OBL, FACW, or FAC: 25.0% (A/B)
7		$\overline{\sqcap}$	0.0%		Prevalence Index worksheet:
8		$\bar{\sqcap}$	0.0%		Total % Cover of: Multiply by:
	En .	 = To	otal Cover		0BL species
Sapling-Sapling/Shrub Stratum (Plot size:	_)				FACW species x 2 =
1			0.0%		FAC species 20 x 3 = 60
2			0.0%		FACU species $50 \times 4 = 200$
3			0.0%		l ' 0
4			0.0%		
5			0.0%		Column Totals:
6		Ц	0.0%		Prevalence Index = $B/A = \underline{3.714}$
7			0.0%		Hydrophytic Vegetation Indicators:
8		Ш	0.0%		Rapid Test for Hydrophytic Vegetation
9		Ш	0.0%		☐ Dominance Test is > 50%
10		Ш	0.0%		Prevalence Index is ≤3.0 <sup>1</sup>
Shrub Stratum (Plot size:)	=	= To	otal Cover		Morphological Adaptations <sup>1</sup> (Provide supporting
1	0		0.0%		data in Remarks or on a separate sheet)
2			0.0%		Problematic Hydrophytic Vegetation 1 (Explain)
3	0		0.0%		<sup>1</sup> Indicators of hydric soil and wetland hydrology must
4	0		0.0%		be present, unless disturbed or problematic.
5	0		0.0%		Definition of Vegetation Strata:
6	0		0.0%		Four Vegetation Strata:
7	0		0.0%		Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH),
Herb Stratum (Plot size: 15 )	0 =	= To	otal Cover		regardless of height.
1. Microstegium vimineum	20	<b>v</b>	100.0%	FAC	Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
2			0.0%		
3			0.0%		Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28
4	0		0.0%		ft tall.
5	0		0.0%		Woody vines – Consists of all woody vines greater than 3.28 ft in height.
6	0		0.0%		Five Vegetation Strata:
7	0		0.0%		
8			0.0%		Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in
9.	0		0.0%		diameter at breast height (DBH).
10	0		0.0%		Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and
11			0.0%		less than 3 in. (7.6 cm) DBH.
12	0		0.0%		Shrub stratum – Consists of woody plants, excluding woody
Woody Vine Stratum (Plot size: 15)	20=	= To	otal Cover		vines, approximately 3 to 20 ft (1 to 6 m) in height.  Herb stratum – Consists of all herbaceous (non-woody)
1 Lonicera japonica	0	П	0.0%	FACU	plants, including herbaceous vines, regardless of size, and
2		$\overline{\Box}$	0.0%		woody species, except woody vines, less than approximately 3 ft (1 m) in height.
		$\Box$	0.0%		Woody vines – Consists of all woody vines, regardless of
3 4		$\Box$	0.0%		height.
		$\Box$	0.0%		
5			0.0%		Hydrophytic
6		_	o.0.990 otal Cove		Vegetation
	11				

Soil Sampling Point: 23-1 up

Profile Descri	iption: (Describe to	the depth r	eeded to documen	t the indic	ator or co	onfirm the	absence of indicators.)	
Depth	Matrix		Rec	dox Featu				
(inches)	Color (moist)	%	Color (moist)	%	Type 1	Loc <sup>2</sup> _	Texture	Remarks
0-10	5YR 4/6	100					Clay Loam	
				-	-		,	
				-			-	
							-	
-				-				
				-			-	
<sup>1</sup> Type: C=Cond	centration. D=Depletion	n. RM=Redu	ced Matrix, CS=Cover	ed or Coate	ed Sand Gr	ains <sup>2</sup> Loc	ation: PL=Pore Lining. M=	Matrix
Hydric Soil I	<b>.</b>		,					
Histosol (A			☐ Dark Surface (	S7)			Indicators for Proble	-
`	pedon (A2)		Polyvalue Belov	•	S8) (MI DA	147 149\	2 cm Muck (A10) (	
							Coast Prairie Redo	x (A16)
Black Histi			☐ Thin Dark Surf			170)	(MLRA 147,148)	
	Sulfide (A4)		Loamy Gleyed				Piedmont Floodpla	in Soils (F19)
	Layers (A5)		Depleted Matri	` '			(MLRA 136, 147)	
	k (A10) (LRR N)		Redox Dark Su				☐ Very Shallow Dark	, ,
_ `	Below Dark Surface (A	(11)	Depleted Dark		<b>/</b> )		Other (Explain in F	Remarks)
	k Surface (A12)		Redox Depress	` '				
Sandy Mu MLRA 147	ck Mineral (S1) (LRR N ', 148)	Ν,	Iron-Manganes MLRA 136)	se Masses (	F12) (LRR	N,		
Sandy Gle	eyed Matrix (S4)		Umbric Surface	e (F13) (ML	.RA 136, 12	22)	2	
Sandy Red	dox (S5)		Piedmont Floor	dplain Soils	(F19) (ML	RA 148)	<sup>3</sup> Indicators of	nydrophytic vegetation and rology must be present,
Stripped N	Matrix (S6)		Red Parent Ma	iterial (F21)	) (MLRA 12	7, 147)		turbed or problematic.
	ayer (if observed):							
Type:							Hydric Soil Present?	Yes ○ No •
Depth (incl	hes):						Tryunc Son Tresent:	165 0 110 0
Remarks:								
soils are highl	y compacted. Very	difficult to	get auger into the g	round.				





Photo File: IM	IG_3416.JPG	Orientation:	-facing
Lat/Long or UTM :	Long/Easting:	77°30'47.894"	Lat/Northing: 38°43'51.811"N
Description:			

Photo File: None.bmp		Orientation:		-facing
Lat/Long or UTM:	Long/Easting: 0		Lat/Northing: 0	
Description:				

**From:** Morris, J. Clay [mailto:CMorris@pwcgov.org] **Sent:** Thursday, November 30, 2017 2:10 PM

**To:** Matt Neely <millcreekenvironment@comcast.net>

Cc: Alberts, David <David.Alberts@rsandh.com>; Chanthakoune, Pon <pchanthakoune@pwcgov.org>

Subject: RE: Manassas Regional Airport

#### Good afternoon Matt,

I visited the study site and concur with your delineation and the extent of the Resource Protection Area as depicted.

Remember to reach out to Pon (<u>pchanthakoune@pwcgov.org</u>) should you decide to proceed with the Preservation Area Site Assessment submittal.

Clay Morris
Natural Resources Section Chief
Prince William County Public Works-Watershed Management
Office (703)792-4615
Cell (540)533-5383
cmorris@pwcgov.org

From: Matt Neely [mailto:millcreekenvironment@comcast.net]

**Sent:** Wednesday, November 29, 2017 9:45 AM **To:** Morris, J. Clay <<u>CMorris@pwcgov.org</u>>

Cc: <a href="mailto:david.alberts@rsandh.com">david.alberts@rsandh.com</a>
Subject: Manassas Regional Airport

Good morning Clay

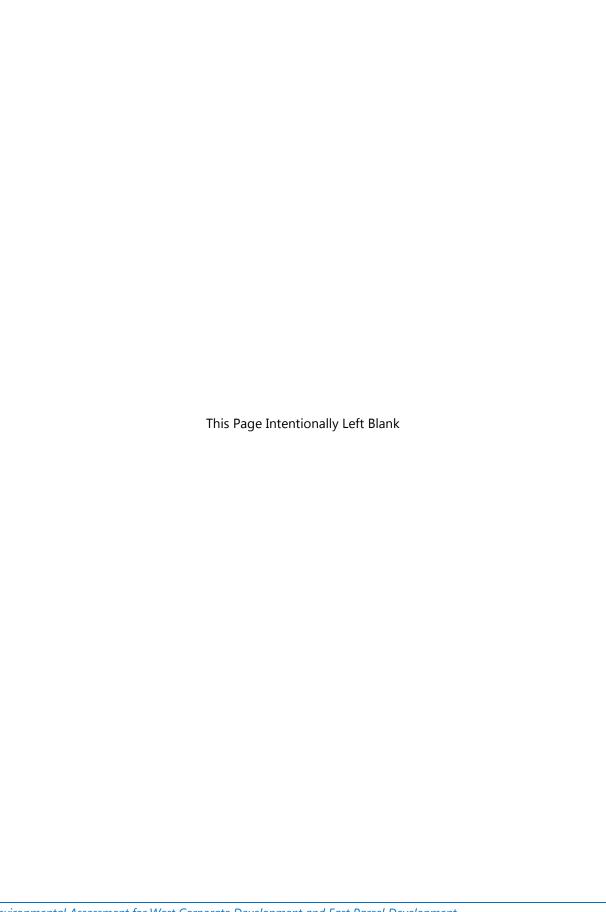
David Alberts from RS&H mentioned that after your discussion, and based upon their unique situation, that you had enough info to take a look at the RPA assessment and that you would go check out the site.

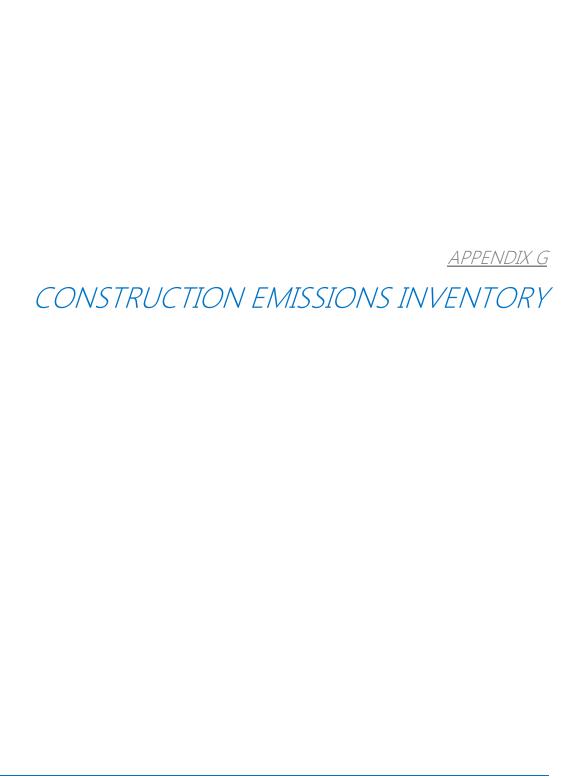
I was wondering if you have had the chance to take a look and how our submission compares to what you saw?

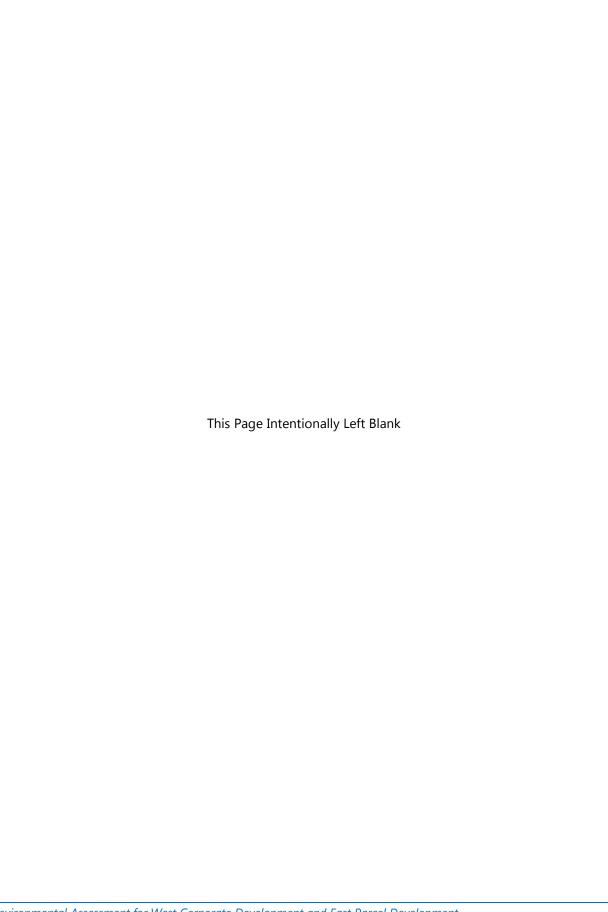
Hope you had a great Thanksgiving.

Matt Neely

Matt Neely President, PWD Mill Creek Environmental Consultants, Ltd. 11400 Longtown Drive Midlothian, VA 23112 804-739-2147 Office 757-329-0573 Cell







	OVERVIEW					
Component	Component Name	Project Type	Size			
1	On-Airport roadway improvements: 8,000 linear feet	Bit. Road	8000 LF			
2	FBO redevelopment: 1.6 acres (2 stories)	Structural	69,696			
3	Parking lot construction: 3.85 acres	Bit. Parking @grade	167,706			
4	Corporate hangar/building construction: 4.40 acres (1 story)	Structural	191,664			
5	Maintenance building construction: 0.27-acre (1 story)	Structural	11,761			
6	Wash rack construction: 0.27-acre (1 story)	Tank - Pump station	11,761			
7	T-hangar construction: 4.40 acres (1 story)	Structural	191,664			
8	T-hangar demo: 3 acres	Structural Demo	130,680			
9	Apron/Taxilane expansion: 29 acres	Bit. GA Apron	1,263,240			
10	Security fence extension: 6,518 linear feet	Fencing	6518 LF			
Definitions						
PCC	Portland Cement Concrete					
TXWY	Taxiway					
NAVAID	Navigational Aid					
Bit.	Bituminious					

Component		<b>Building GSF</b>
1	Х	8000 LF

		NONROAD Structural			
Equipment	Fuel Type	Activity Type	Activity Size	Activity Rate Hrs/SF	Est. Ho
Asphalt Paver	Diesel	Asphalt Placement	44,400.00 SY	8 Hours per 6,400 SY	
Dump Truck	Diesel	Asphalt Placement	44,400.00 SY	8 Hours per 1,777 SY	19
ther General Equipment	Diesel	Asphalt Placement	44,400.00 SY	16 Hours per 6,400 SY	
ickup Truck	Diesel	Asphalt Placement		8 Hours per 6,400 SY	
oller	Diesel	Asphalt Placement		8 Hours per 6,400 SY	
kid Steer Loader	Diesel	Asphalt Placement		8 Hours per 6,400 SY	
urfacing Equipment (Grooving)	Diesel Diesel	Asphalt Placement		8 Hours per 5,000 SY	
nain Saw	Diesel	Clearing and Grubbing	11.10 Acre	12 Hours per 1 Acre	1
nipper/Stump Grinder ckup Truck	Diesel	Clearing and Grubbing Clearing and Grubbing	11.10 Acre 11.10 Acre	12 Hours per 1 Acre 16 Hours per 1 Acre	1
oncrete Truck	Diesel	Curbing	16,000.00 LF	8 Hours per 400 LF	
urb/Gutter Paver	Diesel	Curbing	16,000.00 LF		
ther General Equipment	Diesel	Curbing	16,000.00 LF	8 Hours per 400 LF	
ckup Truck	Diesel	Curbing	16,000.00 LF		
ozer	Diesel	Drainage - 24 inch SICPP	8,010.00 LF	8 Hours per 250 LF	2
ump Truck	Diesel	Drainage - 24 inch SICPP	8,010.00 LF	8 Hours per 250 LF	2
cavator	Diesel	Drainage - 24 inch SICPP	8,010.00 LF	8 Hours per 250 LF	2
ader	Diesel	Drainage - 24 inch SICPP	8,010.00 LF	8 Hours per 250 LF	2
ther General Equipment	Diesel	Drainage - 24 inch SICPP	8,010.00 LF	8 Hours per 250 LF	2
ckup Truck	Diesel	Drainage - 24 inch SICPP	8,010.00 LF	8 Hours per 250 LF	2
oller	Diesel	Drainage - 24 inch SICPP	8,010.00 LF	8 Hours per 250 LF	2
ump Truck	Diesel	Drainage - 6 inch Perforated Underdrain	16,020.00 LF		1
pader	Diesel	Drainage - 6 inch Perforated	16.020.00 LF	8 Hours per 900 LF	1
	Diesel	Underdrain Drainage - 6 inch Perforated		8 Hours per 900 LF	1
ther General Equipment		Underdrain Drainage - 6 inch Perforated			
ckup Truck	Diesel	Underdrain	16,020.00 LF	8 Hours per 900 LF	1
ractors/Loader/Backhoe	Diesel	Drainage - 6 inch Perforated Underdrain	16,020.00 LF	8 Hours per 900 LF	1
/ater Truck	Diesel	Dust Control	240.00 Day	8 Hours per 1 Day	1,92
ozer	Diesel	Excavation (Borrow)		8 Hours per 600 CY	2
ump Truck (12 cy)	Diesel	Excavation (Borrow)		8 Hours per 600 CY	2
ickup Truck	Diesel	Excavation (Borrow)		8 Hours per 600 CY	2
oller	Diesel	Excavation (Borrow)		8 Hours per 1,300 CY	1
ozer	Diesel	Excavation (Cut to Fill)		8 Hours per 800 CY	
ump Truck (12 cy)	Diesel	Excavation (Cut to Fill)		8 Hours per 300 CY	4
ccavator	Diesel	Excavation (Cut to Fill)		8 Hours per 1,000 CY	
ickup Truck	Diesel	Excavation (Cut to Fill)		8 Hours per 1,000 CY	
oller	Diesel	Excavation (Cut to Fill)		8 Hours per 1,000 CY	
craper	Diesel	Excavation (Cut to Fill)	18,500.00 CY	8 Hours per 800 CY	
ozer	Diesel	Excavation (Topsoil Stripping)	44,400.00 SY	8 Hours per 5,100 SY	
oncrete Truck	Diesel	Fencing	8,000.00 LF	2 Hours per 180 LF	
ump Truck	Diesel	Fencing	8,000.00 LF	8 Hours per 180 LF	3
Other General Equipment	Diesel	Fencing	8,000.00 LF	8 Hours per 180 LF	3
ickup Truck	Diesel	Fencing	8,000.00 LF	8 Hours per 180 LF	3
kid Steer Loader	Diesel	Fencing	8,000.00 LF	8 Hours per 180 LF	3
ractors/Loader/Backhoe	Diesel	Fencing	8,000.00 LF	8 Hours per 180 LF	3
ozer	Diesel	Grading	53,346.60 SY	8 Hours per 8,000 SY	
irader	Diesel	Grading	53,346.60 SY	8 Hours per 8,000 SY	
oller	Diesel	Grading		8 Hours per 8,000 SY	
ydroseeder	Diesel	Hydroseeding	480,600.00 SF	8 Hours per 80,000 SF	
ff-Road Truck	Diesel	Hydroseeding	480,600.00 SF	8 Hours per 80,000 SF	
latbed Truck	Diesel	Markings	400,000.00 SF	8 Hours per 3,500 SF	9
ther General Equipment	Diesel	Markings	400,000.00 SF	8 Hours per 3,500 SF	9
ickup Truck	Diesel	Markings	400,000.00 SF	8 Hours per 3,500 SF	9
oncrete Truck	Diesel	Sidewalks	48,000.00 SF	8 Hours per 600 SF	
ump Truck	Diesel	Sidewalks	48,000.00 SF	8 Hours per 600 SF	
ickup Truck	Diesel	Sidewalks	48,000.00 SF	8 Hours per 600 SF	
ractors/Loader/Backhoe	Diesel	Sidewalks	48,000.00 SF	8 Hours per 600 SF	
ibratory Compactor	Diesel	Sidewalks	48,000.00 SF	8 Hours per 600 SF	
ther General Equipment	Diesel	Soil Erosion/Sediment Control	11.10 Acre	4 Hours per 1 Acre	
ickup Truck	Diesel	Soil Erosion/Sediment Control	11.10 Acre	8 Hours per 1 Acre	
umps	Diesel	Soil Erosion/Sediment Control	11.10 Acre	4 Hours per 1 Acre	
ractors/Loader/Backhoe	Diesel	Soil Erosion/Sediment Control	11.10 Acre	4 Hours per 1 Acre	
lump Truck	Diesel	Street Lighting	80.00 Lights	8 Hours per 3 Lights	2
oader	Diesel	Street Lighting	80.00 Lights	8 Hours per 3 Lights	2
ther General Equipment	Diesel Diesel	Street Lighting	80.00 Lights	8 Hours per 3 Lights	2
ickup Truck kid Steer Loader	Diesel	Street Lighting Street Lighting	80.00 Lights 80.00 Lights	8 Hours per 3 Lights 8 Hours per 3 Lights	2
ractors/Loader/Backhoe	Diesel	Street Lighting Street Lighting	-	8 Hours per 3 Lights	2
ractors/Loader/Backhoe ozer	Diesel	Subbase Placement	80.00 Lights 44,400.00 SY	8 Hours per 3 Lights 8 Hours per 3,800 SY	2
ozer ump Truck (12 cy)	Diesel	Subbase Placement Subbase Placement	44,400.00 SY 14,800.00 CY		6
	Diesel	Subbase Placement			,
ickup Truck oller	Diesel	Subbase Placement	44,400.00 SY 14,800.00 CY	8 Hours per 3,800 SY 8 Hours per 1,300 CY	
ozer	Diesel	Topsoil Placement	8,891.10 CY	8 Hours per 600 CY	1
ump Truck	Diesel	Topsoil Placement	8,891.10 CY	8 Hours per 600 CY	
ickup Truck	Diesel	Topsoil Placement	8,891.10 CY	8 Hours per 600 CY	1
		ONROAD	VAAT		
		18-Wheeler	VMT 5800		
		Dump Truck	56000		
		Proceedings of the contract of			

<b>Building Footprint</b>	Floors	<b>Building GSF</b>
		69696

Construction Activity	Equipment	Fuel Type	Activity Size (SF)	Activity Rate Hr per SF	Activity Data	Activit Unit
Concrete Foundations	Backhoe	Diesel	30000.00 SF	0.01067 Hours per 1 SF	640.2	hours
Concrete Foundations	Concrete Ready Mix Trucks	Diesel	30000.00 SF	0.002 Hours per 1 SF	120	hours
<b>Concrete Foundations</b>	Fork Truck	Diesel	30000.00 SF	0.01067 Hours per 1 SF	640.2	hours
<b>Concrete Foundations</b>	Tool Truck	Diesel	30000.00 SF	0.00267 Hours per 1 SF	160.2	hour
Concrete Foundations	Tractor Trailer- Material Delivery	Diesel	30000.00 SF	0.00053 Hours per 1 SF	31.8	hour
Construction Mob & Layout	Survey Crew Trucks	Diesel	30000.00 SF	0.00033 Hours per 1 SF	19.8	hour
Construction Mob & Layout	Tractor Trailers Temp Fac.	Diesel	30000.00 SF	0.00013 Hours per 1 SF	7.8	hour
Exterior Wall Framing	Fork Truck	Diesel	30000.00 SF	0.02 Hours per 1 SF	1200	hour
Exterior Wall Framing	Generator	Diesel	30000.00 SF	0.01 Hours per 1 SF	600	hour
Exterior Wall Framing	Man Lift	Diesel	30000.00 SF	0.02 Hours per 1 SF	1200	hour
Exterior Wall Framing	Tool Truck	Diesel	30000.00 SF	0.005 Hours per 1 SF	300	hour
Exterior Wall Framing	Tractor Trailer- Material Delivery	Diesel	30000.00 SF	0.005 Hours per 1 SF	300	hour
Interior Build-Out/ Finishes	Fork Truck	Diesel	30000.00 SF	0.08 Hours per 1 SF	4800	hour
Interior Build-Out/ Finishes	Man Lift	Diesel	30000.00 SF	0.08 Hours per 1 SF	4800	hour
Interior Build-Out/ Finishes	Tool Truck	Diesel	30000.00 SF	0.01 Hours per 1 SF	600	hour
Interior Build-Out/ Finishes	Tractor Trailer- Material Delivery	Diesel	30000.00 SF	0.02 Hours per 1 SF	1200	hour
Roofing	High Lift	Diesel	30000.00 SF	0.004 Hours per 1 SF	240	hour
Roofing	Man Lift (Fascia Construction)	Diesel	30000.00 SF	0.0008 Hours per 1 SF	48	hour
Roofing	Material Deliveries	Diesel	30000.00 SF	0.002 Hours per 1 SF	120	hour
Roofing	Tractor Trailer- Material Delivery	Diesel	30000.00 SF	0.002 Hours per 1 SF	120	hour
Security & Safety Systems	High Lift	Diesel	30000.00 SF	0.02667 Hours per 1 SF	1600.2	hour
Security & Safety Systems	Tool Truck	Diesel	30000.00 SF	0.00667 Hours per 1 SF	400.2	hour
Structural Steel Frame	90 Ton Crane	Diesel	30000.00 SF	0.01067 Hours per 1 SF	640.2	hour
Structural Steel Frame	Concrete Pump	Diesel	30000.00 SF	0.0004 Hours per 1 SF	24	hour
Structural Steel Frame	Concrete Truck	Diesel	30000.00 SF	0.0008 Hours per 1 SF	48	hour
Structural Steel Frame	Fork Truck	Diesel	30000.00 SF	0.00267 Hours per 1 SF	160.2	hour
Structural Steel Frame	Tool Truck	Diesel	30000.00 SF	0.0004 Hours per 1 SF	24	hour
Structural Steel Frame	Tractor Trailer- Steel Deliveries	Diesel	30000.00 SF	0.00133 Hours per 1 SF	79.8	hour
Structural Steel Frame	Trowel Machine	Diesel	30000.00 SF	0.0004 Hours per 1 SF	24	hour
		ONROAD		·		
	Cement Mixer	7000				
	Dump Truck	3700				
	Tractor Trailor	159				
	Passenger Car	85000				

Component	X	x	Parkign Lot GSF
	X	X	167706

		NONROAD			
Equipment	Fuel Type	Activity	Activity Size	Activity Rate Hrs/SF	Activity Data
Paving Machine	Diesel	Binder Coat of Pavement	167000 SF	0.0016 Hours per 1 SF	267.2 hours
Fen Wheelers- Material Delivery	Diesel	Binder Coat of Pavement	167000 SF	0.0016 Hours per 1 SF	267.2 hours
Survey Crew Trucks	Diesel	Construction Mob & Layout	167000 SF	0.0004 Hours per 1 SF	66.8 hours
Tractor Trailers Temp Fac.	Diesel	Construction Mob & Layout	167000 SF	0.0004 Hours per 1 SF	66.8 hours
Bob Cat	Diesel	Curbing	167000 SF	0.0024 Hours per 1 SF	400.8 hours
Concrete Ready Mix Trucks	Diesel	Curbing	167000 SF	0.0024 Hours per 1 SF	400.8 hours
Material Deliveries	Diesel	Curbing	167000 SF	0.0024 Hours per 1 SF	400.8 hours
Fractor Trailer with Boom Hoist- Delivery	Diesel	Curbing	167000 SF	0.0024 Hours per 1 SF	400.8 hours
Bulldozer	Diesel	Grub the site down 2 ft.	167000 SF	0.0016 Hours per 1 SF	267.2 hours
ront Loader	Diesel	Grub the site down 2 ft.	167000 SF	0.0016 Hours per 1 SF	267.2 hours
en Wheelers	Diesel	Grub the site down 2 ft.	167000 SF	0.0016 Hours per 1 SF	267.2 hours
Auger Drill	Diesel	Lighting Pre-Cast Concrete Piers (10)	167000 SF	0.0024 Hours per 1 SF	400.8 hours
ork Truck	Diesel	Lighting Pre-Cast Concrete Piers (10)	167000 SF	0.0024 Hours per 1 SF	400.8 hours
ront Loader	Diesel	Lighting Pre-Cast Concrete Piers (10)	167000 SF	0.0024 Hours per 1 SF	400.8 hours
Fractor Trailer- Material Delivery	Diesel	Lighting Pre-Cast Concrete Piers (10)	167000 SF	0.0012 Hours per 1 SF	200.4 hours
Bulldozer	Diesel	Remove Trees and shrubs	167000 SF	0.004 Hours per 1 SF	668 hours
Chain Saws	Diesel	Remove Trees and shrubs	167000 SF	0.0024 Hours per 1 SF	400.8 hours
lat Bed or Dump Trucks	Diesel	Remove Trees and shrubs	167000 SF	0.004 Hours per 1 SF	668 hours
og Chipper	Diesel	Remove Trees and shrubs	167000 SF	0.0024 Hours per 1 SF	400.8 hours
Mulcher	Diesel	Remove Trees and shrubs	167000 SF	0.0024 Hours per 1 SF	400.8 hours
ractor	Diesel	Remove Trees and shrubs	167000 SF	0.004 Hours per 1 SF	668 hours
Compacting Equipment	Diesel	Rough Grading	167000 SF	0.0016 Hours per 1 SF	267.2 hours
mall Dozer	Diesel	Rough Grading	167000 SF	0.0016 Hours per 1 SF	267.2 hours
10 Ton Rough Terrain Crane	Diesel	Set in-place Light Poles	167000 SF	0.0016 Hours per 1 SF	267.2 hours
High Lift	Diesel	Set in-place Light Poles	167000 SF	0.0016 Hours per 1 SF	267.2 hours
ractor Trailer- Material Delivery	Diesel	Set in-place Light Poles	167000 SF	0.0016 Hours per 1 SF	267.2 hours
ine Painting Truck and Sprayer	Diesel	Stripping	167000 SF	0.0008 Hours per 1 SF	133.6 hours
Backhoe	Diesel	Subgrade Materials installed	167000 SF	0.0016 Hours per 1 SF	267.2 hours
coller	Diesel	Subgrade Materials installed	167000 SF	0.0016 Hours per 1 SF	267.2 hours
ractor Trailer- Material Delivery	Diesel	Subgrade Materials installed	167000 SF	0.0016 Hours per 1 SF	267.2 hours
aving Machine	Diesel	Top Coat of Asphalt	167000 SF	0.0016 Hours per 1 SF	267.2 hours
en Wheelers- Material Delivery	Diesel	Top Coat of Asphalt	167000 SF	0.0016 Hours per 1 SF	267.2 hours
Backhoe	Diesel	Underground Conduits	167000 SF	0.0024 Hours per 1 SF	400.8 hours
ork Truck	Diesel	Underground Conduits	167000 SF	0.0024 Hours per 1 SF	400.8 hours
ractor Trailer- Material Delivery	Diesel	Underground Conduits	167000 SF	0.0012 Hours per 1 SF	200.4 hours
		ONROAD			
			VMT		
		Dump Truck	19,200		
		Passenger Car	112,000		
		Tractor Trailor	1,920		

Component	Floors	Hangar GSF
4	1	191664

	NONR	OAD				
Activity	Equipment	Fuel Type	Activity Size	Activity Rate Hrs/SF	Activity Data	Activity Unit
Construction Mob & Layout	Survey Crew Trucks	Diesel	10000.00 SF	0.001 Hours per 1 SF	190	hours
Construction Mob & Layout	Tractor Trailers Temp Fac.	Diesel	10000.00 SF	0.0004 Hours per 1 SF	76	hours
Erection of Pre-Engineered Metal Building	90 Ton Crane	Diesel	10000.00 SF	0.02 Hours per 1 SF	3800	hours
Erection of Pre-Engineered Metal Building	High Lift Fork Truck	Diesel	10000.00 SF	0.02 Hours per 1 SF	3800	hours
Erection of Pre-Engineered Metal Building	Man Lift	Diesel	10000.00 SF	0.005 Hours per 1 SF	950	hours
Erection of Pre-Engineered Metal Building	Tractor Trailer- Steel Deliveries	Diesel	10000.00 SF	0.006 Hours per 1 SF	1140	hours
Interior Build-Out/ Finishes	Fork Truck	Diesel	10000.00 SF	0.032 Hours per 1 SF	6080	hours
nterior Build-Out/ Finishes	Man Lift	Diesel	10000.00 SF	0.032 Hours per 1 SF	6080	hours
Interior Build-Out/ Finishes	Tool Truck	Diesel	10000.00 SF	0.004 Hours per 1 SF	760	hours
Interior Build-Out/ Finishes	Tractor Trailer- Material Delivery	Diesel	10000.00 SF	0.008 Hours per 1 SF	1520	hours
Masonry Wall 4 ft.	Concrete Ready Mix Trucks	Diesel	10000.00 SF	0.0016 Hours per 1 SF	304	hours
Masonry Wall 4 ft.	Grout Mixer for Mortar	Diesel	10000.00 SF	0.012 Hours per 1 SF	2280	hours
Masonry Wall 4 ft.	Masonry Saw	Diesel	10000.00 SF	0.012 Hours per 1 SF	2280	hours
Masonry Wall 4 ft.	Tractor Trailer- Truck Delivery	Diesel	10000.00 SF	0.003 Hours per 1 SF	570	hours
Metal Panels	Fork Truck	Diesel	10000.00 SF	0.012 Hours per 1 SF	2280	hours
Metal Panels	Man Lift	Diesel	10000.00 SF	0.012 Hours per 1 SF	2280	hours
Metal Panels	Tool Truck	Diesel	10000.00 SF	0.003 Hours per 1 SF	570	hours
Metal Panels	Tractor Trailer- Material Delivery	Diesel	10000.00 SF	0.006 Hours per 1 SF	1140	hours
Roofing	High Lift	Diesel	10000.00 SF	0.012 Hours per 1 SF	2280	hours
Roofing	Man Lift (Fascia Construction)	Diesel	10000.00 SF	0.012 Hours per 1 SF	2280	hours
Roofing	Material Deliveries	Diesel	10000.00 SF	0.0008 Hours per 1 SF	152	hours
Roofing	Tractor Trailer- Material Delivery	Diesel	10000.00 SF	0.0024 Hours per 1 SF	456	hours
Security & Safety Systems	High Lift	Diesel	10000.00 SF	0.012 Hours per 1 SF	2280	hours
Security & Safety Systems	Tool Truck	Diesel	10000.00 SF	0.003 Hours per 1 SF	570	hours
	ONRO	DAD				
			VMT			
		Cement Mixer	43,700			

	VMT
Cement Mixer	43,700
Dump Truck	22,800
Passenger Car	330,000
Tractor Trailer	15,200

Component		<b>Building GSF</b>
5a		125,000

		<u> </u>	NONROAD			
Equipment	Fuel Type	Activity	Activity Size	Activity Rate Hrs/SF	Activity Data	<b>Activity Unit</b>
Backhoe	Diesel	Concrete Foundations	11000	0.032 Hours per 1 SF	320	hours
Concrete Ready Mix Trucks	Diesel	Concrete Foundations	11000	0.006 Hours per 1 SF	60	hours
Fork Truck	Diesel	Concrete Foundations	11000	0.032 Hours per 1 SF	320	hours
Tool Truck	Diesel	Concrete Foundations	11000	0.008 Hours per 1 SF	80	hours
Tractor Trailer- Material Delivery	Diesel	Concrete Foundations	11000	0.0016 Hours per 1 SF	16	hours
Survey Crew Trucks	Diesel	Construction Mob & Layout	11000	0.001 Hours per 1 SF	10	hours
Tractor Trailers Temp Fac.	Diesel	Construction Mob & Layout	11000	0.0004 Hours per 1 SF	4	hours
Fork Truck	Diesel	Exterior Wall Framing	11000	0.024 Hours per 1 SF	240	hours
Man Lift	Diesel	Exterior Wall Framing	11000	0.024 Hours per 1 SF	240	hours
Tool Truck	Diesel	Exterior Wall Framing	11000	0.006 Hours per 1 SF	60	hours
Tractor Trailer- Material Delivery	Diesel	Exterior Wall Framing	11000	0.0024 Hours per 1 SF	24	hours
Fork Truck	Diesel	Interior Build-Out/ Finishes	11000	0.096 Hours per 1 SF	960	hours
Man Lift	Diesel	Interior Build-Out/ Finishes	11000	0.096 Hours per 1 SF	960	hours
Tool Truck	Diesel	Interior Build-Out/ Finishes	11000	0.012 Hours per 1 SF	120	hours
Tractor Trailer- Material Delivery	Diesel	Interior Build-Out/ Finishes	11000	0.012 Hours per 1 SF	120	hours
High Lift	Diesel	Roofing	11000	0.012 Hours per 1 SF	120	hours
Man Lift (Fascia Construction)	Diesel	Roofing	11000	0.012 Hours per 1 SF	120	hours
Material Deliveries	Diesel	Roofing	11000	0.0008 Hours per 1 SF	8	hours
Tractor Trailer- Material Delivery	Diesel	Roofing	11000	0.0012 Hours per 1 SF	12	hours
High Lift	Diesel	Security & Safety Systems	11000	0.032 Hours per 1 SF	320	hours
Tool Truck	Diesel	Security & Safety Systems	11000	0.008 Hours per 1 SF	80	hours
40 Ton Crane	Diesel	Structural Steel Erection	11000	0.024 Hours per 1 SF	240	hours
Fork Truck	Diesel	Structural Steel Erection	11000	0.012 Hours per 1 SF	120	hours
Tool Truck	Diesel	Structural Steel Erection	11000	0.006 Hours per 1 SF	60	hours
Tractor Trailer- Steel Deliveries	Diesel	Structural Steel Erection	11000	0.0016 Hours per 1 SF	16	hours
			ONROAD			
		Cement Mixer	<b>VMT</b> 2300			
		Dump Truck	1200			
		Passenger Car	11000			
		_				
		Tractor Trailor	160			

Component	<b>Building Footprint</b>	Floors	<b>Building GSF</b>
6	25000	G+2	75000

		NONROAD				
Equipment	Fuel Type	Activity	Activity Size	Activity Rate Hrs/SF	Est. Hours	Units
Concrete Truck	Diesel	Concrete Placement	508.80 CY	8 Hours per 240 CY	17	hours
Other General Equipment	Diesel	Concrete Placement	508.80 CY	16 Hours per 1,000 CY	8.1	hours
Pickup Truck	Diesel	Concrete Placement	508.80 CY	24 Hours per 1,000 CY	12.2	hours
Rubber Tired Loader	Diesel	Concrete Placement Concrete Placement	508.80 CY	8 Hours per 1,000 CY	4.1	hours
Slip Form Paver Surfacing Equipment (Grooving)	Diesel Diesel	Concrete Placement  Concrete Placement	508.80 CY 508.80 CY	8 Hours per 1,000 CY 8 Hours per 1,000 CY	4.1 4.1	hours hours
Dozer	Diesel	Drainage - 24 inch SICPP	1,010.00 LF	8 Hours per 250 LF	32.3	hours
Dump Truck	Diesel	Drainage - 24 inch SICPP	1,010.00 LF	8 Hours per 250 LF	32.3	hours
Excavator	Diesel	Drainage - 24 inch SICPP	1,010.00 LF	8 Hours per 250 LF	32.3	hours
Loader	Diesel	Drainage - 24 inch SICPP	1,010.00 LF	8 Hours per 250 LF	32.3	hours
Other General Equipment	Diesel	Drainage - 24 inch SICPP	1,010.00 LF	8 Hours per 250 LF	32.3	hours
Pickup Truck	Diesel	Drainage - 24 inch SICPP	1,010.00 LF	8 Hours per 250 LF	32.3	hours
Roller	Diesel	Drainage - 24 inch SICPP	1,010.00 LF	8 Hours per 250 LF	32.3	hours
Dump Truck	Diesel	Drainage - 6 inch Perforated Underdrain	2,020.00 LF	8 Hours per 900 LF	18	hours
Loader	Diesel	Drainage - 6 inch Perforated Underdrain	2,020.00 LF	8 Hours per 900 LF	18	hours
Other General Equipment	Diesel	Drainage - 6 inch Perforated Underdrain	2,020.00 LF	8 Hours per 900 LF	18	hours
Pickup Truck	Diesel	Drainage - 6 inch Perforated Underdrain	2,020.00 LF	8 Hours per 900 LF	18	hours
Tractors/Loader/Backhoe	Diesel	Drainage - 6 inch Perforated Underdrain	2,020.00 LF	8 Hours per 900 LF	18	hours
Water Truck	Diesel	Dust Control	60.00 Day	8 Hours per 1 Day	480	hours
Dozer Dump Truck (13 cv)	Diesel Diesel	Excavation (Borrow)	508.80 CY 508.80 CY	8 Hours per 600 CY	6.8 6.8	hours
Dump Truck (12 cy) Pickup Truck	Diesel	Excavation (Borrow) Excavation (Borrow)	508.80 CY	8 Hours per 600 CY 8 Hours per 600 CY	6.8	hours hours
Roller	Diesel	Excavation (Borrow)	508.80 CY	8 Hours per 1,300 CY	3.1	hours
Dozer	Diesel	Excavation (Cut to Fill)	508.80 CY	8 Hours per 800 CY	5.1	hours
Dump Truck (12 cy)	Diesel	Excavation (Cut to Fill)	508.80 CY	8 Hours per 300 CY	13.6	hours
Excavator	Diesel	Excavation (Cut to Fill)	508.80 CY	8 Hours per 1,000 CY	4.1	hours
Pickup Truck	Diesel	Excavation (Cut to Fill)	508.80 CY	8 Hours per 1,000 CY	4.1	hours
Roller	Diesel	Excavation (Cut to Fill)	508.80 CY	8 Hours per 1,000 CY	4.1	hours
Scraper	Diesel	Excavation (Cut to Fill)	508.80 CY	8 Hours per 800 CY	5.1	hours
Dozer	Diesel	Excavation (Topsoil Stripping)	1,221.00 SY	8 Hours per 5,100 SY	1.9	hours
Concrete Truck	Diesel	Fencing	1,000.00 LF	2 Hours per 180 LF	11.1	hours
Dump Truck	Diesel	Fencing	1,000.00 LF	8 Hours per 180 LF	44.4	hours
Other General Equipment	Diesel	Fencing	1,000.00 LF	8 Hours per 180 LF	44.4	hours
Pickup Truck	Diesel	Fencing	1,000.00 LF	8 Hours per 180 LF	44.4	hours
Skid Steer Loader	Diesel	Fencing Subbase Placement	1,000.00 LF	8 Hours per 180 LF	44.4 2.6	hours
Dozer Dump Truck (12 cy)	Diesel Diesel	Subbase Placement Subbase Placement	1,221.00 SY 407.00 CY	8 Hours per 3,800 SY 8 Hours per 180 CY	18.1	hours hours
Pickup Truck	Diesel	Subbase Placement	1,221.00 SY	8 Hours per 3,800 SY	2.6	hours
Roller	Diesel	Subbase Placement	407.00 CY	8 Hours per 1,300 CY	2.5	hours
Fork Truck	Diesel	Exterior Wall Framing		0.024 Hours per 1 SF	240	hours
Man Lift	Diesel	Exterior Wall Framing		0.024 Hours per 1 SF	240	hours
Tool Truck	Diesel	Exterior Wall Framing		0.006 Hours per 1 SF	60	hours
Tractor Trailer- Material Delivery	Diesel	Exterior Wall Framing	1000	0.0024 Hours per 1 SF	24	hours
Fork Truck	Diesel	Interior Build-Out/ Finishes	1000	0.096 Hours per 1 SF	960	hours
Man Lift	Diesel	Interior Build-Out/ Finishes	1000	0.096 Hours per 1 SF	960	hours
Tool Truck	Diesel	Interior Build-Out/ Finishes		0.012 Hours per 1 SF	120	hours
Tractor Trailer- Material Delivery	Diesel	Interior Build-Out/ Finishes		0.012 Hours per 1 SF	120	hours
High Lift	Diesel	Roofing		0.012 Hours per 1 SF	120	hours
Man Lift (Fascia Construction)	Diesel	Roofing		0.012 Hours per 1 SF	120	hours
Material Deliveries	Diesel	Roofing		0.0008 Hours per 1 SF	8	hours
Tractor Trailer- Material Delivery	Diesel	Roofing Socurity & Safety Systems		0.0012 Hours per 1 SF 0.032 Hours per 1 SF	12 320	hours
High Lift Tool Truck	Diesel Diesel	Security & Safety Systems Security & Safety Systems		0.032 Hours per 1 SF 0.008 Hours per 1 SF	320 80	hours hours
40 Ton Crane	Diesel	Structural Steel Erection		0.008 Hours per 1 SF 0.024 Hours per 1 SF	240	hours
Fork Truck	Diesel	Structural Steel Erection Structural Steel Erection		0.024 Hours per 1 SF	120	hours
Tool Truck	Diesel	Structural Steel Erection		0.012 Hours per 1 SF	60	hours
Tractor Trailer- Steel Deliveries	Diesel	Structural Steel Erection		0.000 Hours per 1 SF	16	hours
1,355	2.000.	NONROAD			10	
			VMT			
		Cement Mixer	5000	)		
		Dump Truck	2500	)		
		Passenger Car	86000	)		
		Tractor Trailer	160	)		

Component	Building Footprint	Floors	<b>Building GSF</b>
7			130680

			NONROAD	-			
Activity	Equipment		Fuel Type	Activity Size	Activity Rate Hrs/SF	Activity Data	Activity Unit
Construction Mob & Layout	Survey Crew Trucks	Diesel		10000.00 SF	0.001 Hours per 1 SF	190	hours
Construction Mob & Layout	Tractor Trailers Temp Fac.	Diesel		10000.00 SF	0.0004 Hours per 1 SF	76	hours
Erection of Pre-Engineered Metal Building	90 Ton Crane	Diesel		10000.00 SF	0.02 Hours per 1 SF	3800	hours
Erection of Pre-Engineered Metal Building	High Lift Fork Truck	Diesel		10000.00 SF	0.02 Hours per 1 SF	3800	hours
Erection of Pre-Engineered Metal Building	Man Lift	Diesel		10000.00 SF	0.005 Hours per 1 SF	950	hours
Erection of Pre-Engineered Metal Building	Tractor Trailer- Steel Deliveries	Diesel		10000.00 SF	0.006 Hours per 1 SF	1140	hours
Interior Build-Out/ Finishes	Fork Truck	Diesel		10000.00 SF	0.032 Hours per 1 SF	6080	hours
Interior Build-Out/ Finishes	Man Lift	Diesel		10000.00 SF	0.032 Hours per 1 SF	6080	hours
Interior Build-Out/ Finishes	Tool Truck	Diesel		10000.00 SF	0.004 Hours per 1 SF	760	hours
Interior Build-Out/ Finishes	Tractor Trailer- Material Delivery	Diesel		10000.00 SF	0.008 Hours per 1 SF	1520	hours
Masonry Wall 4 ft.	Concrete Ready Mix Trucks	Diesel		10000.00 SF	0.0016 Hours per 1 SF	304	hours
Masonry Wall 4 ft.	Grout Mixer for Mortar	Diesel		10000.00 SF	0.012 Hours per 1 SF	2280	hours
Masonry Wall 4 ft.	Masonry Saw	Diesel		10000.00 SF	0.012 Hours per 1 SF	2280	hours
Masonry Wall 4 ft.	Tractor Trailer- Truck Delivery	Diesel		10000.00 SF	0.003 Hours per 1 SF	570	hours
Metal Panels	Fork Truck	Diesel		10000.00 SF	0.012 Hours per 1 SF	2280	hours
Metal Panels	Man Lift	Diesel		10000.00 SF	0.012 Hours per 1 SF	2280	hours
Metal Panels	Tool Truck	Diesel		10000.00 SF	0.003 Hours per 1 SF	570	hours
Metal Panels	Tractor Trailer- Material Delivery	Diesel		10000.00 SF	0.006 Hours per 1 SF	1140	hours
Roofing	High Lift	Diesel		10000.00 SF	0.012 Hours per 1 SF	2280	hours
Roofing	Man Lift (Fascia Construction)	Diesel		10000.00 SF	0.012 Hours per 1 SF	2280	hours
Roofing	Material Deliveries	Diesel		10000.00 SF	0.0008 Hours per 1 SF	152	hours
Roofing	Tractor Trailer- Material Delivery	Diesel		10000.00 SF	0.0024 Hours per 1 SF	456	hours
Security & Safety Systems	High Lift	Diesel		10000.00 SF	0.012 Hours per 1 SF	2280	hours
Security & Safety Systems	Tool Truck	Diesel		10000.00 SF	0.003 Hours per 1 SF	570	hours
			ONROAD				
				VMT			
			Cement Mixer	43,700			
			Dump Truck	22,800			
			Passenger Car	330,000			
			<b>Tractor Trailer</b>	15,200			

Component	<b>Building Footprint</b>	Floors	<b>Building GSF</b>
8			0

		NONROAD			
Equipment	Fuel Type	Activity	Activity Size	Activity Rate Hrs/SF	Est. Hours
Bob Cat	Diesel	Building Demolition	130,000.00 SF	0.0240 Hours per 1 SF	3,120.00
Dump Truck	Diesel	Building Demolition	130,000.00 SF	0.0240 Hours per 1 SF	3,120.00
Excavator with Bucket	Diesel	Building Demolition	130,000.00 SF	0.0120 Hours per 1 SF	1,560.00
Generator Sets	Diesel	Building Demolition	130,000.00 SF	0.0120 Hours per 1 SF	1,560.00
Pickup Truck	Diesel	Building Demolition	130,000.00 SF	0.0140 Hours per 1 SF	1,820.00
		ONROAD			
			VMT		
		Dump Truck	72,00	0	
		Passenger Car	280	0	

Component	x	Floors	Apron GSF
9	X	Χ	1263240

NONROAD						
Construction Activity	Equipment	Fuel Type	Activity Size	Activity Rate Hr per SF	Activity Data	Activity Unit
Asphalt Placement	Asphalt Paver	Diesel	140,193.00 SY	8 Hours per 6,400 SY	175.2 l	nours
Asphalt Placement	Dump Truck	Diesel	140,193.00 SY	8 Hours per 1,777 SY	631.1 h	nours
Asphalt Placement	Other General Equipment	Diesel	140,193.00 SY	16 Hours per 6,400 SY	350.5 h	nours
Asphalt Placement	Pickup Truck	Diesel	140,193.00 SY	8 Hours per 6,400 SY	175.2 l	nours
Asphalt Placement	Roller	Diesel	140,193.00 SY	8 Hours per 6,400 SY	175.2 l	nours
Asphalt Placement	Skid Steer Loader	Diesel	140,193.00 SY	8 Hours per 6,400 SY	175.2 l	nours
Asphalt Placement	Surfacing Equipment (Grooving)	Diesel	140,193.00 SY	8 Hours per 5,000 SY	224.3 h	nours
Clearing and Grubbing	Chain Saw	Diesel	29.60 Acre	12 Hours per 1 Acre	355.2 h	nours
Clearing and Grubbing	Chipper/Stump Grinder	Diesel	29.60 Acre	12 Hours per 1 Acre	355.2 h	nours
Clearing and Grubbing	Pickup Truck	Diesel	29.60 Acre	16 Hours per 1 Acre	473.6 ł	nours
Drainage - 24 inch SICPP	Dozer	Diesel	1,273.00 LF	8 Hours per 250 LF	40.7 ł	nours
Drainage - 24 inch SICPP	Dump Truck	Diesel	1,273.00 LF	8 Hours per 250 LF	40.7 h	nours
Drainage - 24 inch SICPP	Excavator	Diesel	1,273.00 LF	8 Hours per 250 LF	40.7 h	nours
Drainage - 24 inch SICPP	Loader	Diesel	1,273.00 LF	8 Hours per 250 LF	40.7 h	nours
Drainage - 24 inch SICPP	Other General Equipment	Diesel	1,273.00 LF	8 Hours per 250 LF	40.7 h	nours
Drainage - 24 inch SICPP	Pickup Truck	Diesel	1,273.00 LF	8 Hours per 250 LF	40.7 h	nours
Drainage - 24 inch SICPP	Roller	Diesel	1,273.00 LF	8 Hours per 250 LF	40.7 h	nours
Drainage - 6 inch Perforated Underdrain	Dump Truck	Diesel	2,546.00 LF	8 Hours per 900 LF	22.6 l	nours
Drainage - 6 inch Perforated Underdrain	Loader	Diesel	2,546.00 LF	8 Hours per 900 LF	22.6 h	nours
Drainage - 6 inch Perforated Underdrain	Other General Equipment	Diesel	2,546.00 LF	8 Hours per 900 LF	22.6 h	nours
Drainage - 6 inch Perforated Underdrain	Pickup Truck	Diesel	2,546.00 LF	8 Hours per 900 LF	22.6 h	nours
Drainage - 6 inch Perforated Underdrain	Tractors/Loader/Backhoe	Diesel	2,546.00 LF	8 Hours per 900 LF	22.6 h	nours
Dust Control	Water Truck	Diesel	240.00 Day	8 Hours per 1 Day	1,920.00 l	nours
Excavation (Borrow)	Dozer	Diesel	58,413.80 CY	8 Hours per 600 CY	778.9 l	nours
Excavation (Borrow)	Dump Truck (12 cy)	Diesel	58,413.80 CY	8 Hours per 600 CY	778.9 l	nours
Excavation (Borrow)	Pickup Truck	Diesel	58,413.80 CY	8 Hours per 600 CY	778.9 l	nours
Excavation (Borrow)	Roller	Diesel	58,413.80 CY	8 Hours per 1,300 CY	359.5 h	nours
Excavation (Cut to Fill)	Dozer	Diesel	58,413.80 CY	8 Hours per 800 CY	584.1 h	nours
Excavation (Cut to Fill)	Dump Truck (12 cy)	Diesel	58,413.80 CY	8 Hours per 300 CY	1,557.70 ł	nours
Excavation (Cut to Fill)	Excavator	Diesel	58,413.80 CY	8 Hours per 1,000 CY	467.3 ł	nours
Excavation (Cut to Fill)	Pickup Truck	Diesel	58,413.80 CY	8 Hours per 1,000 CY	467.3 ł	nours
Excavation (Cut to Fill)	Roller	Diesel	58,413.80 CY	8 Hours per 1,000 CY	467.3 ł	nours
Excavation (Cut to Fill)	Scraper	Diesel	58,413.80 CY	8 Hours per 800 CY	584.1 ł	nours
Excavation (Topsoil Stripping)	Dozer	Diesel	140,193.00 SY	8 Hours per 5,100 SY	219.9 h	nours
Fencing	Concrete Truck	Diesel	1,263.00 LF	2 Hours per 180 LF	14 h	nours
Fencing	Dump Truck	Diesel	1,263.00 LF	8 Hours per 180 LF	56.1 h	
Fencing	Other General Equipment	Diesel	1,263.00 LF	8 Hours per 180 LF	56.1 h	

Fencing	Pickup Truck	Diesel	1,263.00 LF	8 Hours per 180 LF	56.1 hours
Fencing	Skid Steer Loader	Diesel	1,263.00 LF	8 Hours per 180 LF	56.1 hours
Fencing	Tractors/Loader/Backhoe	Diesel	1,263.00 LF	8 Hours per 180 LF	56.1 hours
Grading	Dozer	Diesel	142,716.00 SY	8 Hours per 8,000 SY	142.7 hours
Grading	Grader	Diesel	142,716.00 SY	8 Hours per 8,000 SY	142.7 hours
Grading	Roller	Diesel	142,716.00 SY	8 Hours per 8,000 SY	142.7 hours
Hydroseeding	Hydroseeder	Diesel	1,285,730.00 SF	8 Hours per 80,000 SF	128.6 hours
Hydroseeding	Off-Road Truck	Diesel	1,285,730.00 SF	8 Hours per 80,000 SF	128.6 hours
Lighting	Dump Truck	Diesel	4,526.00 LF	8 Hours per 1,200 LF	30.2 hours
Lighting	Loader	Diesel	4,526.00 LF	8 Hours per 1,200 LF	30.2 hours
Lighting	Other General Equipment	Diesel	4,526.00 LF	8 Hours per 1,200 LF	30.2 hours
Lighting	Pickup Truck	Diesel	4,526.00 LF	8 Hours per 1,200 LF	30.2 hours
Lighting	Skid Steer Loader	Diesel	4,526.00 LF	8 Hours per 1,200 LF	30.2 hours
Lighting	Tractors/Loader/Backhoe	Diesel	4,526.00 LF	8 Hours per 1,200 LF	30.2 hours
Markings	Flatbed Truck	Diesel	1,263,000.00 SF	8 Hours per 3,500 SF	2,886.90 hours
Markings	Other General Equipment	Diesel	1,263,000.00 SF	8 Hours per 3,500 SF	2,886.90 hours
Markings	Pickup Truck	Diesel	1,263,000.00 SF	8 Hours per 3,500 SF	2,886.90 hours
Sealing/Fuel Resistant	Distributing Tanker	Diesel	140,193.00 SY	8 Hours per 3,000 SY	373.8 hours
Sealing/Fuel Resistant	Other General Equipment	Diesel	140,193.00 SY	8 Hours per 3,000 SY	373.8 hours
Sealing/Fuel Resistant	Pickup Truck	Diesel	140,193.00 SY	8 Hours per 3,000 SY	373.8 hours
Soil Erosion/Sediment Control	Other General Equipment	Diesel	29.60 Acre	4 Hours per 1 Acre	118.4 hours
Soil Erosion/Sediment Control	Pickup Truck	Diesel	29.60 Acre	8 Hours per 1 Acre	236.8 hours
Soil Erosion/Sediment Control	Pumps	Diesel	29.60 Acre	4 Hours per 1 Acre	118.4 hours
Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Diesel	29.60 Acre	4 Hours per 1 Acre	118.4 hours
Subbase Placement	Dozer	Diesel	140,193.00 SY	8 Hours per 3,800 SY	295.1 hours
Subbase Placement	Dump Truck (12 cy)	Diesel	46,731.00 CY	8 Hours per 180 CY	2,076.90 hours
Subbase Placement	Pickup Truck	Diesel	140,193.00 SY	8 Hours per 3,800 SY	295.1 hours
Subbase Placement	Roller	Diesel	46,731.00 CY	8 Hours per 1,300 CY	287.6 hours
Topsoil Placement	Dozer	Diesel	23,786.00 CY	8 Hours per 600 CY	317.1 hours
Topsoil Placement	Dump Truck	Diesel	23,786.00 CY	8 Hours per 600 CY	317.1 hours
Topsoil Placement	Pickup Truck	Diesel	23,786.00 CY	8 Hours per 600 CY	317.1 hours
		<b>ONROAD</b> VMT			
	18-wheel	1832	26		
	Dump Truck	17577			
	Passenger Car	200,00			

Component	x	X	Fencing LF
10	X	X	6500

		NONROAD					
Project	Construction Activity	Equipment	Fuel Type	Activity	Activity Rate Hr per	Activity	Activity
Troject	Construction Activity	Equipment	Tuel Type	Size (LF)	SF	Data	Unit
Fer	ncing	Concrete Truck	Diesel	6,518	2 Hours per 180 LF	72.42	Hour
Fer	ncing	Dump Truck	Diesel	6,518	8 Hours per 180 LF	289.69	hour
Fer	ncing	Other General Equipment	Diesel	6,518	8 Hours per 180 LF	289.69	Hour
Fencing		Pickup Truck	Diesel	6,518	8 Hours per 180 LF	289.69	Hour
Fer	ncing	Skid Steer Loader	Diesel	6,518	8 Hours per 180 LF	289.69	Hour
Fer	ncing	Tractors/Loader/Backhoe	Diesel	6,518	8 Hours per 180 LF	289.69	Hour
		ONROAD					
			VMT				
		Cement Truck	93				
		Passenger Car	7,700				

40 Ton Rough Terrain Crane	747
90 Ton Crane	8,240
Asphalt Paver	231
Auger Drill	401
Backhoe	1,628
Bob Cat	3,521
Bulldozer	935
Compacting Equipment	267
Concrete Pump	24
Concrete Ready Mix Trucks	1,189
Concrete Truck	1,211
Curb/Gutter Paver	320
Distributing Tanker	374
Dozer	3,450
Dump Truck (12 cy)	12,378
Excavator with Bucket	2,509
Flatbed Truck	4,469
Fork Truck	27,282
Front Loader	668
Generator Sets	2,160
Grader	196
Grout Mixer for Mortar	4,560
High Lift	12,107
High Lift Fork Truck	7,600
Hydroseeder	177
Line Painting Truck and Sprayer	134
Loader	756
Log Chipper	401
Man Lift	31,868
Masonry Saw	4,560
Material Deliveries	841
Mulcher	401
Off-Road Truck	177
Other General Equipment	6,629
Paving Machine	534
Pickup Truck	12,155
Pumps	163
Roller	2,500
Rubber Tired Loader	4
Scraper	774
Skid Steer Loader	1,220
Slip Form Paver	4
Small Dozer	267 299
Survey Crow Trucks	477
Survey Crew Trucks Ten Wheelers	267
Ten Wheelers- Material Delivery	534
Tool Truck	6,004
Tractors/Loader/Backhoe	15,909
Trowel Machine	13,909
Vibratory Compactor	640
Water Truck	4,320
Water Huck	4,320

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Equipment	Fuel Type A	wg Rated	Load	CO (g/hp-hr)	NOx (g/hp-hr)	CO2 (g/hp-hr)	SO2 (g/hp-hr)	PM10 (g/hp-hr)	PM2.5 (g/hp-hr)	VOC Exhaust	VOC Evaporative	Hours	Hours	со	NOX	CO2	SO2	PM10	PM2.5	VOC
		HP	Factor							(g/hp-hr)	(g/equipment-day)									
40 Ton Rough Terrain 90 Ton Crane	Diesel Diesel	300 300	0.43 0.43	0.316550925 0.316550925	1.431589626 1.431589626	530.5368177 530.5368177	0.002878767 0.002878767	0.063581977 0.063581977	0.058495419 0.058495419	0.166949686 0.166949686	0.464551326 0.464551326	40 Ton Rough Terrain Crane 90 Ton Crane	747 8,240	30,511.96 336,489.14	137,989.21 1,521,759.44	51,137,807.22 563,953,103.64	277.48 3,060.09	6,128.59 67,586.74	5,638.30 62,179.80	16,092.08 177,465.15
Aerial Lift	Diesel	75	0.21	4.477751685	5.081230722	693.2376418	0.00237377	0.62799751	0.577757709	0.911360345	0.221125086	30 Ton Crane	0,240	330,403.14	1,321,733.44	303,333,103.04	3,000.03	07,300.74	02,173.00	177,403.13
Air Compressor	Diesel	100	0.43	1.376675687	2.284886283	589.6476443	0.003374378	0.205106967	0.188698409	0.238055631	0.263090966									
Asphalt Deliveries/Ten Wheelers Asphalt Paver	Diesel Diesel	600 175	0.59 0.59	0.266378968 0.581022268	0.824782278 1.348614811	536.3966417 536.312871	0.002683985 0.002920665	0.034262161 0.135015945	0.031521188 0.12421467	0.143201825 0.170888434	0.444220721 0.321556315	Asphalt Paver	230.7	13,839.82	32,123.70	12,774,851.92	69.57	3,216.05	2,958.77	4,070.52
Auger Drill	Diesel	175	0.43	0.995019514	3.571499987	530.0962543	0.002320003	0.219839979	0.20225278	0.312353444	0.447178698	Auger Drill	401	30,009.99	107,717.15	15,987,809.05	97.32	6,630.42	6,099.98	9,420.64
Backfill with Backhoe	Diesel	600	0.59	1.170567513	2.737275839	536.2077719	0.003163769	0.166505915	0.153185442	0.205546016	1.464577623	Backhoe	1628.2	674,694.98	1,577,718.71	309,060,936.92	1,823.54	95,971.15	88,293.45	118,473.19
Backhoe Bob Cat	Diesel	100 75	0.21	4.557147382 4.902492433	3.625291823 4.97678879	693.7839599 693.0439557	0.004158576 0.004297767	0.649178824 0.731666697	0.597244518 0.673133362	0.731047818 0.975304602	0.89787357 0.568134479	Bob Cat	3,521	271,855.95	275,975.88	38,431,089.26	238.32	40,572.82	37,327.00	54,083.18
Boom Manlift	Diesel Diesel	75 75	0.21 0.21	4.477751685	5.081230722	693.2376418	0.004297787	0.62799751	0.577757709	0.911360345	0.221125086	BOD Cat	3,321	271,633.93	273,373.88	36,431,069.20	230.32	40,372.82	37,327.00	34,063.16
Bore/Drill Rig	Diesel	175	0.43	0.995019514	3.571499987	530.0962543	0.003226884	0.219839979	0.20225278	0.312353444	0.447178698									
Bulldozer	Diesel	175	0.59	0.492297191	1.155006653	536.3389947	0.002851584	0.111014157	0.102133024	0.162232759	0.283774593	Bulldozer	935	47,535.92	111,526.75	51,788,571.53	275.35	10,719.46	9,861.90	15,665.10
Caisson Drilling Rig Chain Saw	Diesel Diesel	175 11	0.43	0.995019514 293.5350015	3.571499987 1.322992972	530.0962543 685.9963799	0.003226884 0.14019156	0.219839979 9.748189616	0.20225278 8.968334446	0.312353444 61.88835833	0.447178698 29.06708923									
Chipper/Stump Grinder	Diesel	100	0.43	1.929615963	3.464993168	589.1723771	0.003558005	0.342033118	0.314670468	0.394960088	0.505359396									
Cold Planer	Diesel	175	0.59	0.581022268	1.348614811	536.312871	0.002920665	0.135015945	0.12421467	0.170888434	0.321556315		257							
Compacting Equipment Concrete Boom Pump	Diesel Diesel	6 11	0.43 0.43	4.454041726 4.464978441	4.505787909 4.708033203	588.4781232 588.3635706	0.003966982 0.003966193	0.409876112 0.447631488	0.377086023 0.411820969	0.62410652 0.661951648	0.009376841 0.018665835	Compacting Equipment	267	3,070.51	3,106.18	405,682.69	2.73	282.56	259.95	430.24
Concrete Pump	Diesel	11	0.43	4.464978441	4.708033203	588.3635706	0.003966193	0.447631488	0.411820969	0.661951648	0.018665835	Concrete Pump	24	506.86	534.46	66,791.03	0.45	50.82	46.75	75.14
Concrete Ready Mix Trucks	Diesel	600	0.59	0.266378968	0.824782278	536.3966417	0.002683985	0.034262161	0.031521188	0.143201825	0.444220721	Concrete Ready Mix Trucks	1,189	112,101.65	347,097.41	225,734,588.00	1,129.52	14,418.72	13,265.23	60,264.37
Concrete Saws	Diesel	40	0.59	0.678441678	3.483034319	595.5999792	0.003184605	0.100149627	0.092137657	0.183823668	0.005825695	Compresso Truck	1 211	114 224 00	252 702 40	220 020 405 25	1 151 01	14.602.10	12 517 66	C1 411 17
Concrete Truck Concrete Truck Pump	Diesel Diesel	600 11	0.59	0.266378968 4.464978441	0.824782278 4.708033203	536.3966417 588.3635706	0.002683985 0.003966193	0.034262161 0.447631488	0.031521188 0.411820969	0.143201825 0.661951648	0.444220721 0.018665835	Concrete Truck	1,211	114,234.88	353,702.49	230,030,195.35	1,151.01	14,693.10	13,517.66	61,411.17
Concrete Vibrator	Diesel	600	0.59	1.170567513	2.737275839	536.2077719	0.003163769	0.166505915	0.153185442	0.205546016	1.464577623									
Crack Cleaner	Diesel	40	0.59	0.678441678	3.483034319	595.5999792	0.003184605	0.100149627	0.092137657	0.183823668	0.005825695									
Crack Filler (Trailer Mounted) Crane	Diesel Diesel	100 300	0.43	0.272043686 0.316550925	0.281980346 1.431589626	589.9443204 530.5368177	0.002847128 0.002878767	0.011493165 0.063581977	0.010573711 0.058495419	0.14015792 0.166949686	0 0.464551326									
Curb/Gutter Paver	Diesel	175	0.43	0.581022268	1.348614811	536.312871	0.002978767	0.135015945	0.12421467	0.170888434	0.321556315	Curb/Gutter Paver	320	19,196.98	44,558.23	17,719,777.26	96.50	4,460.93	4,104.05	5,646.15
Delivery of Tanks (3)	Diesel	600	0.59	0.266378968	0.824782278	536.3966417	0.002683985	0.034262161	0.031521188	0.143201825	0.444220721									
Distributing Tanker	Diesel	600 175	0.59	0.266378968	0.824782278 1.155006653	536.3966417	0.002683985 0.002851584	0.034262161	0.031521188	0.143201825 0.162232759	0.444220721 0.283774593	Distributing Tanker	374	35,248.65 175,367.50	109,139.48 411,439.73	70,978,792.90 191,056,191.86	355.16 1,015.80	4,533.75 39,545.78	4,171.05 36,382.11	18,949.21 57,791.01
Dozer Dump Truck	Diesel Diesel	175 600	0.59	0.492297191 0.266378968	0.824782278	536.3389947 536.3966417	0.002683985	0.111014157 0.034262161	0.102133024 0.031521188	0.162232739	0.444220721	Dozer Dump Truck (12 cy)	3,450 12,378	1,167,221.51	3,614,037.64	2,350,387,131.68	11,760.71	150,130.21	138,119.80	627,482.91
Excavator with Bucket	Diesel	175	0.59	0.380005047	0.939555707	536.3664871	0.002766357	0.079582519	0.073215917	0.153175538	0.217168991	Excavator with Bucket	2,509	98,430.15	243,366.80	138,931,404.10	716.55	20,613.72	18,964.63	39,676.03
Flat Bed or Dump Trucks	Diesel	600	0.59	0.266378968	0.824782278	536.3966417	0.002683985	0.034262161	0.031521188	0.143201825	0.444220721	Flatbed Truck	4469.2	421,437.31	1,304,885.40	848,631,410.42	4,246.32	54,206.06	49,869.57	226,559.15
Fork Truck Forklift	Diesel Diesel	100 100	0.59 0.59	0.509714417 0.509714417	0.485604153 0.485604153	595.7285281 595.7285281	0.002909958 0.002909958	0.029568732 0.029568732	0.027203234 0.027203234	0.141348615 0.141348615	0.029746696 0.029746696	Fork Truck	27,362	822,861.55	783,938.95	961,719,115.10	4,697.71	47,734.52	43,915.76	228,187.27
Forktruck (Hoist)	Diesel	100	0.59	0.509714417	0.485604153	595.7285281	0.002909958	0.029568732	0.027203234	0.141348615	0.029746696									
Front Loader	Diesel	100	0.21	4.557147382	3.625291823	693.7839599	0.004158576	0.649178824	0.597244518	0.731047818	0.89787357	Front Loader	668	63,927.66	50,855.59	9,732,401.39	58.34	9,106.68	8,378.15	10,255.14
Front Loader for Subgrade Materials	Diesel	100	0.21	4.557147382	3.625291823	693.7839599	0.004158576	0.649178824	0.597244518	0.731047818	0.89787357									
Front Loader/Scraper (to clear lot)	Diesel	100	0.21	4.557147382	3.625291823	693.7839599	0.004158576	0.649178824	0.597244518	0.731047818	0.89787357									
Front Loader/Scraper (to clear lot)	Diesel	100	0.21	4.557147382	3.625291823	693.7839599	0.004158576	0.649178824	0.597244518	0.731047818	0.89787357									
Generator Sets	Diesel	40 40	0.43	1.401663198	4.269644136	589.2645307	0.003541701	0.271978691	0.250220396	0.364489839	0.061588891	Generator Sets	2,160	52,074.59	158,625.82	21,892,355.85	131.58	10,104.55	9,296.19	13,541.53
Generator Sets Grader	Diesel Diesel	300	0.43	1.401663198 0.310980707	4.269644136 1.005164092	589.2645307 536.3674174	0.003541701 0.002755175	0.271978691 0.052605418	0.250220396 0.048396985	0.364489839 0.152820468	0.061588891 0.306020679	Grader	196	10,788.54	34,871.15	18,607,658.45	95.58	1,824.99	1,678.99	5,301.65
Grout Mixer	Diesel	600	0.59	1.170567513	2.737275839	536.2077719	0.003163769	0.166505915	0.153185442	0.205546016	1.464577623	Grout Mixer for Mortar	4,560	1,889,576.90	4,418,620.15	865,568,033.64	5,107.08	268,780.51	247,278.07	331,800.60
Grout Wheel Truck	Diesel	600	0.59	0.266378968	0.824782278	536.3966417	0.002683985	0.034262161	0.031521188	0.143201825	0.444220721	111.1.10	42.407	264.407.66	246.004.02	425 550 604 26	2.070.60	24 422 02	40 400 07	100.070.40
High Lift High Lift Fork Truck	Diesel Diesel	100 100	0.59 0.59	0.509714417 0.509714417	0.485604153 0.485604153	595.7285281 595.7285281	0.002909958 0.002909958	0.029568732 0.029568732	0.027203234 0.027203234	0.141348615 0.141348615	0.029746696 0.029746696	High Lift High Lift Fork Truck	12,107 7600	364,107.66 228,555.94	346,884.82 217,744.90	425,550,691.26 267,124,671.98	2,078.69 1,304.83	21,122.03 13,258.62	19,432.27 12,197.93	100,970.49 63,380.72
Hoist Equipment with 40 Ton Rig	Diesel	600	0.59	0.266378968	0.824782278	536.3966417	0.002683985	0.034262161	0.031521188	0.143201825	0.444220721	g z sas	7000	220,000.0	21/// 11.50	207,12 1,07 1.30	2,5055	13,233.02	12,137.33	03,5552
Hydralic Hammer	Diesel	175	0.59	0.380005047	0.939555707	536.3664871	0.002766357	0.079582519	0.073215917	0.153175538	0.217168991									
Hydroseeder Line Painting Truck and Sprayer	Diesel Diesel	600 600	0.59	0.266378968 0.266378968	0.824782278 0.824782278	536.3966417 536.3966417	0.002683985 0.002683985	0.034262161 0.034262161	0.031521188 0.031521188	0.143201825 0.143201825	0.444220721 0.444220721	Hydroseeder Line Painting Truck and Sprayer	177 5651.896	16,662.48 532,963.36	51,591.62 1,650,200.62	33,552,575.45 1,073,206,943.97	167.89 5,370.04	2,143.16 68,550.75	1,971.71 63,066.69	8,957.53 286,514.09
Loader	Diesel	175	0.59	0.634867812	1.479918189	536.2944607	0.002963106	0.149449424	0.13749347	0.176953425	0.348126673	Loader	1232	80,757.73	188,251.51	68,218,800.58	376.92	19,010.56	17,489.72	22,509.18
Log Chipper	Diesel	100	0.43	1.929615963	3.464993168	589.1723771	0.003558005	0.342033118	0.314670468	0.394960088	0.505359396	Log Chipper	2,118	175,737.84	315,570.79	53,658,285.08	324.04	31,150.32	28,658.30	35,970.60
Man Lift Man Lift (Fascia Construction)	Diesel	75 75	0.21	4.477751685 4.477751685	5.081230722 5.081230722	693.2376418 693.2376418	0.004295731 0.004295731	0.62799751 0.62799751	0.577757709 0.577757709	0.911360345 0.911360345	0.221125086 0.221125086	Man Lift	51,000	3,596,754.04 -	4,081,498.58 -	556,843,135.75	3,450.55	504,439.00	464,083.88	732,050.20
Masonry Saw	Diesel Diesel	75 40	0.21 0.59	0.678441678	3.483034319	595.5999792	0.004293731	0.100149627	0.092137657	0.183823668	0.005825695	Masonry Saw	4,560	73,011.18	374,830.22	64,096,087.37	342.71	10,777.70	- 9,915.49	19,782.37
, Material Deliveries	Diesel	600	0.59	0.266378968	0.824782278	536.3966417	0.002683985	0.034262161	0.031521188	0.143201825	0.444220721	Material Deliveries	2628.6056	247,872.66	767,481.67	499,131,226.56	2,497.52	31,881.85	29,331.30	133,253.08
Mulcher	Diesel	100	0.43	1.929615963	3.464993168	589.1723771	0.003558005	0.342033118	0.314670468	0.394960088	0.505359396	Mulcher	2,100	174,244.32	312,888.88	53,202,265.66	321.29	30,885.59	28,414.74	35,664.90
Off-Road Truck Other General Equipment	Diesel Diesel	600 175	0.59 0.43	0.266378968 0.489976888	0.824782278 1.797357813	536.3966417 530.4648426	0.002683985 0.003009557	0.034262161 0.122123479	0.031521188 0.112353601	0.143201825 0.190729231	0.444220721 0.304444871	Off-Road Truck Other General Equipment	198 11,333	18,671.03 417,844.86	57,810.64 1,532,759.49	37,597,113.41 452,372,375.33	188.13 2,566.50	2,401.50 104,145.05	2,209.38 95,813.45	10,037.30 162,651.00
Paving Machine	Diesel	175	0.59	0.766736004	1.850666907	536.2255986	0.003054638	0.176842257	0.162694876	0.199686508	0.382431367	Paving Machine	2,770	219,316.79	529,363.85	153,381,704.68	873.75	50,583.87	46,537.16	57,118.23
Pickup Truck	Diesel	600	0.59	0.266378968	0.824782278	536.3966417	0.002683985	0.034262161	0.031521188	0.143201825	0.444220721	Pickup Truck	23,998	2,262,920.34	7,006,621.47	4,556,751,916.68	22,800.76	291,061.05	267,776.17	1,216,516.18
Pile Driver Pressure Washer	Diesel Diesel	175 25	0.43 0.43	0.995019514 3.068737574	3.571499987 5.512989237	530.0962543 587.8974894	0.003226884 0.003962979	0.219839979 0.47880457	0.20225278 0.440500204	0.312353444 0.815790015	0.447178698 0.040337855									
Pruning Saw/Chain Saw	Diesel	11	0.7	293.5350015	1.322992972	685.9963799	0.14019156	9.748189616	8.968334446	61.88835833	29.06708923									
Pumps	Diesel	11	0.43	4.464978441	4.708033203	588.3635706	0.003966193	0.447631488	0.411820969	0.661951648	0.018665835	Pumps	274	5,790.93	6,106.16	763,087.55	5.14	580.56	534.12	858.53
Roller	Diesel	100 175	0.59	1.727618137	1.748739164	595.5673436 536.2944607	0.003290897 0.002963106	0.224984469 0.149449424	0.206985712 0.13749347	0.194557484 0.176953425	0.258968307	Roller Rubber Tired Loader	5,135	523,405.71 22,182,15	529,804.61 51,708.05	180,435,329.36 18,738,021.20	997.02 103.53	68,162.14 5,221.73	62,709.17 4,803.99	58,943.87 6,182.72
Rubber Tired Loader Scraper	Diesel Diesel	175 600	0.59 0.59	0.634867812 0.705200366	1.479918189 1.719860945	536.2944607 536.3431772	0.002963106	0.149449424	0.13749347	0.176953425	0.348126673 1.128266021	Scraper	338 1,477	22,182.15 368,644.76	899,060.40	280,374,361.29	1,566.49	56,171.89	4,803.99 51,678.14	84,089.17
Seed Truck Spreader	Diesel	600	0.59	0.266378968	0.824782278	536.3966417	0.002683985	0.034262161	0.031521188	0.143201825	0.444220721	•	•	,	•	. ,	•	•	•	•
Set With Fork-Truck	Diesel	100	0.59	0.509714417	0.485604153	595.7285281	0.002909958	0.029568732	0.027203234	0.141348615	0.029746696	Chid Stoor Looder	500	- 46 335 00	46.036.50		-		- 6 249 20	0.400.30
Skid Steer Loader Small Dozer	Diesel Diesel	75 175	0.21 0.59	4.902492433 0.492297191	4.97678879 1.155006653	693.0439557 536.3389947	0.004297767 0.002851584	0.731666697 0.111014157	0.673133362 0.102133024	0.975304602 0.162232759	0.568134479 0.283774593	Skid Steer Loader Small Dozer	599 2,338	46,235.90 118,848.91	46,936.59 278,838.24	6,536,166.85 129,481,352.37	40.53 688.42	6,900.42 26,800.70	6,348.39 24,656.65	9,198.20 39,165.75
Stripping Machine & Truck	Diesel	600	0.59	1.170567513	2.737275839	536.2077719	0.003163769	0.166505915	0.153185442	0.205546016	1.464577623		_,,===	-,5-5-5-4	-, <del>-</del> -	, - <u>-,-3<b>-</b>-3</u> ,	<del></del>	-,	,	2-,

Surfacing Equipment (Grooving)	Diesel	25	0.59	2.395308746	4.457986672	594.7241942	0.004009162	0.352928772	0.32469447	0.472895529	0.007705337
Survey Crew Trucks	Diesel	600	0.59	0.266378968	0.824782278	536.3966417	0.002683985	0.034262161	0.031521188	0.143201825	0.444220721
Sweepers	Diesel	175	0.43	0.343805302	1.20160073	530.5518076	0.00284204	0.081797091	0.075253324	0.162000767	0.237064319
Ten Wheelers	Diesel	600	0.59	0.266378968	0.824782278	536.3966417	0.002683985	0.034262161	0.031521188	0.143201825	0.444220721
Tool Truck	Diesel	600	0.59	0.266378968	0.824782278	536.3966417	0.002683985	0.034262161	0.031521188	0.143201825	0.444220721
Tower Crane	Diesel	300	0.43	0.316550925	1.431589626	530.5368177	0.002878767	0.063581977	0.058495419	0.166949686	0.464551326
Tractor	Diesel	100	0.21	4.557147382	3.625291823	693.7839599	0.004158576	0.649178824	0.597244518	0.731047818	0.89787357
Tractor Trailers Temp Fac.	Diesel	600	0.59	0.266378968	0.824782278	536.3966417	0.002683985	0.034262161	0.031521188	0.143201825	0.444220721
Tractors/Loader/Backhoe	Diesel	100	0.21	4.557147382	3.625291823	693.7839599	0.004158576	0.649178824	0.597244518	0.731047818	0.89787357
Trenchers	Diesel	75	0.59	1.964489003	3.497462209	595.4006135	0.003494677	0.228941868	0.210626519	0.24961315	0.176592476
Trowel Machine	Diesel	600	0.59	1.170567513	2.737275839	536.2077719	0.003163769	0.166505915	0.153185442	0.205546016	1.464577623
Truck for Topsoil & Seed Del&Spread	Diesel	600	0.59	0.266378968	0.824782278	536.3966417	0.002683985	0.034262161	0.031521188	0.143201825	0.444220721
Truck Tower (Mantiwoc type)	Diesel	300	0.43	0.316550925	1.431589626	530.5368177	0.002878767	0.063581977	0.058495419	0.166949686	0.464551326
Vibratory Compactor	Diesel	6	0.43	4.454041726	4.505787909	588.4781232	0.003966982	0.409876112	0.377086023	0.62410652	0.009376841
Water Truck	Diesel	600	0.59	0.266378968	0.824782278	536.3966417	0.002683985	0.034262161	0.031521188	0.143201825	0.444220721

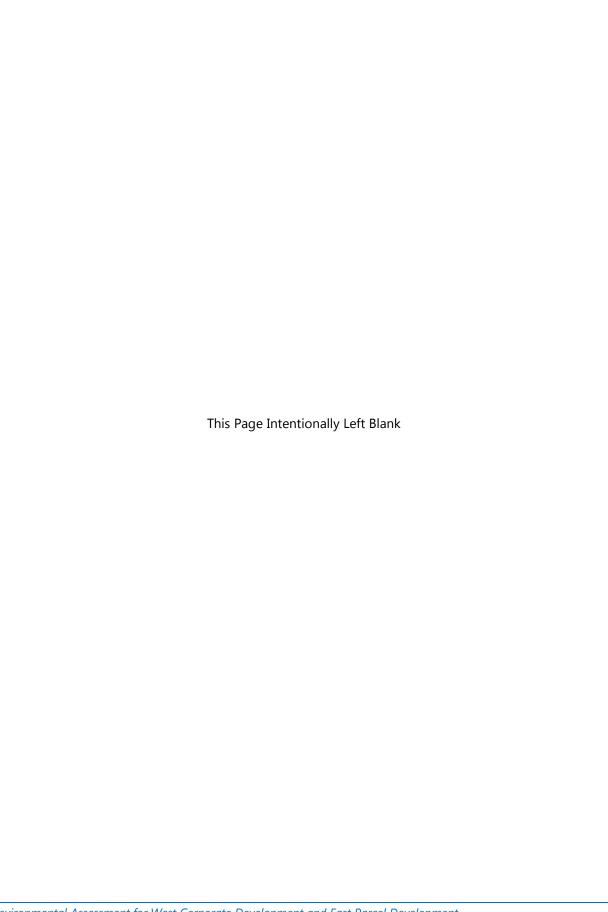
СО	NOX	CO2	Sox	PM10	PM2.5	VOC
5.1902	0.1915		0.0197	0.0363	0.0193	0.066
5.7251	0.2115		0.0216	0.0375	0.0204	0.0696
6.0971	0.2252		0.0228	0.0623	0.0272	0.0726
2.6309	0.0167		0.0068	0.0247	0.0112	0.0521

Surfacing Equipment (Grooving)	664	23,459.65	43,661.52	5,824,728.76	39.27	3,456.58	3,180.06	4,631.54	
Survey Crew Trucks	914	86,180.57	266,838.67	173,538,363.55	868.34	11,084.71	10,197.93	46,329.54	
,		,	•	, ,		,	ŕ	,	
Ten Wheelers	4,241	399,874.87	1,238,122.17	805,211,985.24	4,029.06	51,432.65	47,318.04	214,967.46	
Tool Truck	12,050	1,136,305.97	3,518,314.64	2,288,133,738.46	11,449.21	146,153.80	134,461.50	610,863.12	
Tractors/Loader/Backhoe	16,835	1,611,063.25	1,281,629.48	245,269,627.54	1,470.16	229,500.62	211,140.57	258,443.31	
Tractor Trailer- Equipment Delivery	9,485	894,439.12	2,769,428.61	1,801,096,174.09	9,012.20	115,044.43	105,840.88	480,838.69	
Trencher	250	21,732.16	38,690.68	6,586,619.29	38.66	2,532.67	2,330.06	2,761.35	
Trowel Machine	120	49,725.71	116,279.48	22,778,106.15	134.40	7,073.17	6,507.32	8,731.59	
Truck for Topsoil & Seed Del&Spread	14	1,282.45	3,970.83	2,582,427.99	12.92	164.95	151.76	689.43	
Vibratory Compactor	915	10,516.95	10,639.14	1,389,523.96	9.37	967.81	890.38	1,473.65	
Water Truck	4,320	407,368.03	1,240.30	364,184.74	5.64	46,842.12	0.22	12.51	
	_	20,527,460.35	44,178,358.97	21,258,387,291.38	109,540.70	2,830,814.14	2,561,254.47	6,796,197.70	
					NONROA	D TOTAL			
		СО	NOX	CO2	Sox	PM10	PM2.5	VOC	
		22.63	48.70	23,433.35	0.12	3.12	2.82	7.49	
								67.93 I	EVAP. E
								75.42	
					ONROAD	TOTAL			
Equipment	VMT	СО	NOX	CO2	SOx	PM10	PM2.5	VOC	
Cement Mixer	101,793.00	528,326.03	19,493.36	-	2,005.32	3,695.09	1,964.60	6,718.34	
Dump Truck	375,970.00	2,152,465.85	79,517.66	-	8,120.95	14,098.88	7,669.79	26,167.51	
Material Delivery - Tractor Trailer	56,925.00	347,077.42	12,819.51	-	1,297.89	3,546.43	1,548.36	4,132.76	
Passenger Car	1,264,500.00	3,326,773.05	21,117.15	-	8,598.60	31,233.15	14,162.40	65,880.45	
		-	-	-	-	-	-	-	
		7.00	0.15	-	0.02	0.06	0.03	0.11	
					GRAND	TOTAL			
		СО	NOX	CO2	SOx	PM10	PM2.5	VOC	
	L								
	ţ	29.63	48.84	23,433.35	0.14	3.18	2.85	75.53	

Componen	GSF			
EVAP. E.		Variable	Values	Units
A in M2=	170,100	AR = Application rate of liquefied asphalt over area	1.811	I/m2
VOC =	135,850.84	VD = Volume fraction of diluent in liquefied asphalt	0.35	fraction
	67.93	EF = Mass fraction of diluent which evaporates and becomes VOC	0.7	fraction
		D = Density of solvent utilized	1.8	lbs/l
		VOC = A x AR x VD x EF x D	7,419.50	lbs

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MANASSAS REGIONAL AIRPORT

HYDRAULIC REPORT
FOR
ENVIRONMENTAL
ASSESSMENT FOR
WEST CORPORATE
DEVELOPMENT AND
EAST PARCEL
DEVELOPMENT

NOVEMBER 2017







HYDRAULIC REPORT

FOR

ENVIRONMENTAL

ASSESSMENT FOR WEST

CORPORATE DEVELOPMENT

AND EAST PARCEL

DEVELOPMENT

November 2017

City of Manassas, Prince William County, Virginia City of Manassas P.O. # 170270

RS&H No.: 222-0003-001

Prepared by RS&H, Inc. at the direction of Manassas Regional Airport





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Appendix B - Broad Run Effective Model

Appendix C - Broad Run Duplicate Effective Model

Appendix D - Broad Run Existing Conditions Model

Appendix E - Broad Run Proposed Conditions Model

Appendix F - Agency Coordination

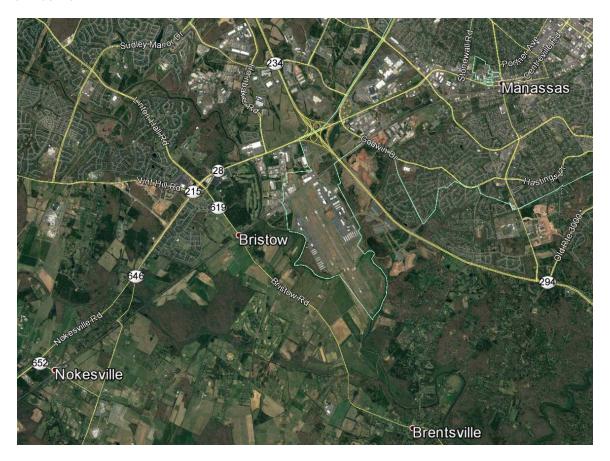
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#### 1.1 PROJECT DESCRIPTION

The City of Manassas retained RS&H, Inc. to provide services for the Environmental Assessment for the West Corporate Development and East Parcel Development, pursuant to an agreement between the City and RS&H dated September 26, 2016. This includes an analysis of impacts to the floodplain and coordination with the City of Manassas, Prince William County, and the Federal Emergency Management Agency (FEMA).

The Manassas Regional Airport (HEF) is owned and operated by the City of Manassas in Prince William County, Virginia. It is located approximately 30 miles southwest of Washington D.C. HEF and the surrounding area are shown in **Figure 1**.

FIGURE 1: AIRPORT LOCATION MAP



HEF conducted a study in coordination with the Federal Aviation Administration (FAA) to redevelop portions of the west corporate area and develop newly acquired land on the east side of the airport. A preliminary environmental analysis found the potential for impacts to multiple environmental categories described in FAA Order 1050.1F and 1050.1 Desk Reference. These impacts include but are not limited to: air quality, biological resources, noise, and water resources.

FEMA has designated areas of HEF as floodplains associated with Broad Run and Cannon Branch. The project requires assessment of impacts to the 100-year floodplain and floodway for Broad Run. The east parcel development will not impact the 100-year floodplain for Cannon Branch. Additionally, any mitigation that may be required for the proposed development is evaluated.

The City of Manassas and Prince William County have jurisdiction over the floodplain in the vicinity of the Manassas Regional Airport. The City of Manassas and Prince William County review hydrologic and hydraulic floodplain analyses and will not permit encroachment in the floodplain unless a "no-rise" condition is achieved or a Conditional Letter of Map Revision (CLOMR) is approved by FEMA. A CLOMR is anticipated for the project because the Proposed Action is within the designated floodway. This document includes the technical hydraulic analysis based on preliminary site design to evaluate the proposed project's impacts to the regulatory floodplain of Broad Run.

#### 1.2 PREVIOUS STUDIES

FEMA has published Flood Insurance Study (FIS) reports and Flood Insurance Rate Maps (FIRM) for Broad Run and Cannon Branch in Prince William County, Virginia. FIRM Panels 0517D and 0519D effective January 5, 1995 contain the floodplain and floodway boundaries for Broad Run and Cannon Branch in the vicinity of HEF. FEMA developed the effective hydraulic models for Broad Run and Cannon Branch using the United States Army Corps of Engineers (USACE) HEC-2 computer model. This model establishes the water surface elevations for 10-, 50-, 100-, 500-year floods and floodway, and also defines the floodplain and floodway boundaries along both streams. The following Letters of Map Change (LOMC) have been issued by FEMA for the surrounding area of HEF.

- FEMA Case No: 00-03-139P: The LOMR was issued on April 4, 2001, to reflect the placement of fill and excavation along Broad Run. The subject area is located from a point just upstream of Southern Railway to a point just downstream of State Route 28 (Nokesville Road). This LOMR reflects decreases in 1 % annual chance water-surface elevations and widening and narrowing of the 1% and 0.2% annual chance floodplains and floodway on FIRM Panels 0156 D and 0157 D.
- FEMA Case No: 01-03-113P: The LOMR was issued on September 12, 2001, to reflect more detailed topographic data for Broad Run from upstream to approximately 2300 feet upstream of Nokesville Road. As a result, this LOMR revises the floodplain and floodway boundaries for FIRM Panel number 0156 D.
- FEMA Case No: 01-03-207P: The LOMR was issued on June 21, 2002, to reflect the effects of a revised hydraulic analysis that incorporated more detailed topographic information of existing conditions for Broad Run in the vicinity of HEF. This request also included revised hydraulic analyses that incorporated the effects of an existing Observation Road cul-de-sac, a new channel identified as Broad Run Side Channel, the Runway 16L-34R and Taxiway bridges. As a result of this LOMR, FIRM Panels 0157 D and 0159 D were revised.
- FEMA Case no: 15-03-2702P: The LOMR was issued on August 11, 2016, to reflect the effects of a revised hydrologic and hydraulic analysis following the placement of fill and modified culverts under Gateway Boulevard,

Prince William Parkway (State Route 234), and Nokesville Road (State Route 28). The subject area is located along Cannon Branch from a point just downstream of Norfolk Southern Railroad to approximately 590 feet upstream of Nokesville Road. This LOMR reflects increases in 1 % annual chance water-surface elevations and widening and narrowing of the 1% and 0.2% annual chance floodplains and floodway on FIRM Panel 0157 D.

» Pending FEMA Case no: 17-03-2321P: A LOMR request to revise FIRM Panels 0157D and 0159D is being reviewed by FEMA for changes to Broad Run due to construction of the Runway 34R Extension program at Manassas Regional Airport. Correspondence with FEMA is included in **Appendix F**.

#### 1.3 HYDROLOGIC METHODOLOGY

Standard hydrologic and hydraulic methods were used to determine the flood hazard data used in this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year.

The FIS for Prince William County, Virginia and Incorporated Areas No. 51153CV001A references that the hydrologic data used is based on either the Soil Conservation Service (SCS) TR-20 or the United States Army Corps of Engineers (USACE) HEC-1 flood hydrograph package. Each watershed was divided into subareas and the drainage areas, percent imperviousness, times of concentration, and routing times for each subarea were determined. The percent imperviousness was based on soil types and land uses that existed at the time of the study. Based on the above basin parameters and rainfall data from Technical Paper No. 40, Technical Paper No. 49, and NWS HYDR0-35, flood hydrographs were computed for each subarea, routing downstream and combined with other subareas using either the TR-20 or HEC-1 computer models.

#### 1.4 HYDRAULIC ANALYSIS

The West Corporate Development will impact the 100-year floodplain and floodway and required indepth hydraulic analysis of Broad Run. The East Parcel Development will not affect the 100-year floodplain for Cannon Branch and, therefore, did not require hydraulic analysis.

#### 1.4.1 Vertical Datum

Cervantes & Associates performed survey for major drainage infrastructure in or near the project area in March 2017. The surveyed elevations are based on the NAVD88 datum.

The FEMA Flood Insurance Study for Prince William County, Virginia, the FEMA FIRM Map elevations, FEMA regulatory model and all figures and tables are based on the NGVD29 datum. In order to maintain vertical datum correlation all existing survey data incorporated into the modeling data has been adjusted by a correlation factor of +0.827 feet to obtain the corresponding NGVD29 datum elevation for modeling purposes. All results from the modeling software should therefore be adjusted by a factor of -0.827 feet to revert elevations to NAVD88 datum.

#### 1.4.2 FEMA Effective Study

An excerpt copy of the current effective floodplain limits is included in **Appendix A**. This map reflects the 1% and 0.2% annual chance (100- and 500-year) floodplains and floodway for Broad Run and Cannon Branch. During the HEF Runway 34R Extension Program design, RS&H obtained a copy of the Broad Run effective HEC-2 hydraulic model, used in the Environmental Assessment (EA) phase of the project, from HNTB Corporation (HNTB). This effective HEC-2 hydraulic model was used as the basis for the issuance of LOMR 01-03-207P by FEMA. During the EA, HNTB reproduced the hydraulic model from approximately 7400 feet downstream of HEF Taxiway Bridge (XS-R) to Southern Railway Bridge crossing (XS-Z) using USACE HEC-2 hydraulic model, version 4.6.2, dated May 1991. A copy of the input/output data is included in **Appendix B**.

#### 1.4.3 Duplicate Effective Model

The effective HEC-2 model was recreated by RS&H using USACE HEC-RAS software, version 5.0.1, dated April 2016. The downstream boundary condition for the 100-year event and floodway were set equal to the water surface elevation (WSEL) calculated in the effective HEC-2 model. For the 10-, 50-, and 500-year events, the energy slope from the effective model was used as the downstream boundary condition. The data was processed to determine discrepancies between computations from the HEC-RAS and HEC-2 software. The Duplicate Effective model produced similar results to the FEMA effective model for all cross sections. Discrepancies are mainly based on the use of different bridge/culvert modeling routines, different conveyance calculations and floodway computations between the HEC-2 and HEC-RAS models. A copy of input/output data for the duplicate effective model is included in **Appendix C**.

#### 1.4.4 Existing Conditions Model

The existing conditions model was used for comparison purposes when quantifying any changes that would result from the proposed development. Note that the existing conditions model represents the pre-project conditions. The hydraulic model currently being reviewed by FEMA for the HEF Runway 34R Extension Program LOMR was used as the existing conditions model for Broad Run. The model includes as-built information and updated survey from the Runway 34R Extension Program. A copy of the input/output data from the LOMR model is included in **Appendix D**.

#### 1.4.5 Proposed Project Analysis

The HEC-RAS model from the Runway 34R Extension Program LOMR was updated to reflect proposed project conditions based on a preliminary grading design. Efforts to minimize impacts on the floodway and 100-year floodplain were made during the design and grading of the proposed West Corporate Development. Observation Road was realigned to avoid the floodway to the maximum extent practicable at the intersection with Piper Lane. Roadway elevations were set at approximately the base flood elevation (BFE) as a safety measure to allow access to and from the airport during a major storm event. To mitigate for any increases in the BFE, a floodplain compensation area was created west of the development, between cross section 285 and 270, on HEF property to offset the effects of proposed fill. Cross sections 314.4 through 264 were updated with ground elevations from the proposed development. All remaining parameters in this HEC-RAS model computation remain the same as the existing conditions model. A copy of the input/output for the Proposed Project Conditions model is included in **Appendix E. Table 1** shows a comparison of BFEs between the existing and proposed project conditions. The Proposed Project

analysis is representative of a No-Rise condition, where there are no increases in BFE. A copy of the annotated FIRMs is included in **Appendix A**.

TABLE 1: BFE COMPARISON FOR BROAD RUN

	Existing	Proposed	Difference
Cross	100-Year	100-Year	
Section	WSEL	WSEL	
	(ft NGVD29)	(ft NGVD29)	(ft)
	-	ad Run	. ,
350	181.46	181.45	-0.01
344.95	181.29	181.28	-0.01
331.6	180.11	180.10	-0.01
320	179.56	179.54	-0.02
314.4	179.40	179.38	-0.02
300	179.16	179.13	-0.03
285	178.12	178.12	0.00
280.55	177.95	177.94	-0.01
270	176.52	176.52	0.00
264	175.98	175.98	0.00
250.12	175.41	175.41	0.00
Runway			
250	174.71	174.71	0.00
246	174.71	174.71	0.00
245	174.68	174.68	0.00
Taxiway			
243.38	174.57	174.57	0.00
243.2	174.57	174.57	0.00
243	174.57	174.57	0.00
190	174.56	174.56	0.00
182	174.54	174.54	0.00
180	174.52	174.52	0.00
170	174.47	174.47	0.00
	Side	Channel	
250.12	175.14	175.14	0.00
225	174.91	174.91	0.00
200	174.78	174.78	0.00
190	174.63	174.63	0.00

#### 1.5 ENDANGERED SPECIES

The Endangered Species Act of 1973, as amended, regulates activities affecting plants and animals designated as threatened or endangered. It also provides measures to help alleviate the loss of species and their habitat to ensure their survival.

A wildlife assessment and coordination with the U.S. Department of Interior Fish and Wildlife Service (FWS), Virginia Fish and Wildlife Information Service (VAFWIS), and the Virginia Department of Conservation and Recreation (VDCR) was conducted to determine if there are any threatened or endangered species or their habitat on the Airport property. The assessment concluded that the proposed development is not likely to adversely affect endangered or threatened species.

#### 1.6 REFERENCES

Federal Emergency Management Agency, Flood Insurance Rate Map, Prince William County, Virginia, January 5, 1995

Federal Emergency Management Agency, Flood Insurance Study, Prince William County, Virginia, August 3, 2015

HNTB Corporation, Draft Environmental Assessment for Runway 16L/34R Extension, Manassas, Virginia, April 2009

Reynolds, Smith & Hills, Letter of Map Revision (LOMR) Request for Runway 34R Extension Program, Alexandria, Virginia, June 5, 2017.

The US Army Corps of Engineers, Hydrologic Engineering Center, HEC-RAS River Analysis System, Version 5.0.1, April 2016.

The US Department of Commerce, National Geodetic survey, Vertcon 2.1 program, Version 2.1, September 2003

APPENDIX A

EXHIBITS

# NOTES TO USERS

This map is for use in administering the National Flood Insurance Program; It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for possible updated flood hazard information prior to use of this map for property

Coastal base flood elevations apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NVGD), and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of special flood hazard (100-year flood) include Zones A, AE, AH, AO, A99,

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency. Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see section 6.0 of the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index.

NOTE: The coordinate system used for the production of this Flood Insurance Rate Map (FIRM) is Universal Transverse Mercator (UTM), North America Datum of 1927 (NAD27), Clarke 1866 spheroid. Corner coordinates shown or the FIRM are in latitude and longitude referenced to the Transverse Mercator projection, NAD27. Differences in the datum and spheroid used in the production of FIRMS for adjacent communities may result in slight positional differences in map features at the community boundaries. These differences do not affect the accuracy of the information shown on the FIRM.

ATTENTION: Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same datum. For infor mation regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, contact the National Geodetic Survey at the following address:

Vertical Network Branch, N/CG13 National Geodetic Survey, NOAA

Silver Spring Metro Center 3 1315 East- West Highway Silver Spring, Maryland 20910 (301) 713-3191

Base Map Source: Base map information prepared by the Prince William County Office of Mapping. This information was compiled by photogrammetric methods from aerial photographs taken February 1987, and complies with U.S.

avement. This dges represe	map is based on the map is based on the map is based on the map is made in the map is based on  roads snown on this map represent edge of the major of the major of the major of the map is inherestandardized map orientation.	
CANAL CONTRACT CONTRA	ELEVATION	REFERENCE MARKS
REFERENCE MARK	ELEVATION IN FT. (NGVD) <sup>1</sup>	DESCRIPTION OF LOCATION
DM 90	210 06	At intersection of State Pouts 28

line of stop sign island. Nail on side of pole at northeast corner of the cemetery, approximately 800 feet south of State Route 28 (Nokesville Road) and approximately 75 feet north of Godwin Drive.

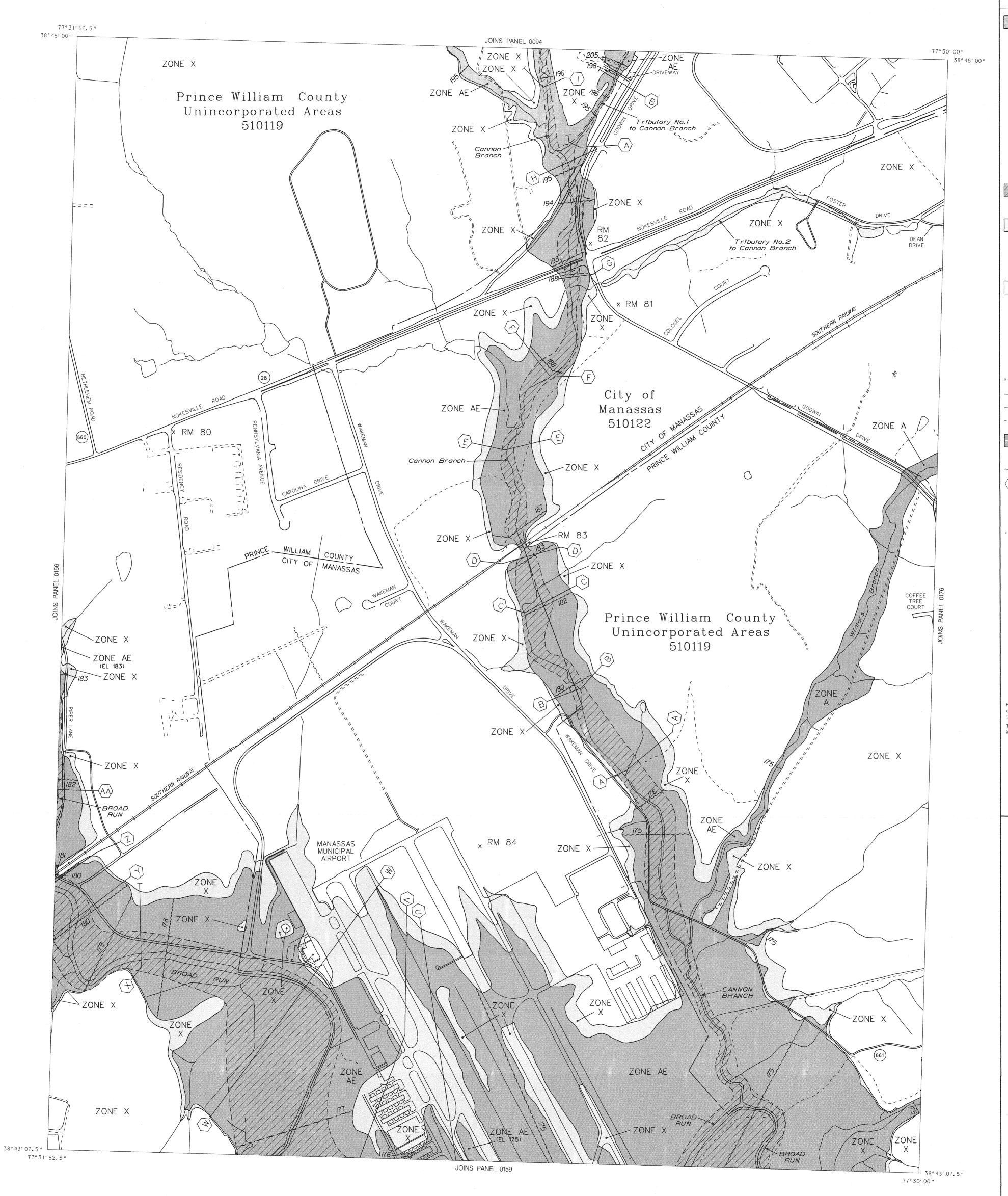
(Nokesville Road) and Residency Road,

chiseled square in north end of center-

north side of round water trough. 2.4 feet above surface of ground.

Chiseled square in center of stop sign island of Godwin Drive, approximately 32 feet north of the centerline of Nokesville Road. Approximately 2.6 miles southwest along Southern Railway from station at Manassas. Prince William County, approx-

imotely 693 feet southwest of milepost bridge, in top of concrete wall of arch culvert, 8.5 feet east of northbound track, a standard monel metal rivet. Approximately one mile east along dirt road from its intersection with Piper Lane, approximately 1,400 feet east of northernmost end of runway at Manassas Municipal Airport, chiseled square in



LEGEND SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD No base flood elevations determined.

Base flood elevations determined. Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined. Flood depths of 1 to 3 feet (usually sheet ZONE AO flow on sloping terrain); average depths de-

termined. For areas of alluvial fan flooding, velocities also determined. ZONE A99 To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations deter-

> Coastal flood with velocity hazard (wave action); base flood elevations determined.

Coastal flood with velocity hazard (wave action); no base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 100-year

OTHER AREAS

ZONE X

Areas determined to be outside 500-year Areas in which flood hazards are undeter-

UNDEVELOPED COASTAL BARRIERS\*

Otherwise Protected Areas

Different Coastal Base Flood Elevation

\*Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas. Floodplain Boundary

----Floodway Boundary Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of

Within Special Flood Hazard Zones. Base Flood Elevation Line; Elevation in ----5/3 -----

Cross Section Line Base Flood Elevation in Feet Where Uniform (EL 987)

RM7 Elevation Reference Mark ●M1.5 River Mile

\*\*Referenced to the National Geodetic Vertical Datum of 1929

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

JANUARY 5, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

Refer to the FLOOD INSURANCE RATE MAP effective date shown on this map to determine when actuarial rates apply to structures in the zones where eleva-

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.



NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP PRINCE WILLIAM COUNTY,

VIRGINIA AND INCORPORATED AREAS

PANEL 157 OF 330

(SEE MAP INDEX FOR PANELS NOT PRINTED) CONTAINS:

COMMUNITY MANASSAS, CITY OF UNINCORPORATED AREAS

when placing map orders; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject MAP NUMBER

Notice to User: The MAP NUMBER shown below should be used

51153C0157 D EFFECTIVE DATE:

JANUARY 5, 1995

Federal Emergency Management Agency

drainage sources of small size, or all planimetric features outside Specia Flood Hazard Areas. The community map repository should be consulted for possible updated flood hazard information prior to use of this map for property purchase or construction purposes.

elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Certain areas not in Special Flood Hazard Areas may be protected by flood

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see section

NOTE: The coordinate system used for the production of this Flood Insurance Rate Map (FIRM) is Universal Transverse Mercator (UTM), North America Datum of 1927 (NAD27), Clarke 1866 spheroid. Corner coordinates shown or the FIRM are in latitude and longitude referenced to the Transverse Mercator projection, NAD27. Differences in the datum and spheroid used in the production of FIRMS for adjacent communities may result in slight positional differences in map features at the community boundaries. These difference do not affect the accuracy of the information shown on the FIRM.

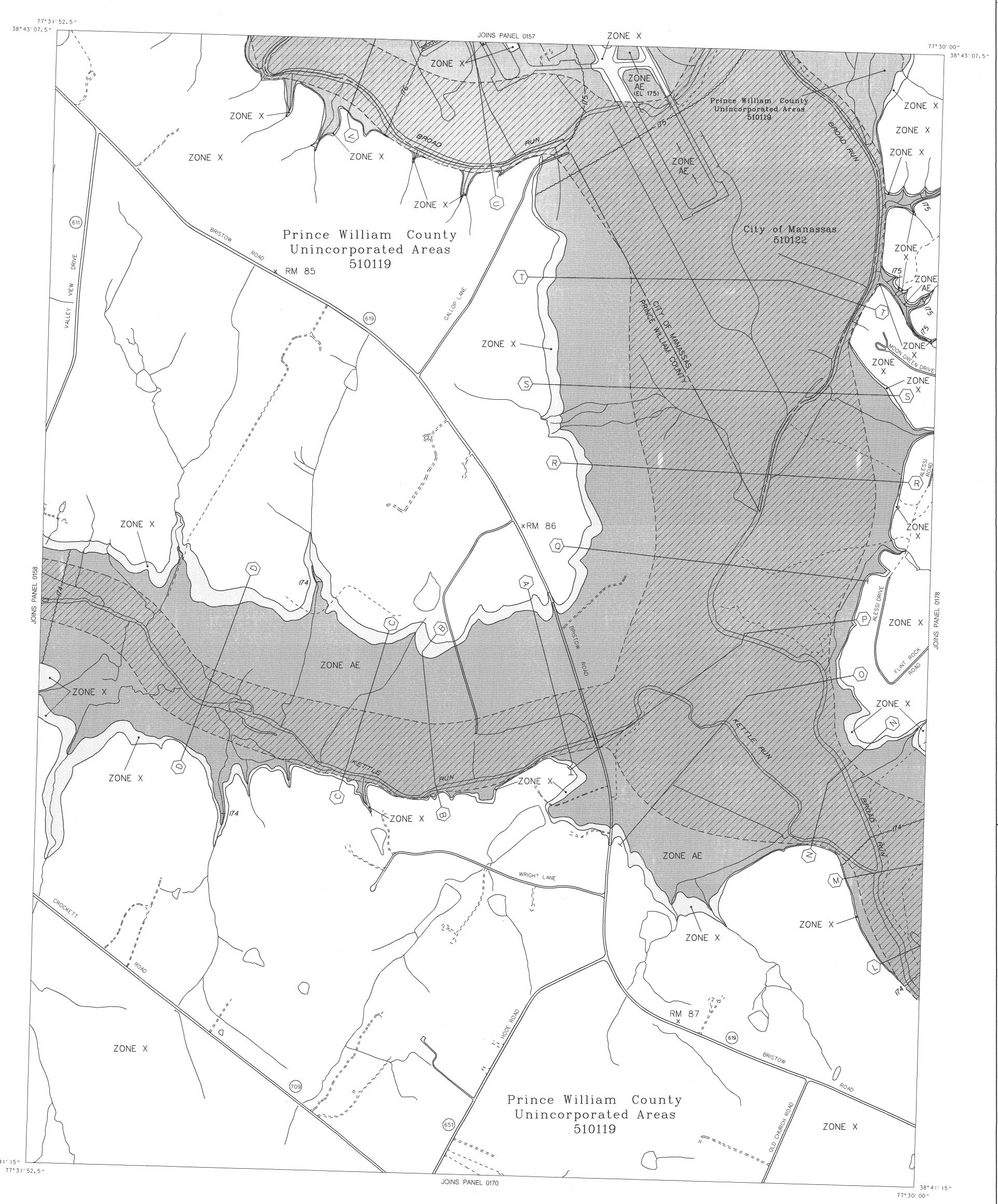
ATTENTION: Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same datum. For info mation regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, contact the National Geodetic Survey at the following address:

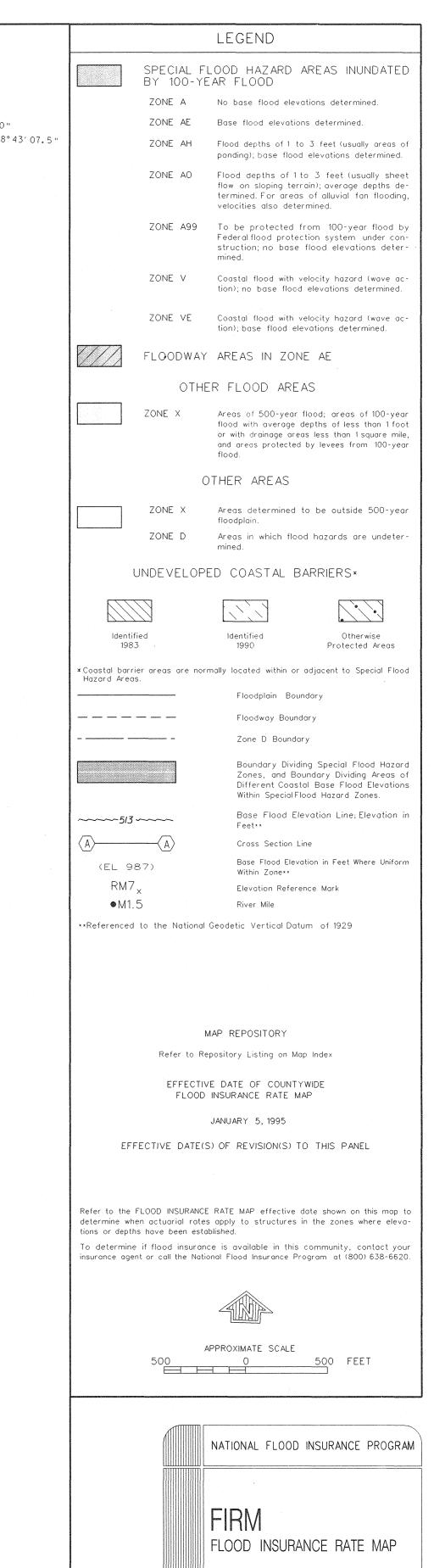
Vertical Network Branch, N/CG13 National Geodetic Survey, NOAA

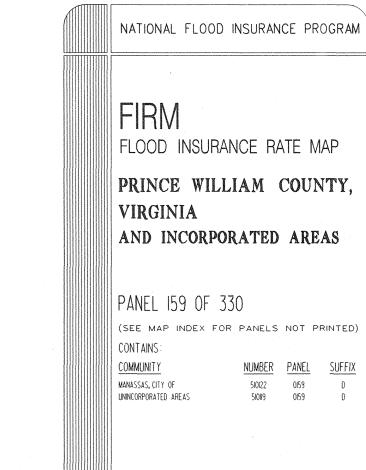
Silver Spring Metro Center 3 1315 East- West Highway Silver Spring, Maryland 20910 (301) 713-3191

Base Map Source: Base map information prepared by the Prince William County Office of Mapping. This information was compiled by photogrammetric methods from aerial photographs taken February 1987, and complies with U.S. National Map Accuracy Standards. Roads shown on this map represent edge of pavement. This map is based on the Transverse Mercator projection; the map

	ELEVATIO	N REFERENCE MARKS
REFERENCE MARK	ELEVATION IN FT. (NGVD) <sup>1</sup>	DESCRIPTION OF LOCATION
RM 85	203.30	Approximately 1.1 miles southeast alor Secondary State Highway 619 (Bristow Road) from Southern Railway station a Bristow, Prince William County, approximately 0.2 mile west of large white house set back in field, approximately 32 feet north of centerline of highway and two feet south of north property line, a standard disk stamped L 115 19 and set in top of concrete post.
RM 86	161.40	Approximately 2.2 miles southeast alor Secondary State Highway 619 (Bristow Road) from Southern Railway station a Bristow, approximately 2.200 feet nor of bridge over Kettle Run, and approx mately 30 feet east of centerline of highway, standard disk stamped M115 RESET 1947 and set in top of concrete post projecting eight inches above ground.
RM 87	226.71	At Brentsville, approximately 0.9 mile northwest along State Route 619 (Bris Road) from crossing over Cedar Run, or noil in VEPCD pole 3-14-CL-8466, 27 fe west of centerline of private drive.





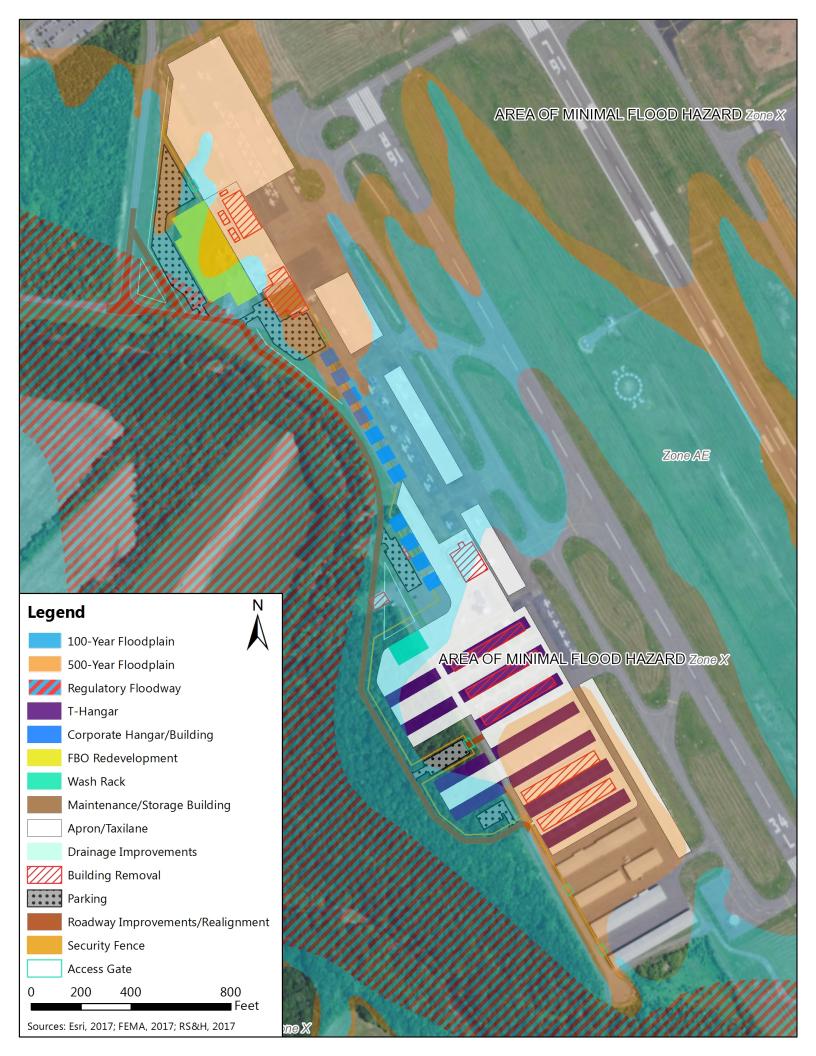


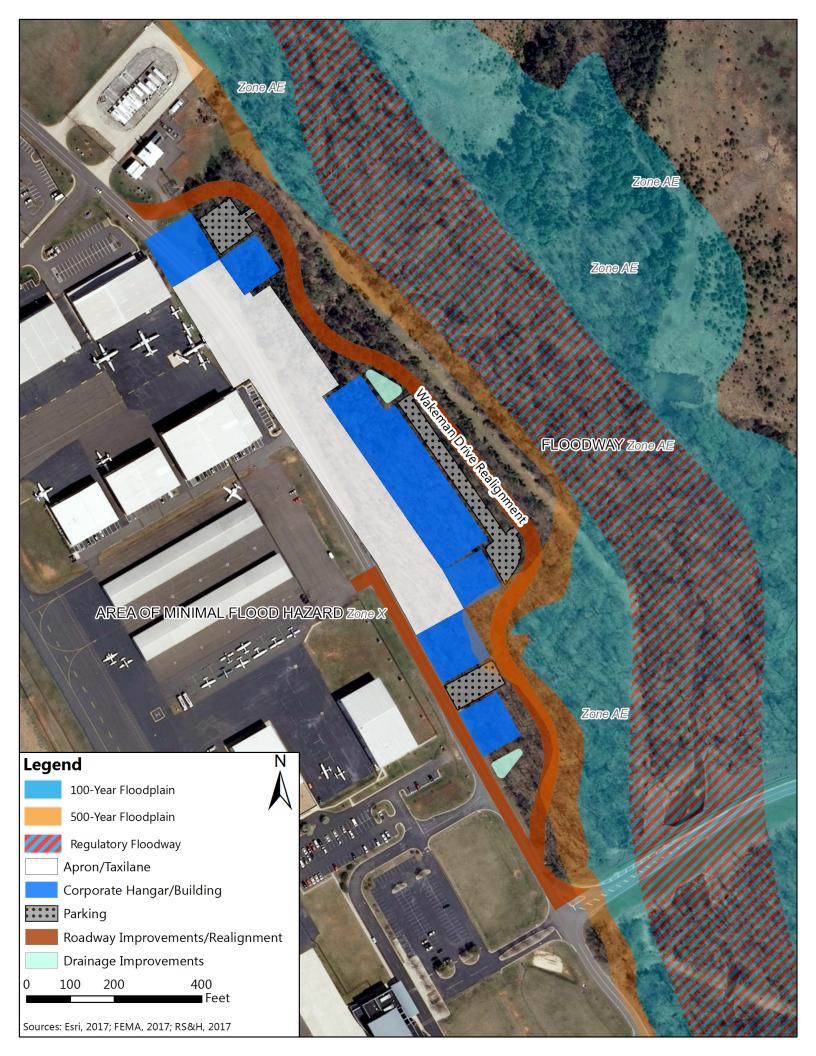
51153C0159 D EFFECTIVE DATE: JANUARY 5, 1995

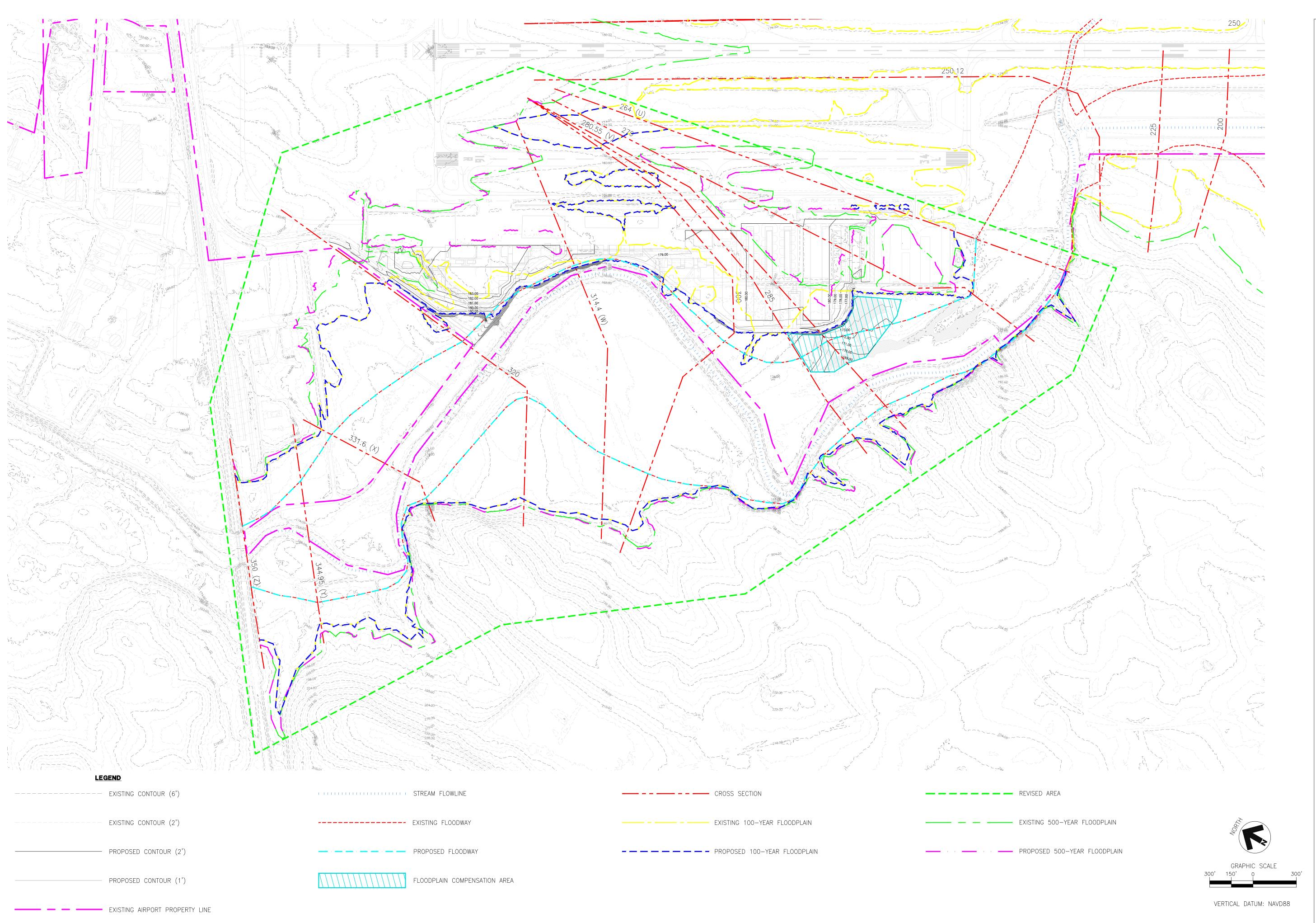
MAP NUMBER

Federal Emergency Management Agency

Notice to User: The MAP NUMBER shown below should be used when placing map orders; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject







RS&H

909 N Washington Street, Suite 330 Alexandria, Virginia 22314 703-549-2472 FAX 703-549-2582

Alexandria VA - Virginia Registration No. 0411-000594



CITY OF MANASSAS, PRINCE WILLIAM COUNTY, VIRGINIA

MANASSAS REGIONAL AIRPORT

ENVIRONMENTAL
ASSESSMENT FOR
WEST CORPORATE
AND EAST PARCEL
DEVELOPMENT

CONSULTANTS

REVISIONS

NO. DESCRIPTION DATE

DATE ISSUED: 11-09-17

REVIEWED BY: LMM

DRAWN BY: SRW

DESIGNED BY: SRW

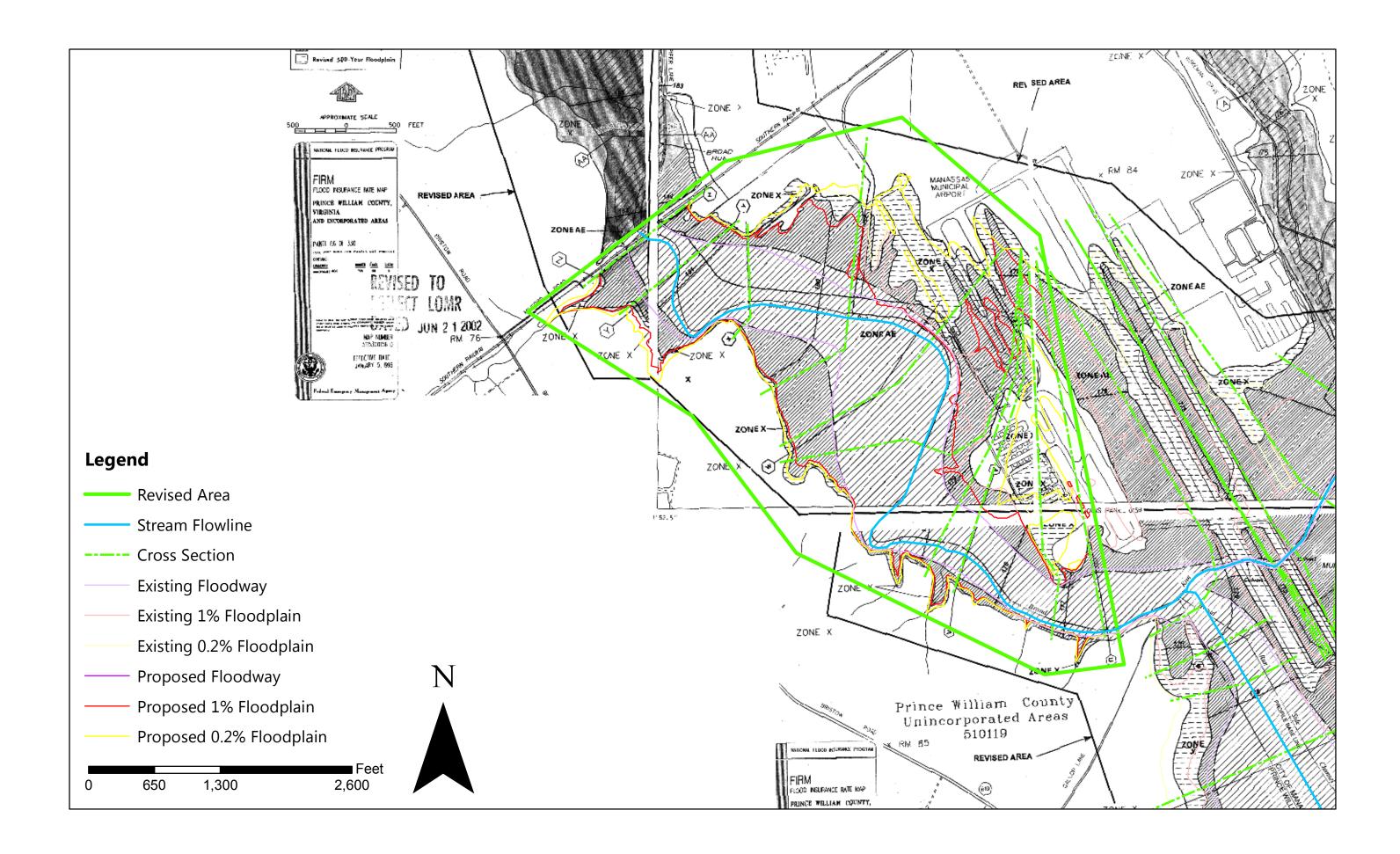
AEP PROJECT NUMBER
222-0003-001

222-0003-001
© 2017 RS&H, INC.
SHEET TITLE

WEST CORPORATE
DEVELOPMENT
(BROAD RUN)
TOPOGRAPHIC

WORK MAP
SHEET NUMBER

EXHIBIT



# APPENDIX B BROAD RUN EFFECTIVE MODEL

\*\*\*\*\*\*\*\*\*\*\* HEC-2 WATER SURFACE PROFILES \* U.S. ARMY CORPS OF ENGINEERS \* HYDROLOGIC ENGINEERING CENTER Version 4.6.2; May 1991 \* 609 SECOND STREET, SUITE D \* DAVIS, CALIFORNIA 95616-4687 \* RUN DATE 04MAY11 TIME 12:33:46 \* (916) 756-1104 \*\*\*\*\*\*\*\*\*\*\* Χ X XXXXXXX XXXXX XXXXX X X X X Χ X X Χ X X Χ X XXXXXXX XXXX X XXXXX XXXXX Х X X Χ Χ X X Χ X X Χ Χ X XXXXXXX XXXXX XXXXXXX 04MAY11 12:33:46 PAGE 1 THIS RUN EXECUTED 04MAY11 12:33:46 \*\*\*\*\*\*\*\*\*\* HEC-2 WATER SURFACE PROFILES Version 4.6.2; May 1991 \*\*\*\*\*\*\*\*\*\* T1PW COUNTY, VIRGINIA HNTB CORP. ARLINGTON Т2 MANASSAS MUNICIPAL AIRPORT - TAXIWAY AND RUNWAY FIS ANALYSIS Т3 100-YEAR FLOOD FG 03/2010 Т4 DUPLICATE EFFECTIVE INCLUDING FEMA ISSUED LOMRS-DIVIDED FLOW REACH MODEL BEGINS AT FEMA X/S "R" STA. 170.000 Т5 J1 ICHECK INO NINV IDIR STRT METRIC HVINS 0 WSEL FO 174.47 4 J2 NPROF IPLOT PRFVS XSECV XSECH FNALLDC IBW CHNIM ITRACE 1 -1 J3 VARIABLE CODES FOR SUMMARY PRINTOUT 110 150 200 J5 LPRNT NUMSEC \*\*\*\*\*\*\*REOUESTED SECTION NUMBERS\*\*\*\*\*\* -10 -10 0.1 0.045 0.1 0.3 NC 0.1 QΤ 5 8930 15300 18100 26100 18100 LETTERED CROSS-SECTION R ET 7.11 925 3225

0

0

0

X1 170.00

25

1965

2040

GR GR GR GR	185 162.5 152.7 160 168	610 1165 2000 2140 3325	180 161 152.7 159 170	635 1665 2030 2275 3520	175 160 155 160 175	660 1865 2040 2460 3810	170 155 160 165 180	720 1965 2045 2620 4050	165 152.7 161 167.5 185	865 1970 2090 3025 4270	
	LETTERED (	CROSS-SECTIO	N S								
ET X1 GR GR GR GR GR GR	180.00 185 163 153.3 162 164 175	28 1140 1570 1975 2270 3680 4630	1970 180 162.5 153.3 164 165 180	2035 1205 1710 2000 3000 3800 4790	1000 175 161 153.3 165 168 185	7.11 1000 1285 1860 2030 3285 4000 5000	1820 1000 170 160.0 155 166 170	4235 1370 1945 2035 3330 4200	165 155 157 165 173	1480 1970 2075 3380 4500	2
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GR GR GR	162.5 168 166 176	3350 4435 4955 5925	164 168 178	3625 4625 5060 6135	160 160 170 180	3730 4645 5335 6255	160 172	4665 5665	164 174	4675 5815	
ı	JUST UPSTRE	EAM OF CANNO	N BRANCH								
NC ET X1 GR GR GR GR	0.07 243 180 170 153.2 168	0.07 7.1 19 0 520 1300 2340	0.045 7.1 1250 178 168 160 166	0.1 7.1 1350 20 570 1350 2490	0.3 7.1 4920 176 166 164 166	9.1 1480 100 660 1360 3170	1080 3938 174 160 166 176	2510 215 680 2070 3280	1250 172 160 168	1350 330 1250 2120	
;	INSERTED XS	TO EVALUAT	E IMPACT OF	PROPOSED SI	TE(5/21/01)						
NC ET X1 GR	0.07 243.2 184	0.07 7.1 20 0	0.045 7.1 3485 180	0.1 7.1 3560 220	0.3 7.1 730 178	9.1 200 1780	3445 730 176	4145 1990	3485 174	3560 2650	
GR GR GR	184 172 155.1 168	2840 3520 3900	180 170 160 166	3045 3560 4100	178 166 164 165	3105 3580 4450	176 166 166 168	3450 3600 4750	174 160 168 176	3485 3700 4900	

MANASSAS MUNICIPAL AIRPORT - TAXIWAY AND RUNWAY THIS THE DOWNSTREAM FACE OF THE SMALL RUNWAY FROM EFFECTIVE MODEL

NC 0.3 0.5

ET						9.11			3835	3990	
X1	243.38	13	3885	3940	600	300	600				
х3	10							176	176		
GR	180	0	175	400	172	1550	172	3800	170	3845	
GR	160	3845	156.7	3910	160	3940	170	3980	170	4040	
GR	168	4100	170	4470	176	4790					
	THIS IS SM	ALL RUNWAY (	CROSSING								
1	0.4147.771.1	10.22.46								51.05	2
	04MAY11	12:33:46								PAGE	3
SB		1.60	2.7	0.0	30		423	0.0	156.8	156.7	
	שוד כ דכ שט	E U/S FACE (	ר דער פאאד.ד	DIIMWAV							
	1112 12 11	E U/S FACE (	JF IRE SMALL	L RUNWAI							
ET						9.11			3890	4050	
X1	245	15	3940	3975	230	230	230				
X2			1	170.9	176.6						
х3	10							176.9	176.6		
BT	-10	0	180		550	177.3		1900	177.3		
BT		3100	176.9		3940	176.6		3944.99	176.6		
BT		3945	176.6	170.9	3975	176.6	170.9	3975.01	176.6		
BT		5030	176.6								
GR	180	0	175	550	174	1900	175	3100	174	3500	
GR	172	3570	170	3890	160	3940	156.8	3960	160	3975	
GR	170	4020	174	4090	175	4260	175	4890	176.2	5030	
	THIS IS TH	E CROSS SECT	TION BETWEEN	THE RUNWAY	S						
ET	0.46	7.11	7.11	7.11	_	9.11	3880	4040	3880	4040	
X1	246	14	3930	3980	5	140	50	2100	174	2500	
GR GR	180 172	0 3570	175 170	550	174 160	1900 3930	175	3100 3955	174 160	3500 3980	
GR	170	3570 4040	172	3880 4050	174	4970	156.8 175.2	5030	100	3900	
GIC	170	4040	1/2	4030	1/4	4570	173.2	3030			
	THIS IS TH	E D/S FACE (	OF RUNWAY 34	1-R							
ET						9.11			3880	4030	
ж1 Х1	250	13	3930	3980	5	60	40		3000	4030	
X3	10	13	3930	3900	5	00	40	177	177		
GR	180	0	175	550	174	1900	175	3100	174	3500	
GR	172	3570	170	3880	160	3930	156.84	3955	160	3980	
GR	172	4035	174	4350	175.2	5030	250.01	3,33	100	3300	
SB		2.29	2.7	0.0	30		375	0.0	157.0	156.84	
		ON IS FROM I									
	THE X2 MIN	HIGH CORD V	WAS REVISED	TO MATCH EX	ISTING CONDIT	I'IONS					
ET		7.1	7.1	7.1	7.1	9.1	3330	3750	3540	3750	
x1	250.12	18	3650	3695	482	482	482				
X2			1	169.5	177.4						
х3	10							177.9	177.9		
BT	-8	0	180		450	180		2850	178.6		
BT		3659.99	177.9		3660	177.9	169.5	3690	177.9	169.5	
BT		3690.01	177.9		5050	177.9					
GR	180	0	175	450	174	2850	174	3270	172	3450	
GR	170	3600	160	3650	157	3675	160	3695	168	3730	
GR	168	3920	165.3	3980	168	4100	170	4225	172	4300	
GR	168	4430	180	4700	194	5050					

04MAY11 12:33:46 PAGE 4

THIS SECTION IS THE FIRST SECTION U/S OF THE DIVIDED FLOW INSERTED AN INEFFECTIVE FLOW ENCROACHMENT AT 500' FROM LEFT CHANNEL BANK FOR THE NATURAL RUN. INEFFECTIVE FLOW AREA DUE TO FILL PLACED IN FLOODPLAIN AT CROSS-SECTION 270

NC	0.1	0.1	0.045	0.1	0.3					
QΤ	5	8780	15000	17700	25700	17700				
ET		7.11	7.11	7.11	7.11	9.11	4470	5070	4400	5052.91
X1	264.00	21	4970	5025	1338	1000	1338			
GR	185	840	180	1140	177	1490	177	1770	177	2310
GR	177	2570	177	2870	177	3100	177	3330	176	3530
GR	175	3650	170	3820	165	4410	164	4680	165	4900
GR	166	4925	165	4950	160	4970	157.5	5000	160	5025
GR	185	5070								
	THIS CROSS S	SECTION IS	THE INSERTE	D CROSS SEC	TION TO REPR	ESENT				
	FILL PLACED	SINCE THE	EFFECTIVE F	IS WAS COMP	LETED					
	THERE IS AN	ENCR. IN T	HE NAT. RUN	TO REFLECT	EFFECTIVE F	LOW				
ET		7.1	7.1	7.1	7.1	9.1	3150	3710	3210	3700
X1	270	31	3550	3655	520	520	520	3710	3210	3700
GR	178	0	175	120	175	680	177	760	177	1840
GR	180	1900	180	1950	182.8	1970	182.8	2180	202.8	2180
GR	202.8	2240	182.8	2240	182.8	2325	202.8	2325	202.8	2385
GR	182.8	2385	181.4	2550	201.4	2550	201.4	2620	180.6	2620
GR	180.4	2710	200.4	2710	200.4	2770	182.8	2770	180.9	3150
	180.4	3200	170	3240	170	3550	157.7	3602.5		3655
GR	206		170	3240	170	3550	15/./	3002.5	170	3055
GR	206	3710								
	LETTERED CRO	OSS-SECTION	V ON EFFEC	TIVE FIS						
	INSERTED NEW				ACED					
ET		7.1	7.1	7.1	7.1	9.1	3545	5280	4585	5185
X1	280.55	20	4945	5045	1140	1140	1140	5200	1505	5205
GR	185	1515	180	1785	177	2130	177	2270	177	2526
GR	177	2630	180	2745	182	3545	176	4305	174	4520
GR	172	4725	170	4925	165	4945	158	5000	165	5045
GR	166	5150	170	5250	175	5270	180	5280	185	5290
GIC	100	3130	170	3230	173	3270	100	3200	103	3230
	INSERTED CRO	OSS-SECTION	TO EVALUAT	E IMPACT OF	PROP. SITE	(5/21/01)				
ET		7.1	7.1	7.1	7.1	9.1	2040	3370	2635	3240
x1	285	17	3060	3130	220	320	320			
GR	180	0	177	100	175	300	178	1100	178	2000
GR	177	2100	177	2300	175	2460	170	2860	165	2990
GR	164	3060	158.2	3095	164	3130	165	3140	170	3250
GR	172	3290	188	3370	101	3130	100	3110	1,0	3230
OIC	1/2	2270	100	3370						

INSERTED CROSS-SECTION TO EVALUATE IMPACT OF PROP. SITE (5/21/01)

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ET X1 GR GR GR	300 180 177 165 175	7.1 18 0 2100 2480 3600 OSS-SECTION	7.1 2400 177 175 170 180	7.1 2480 100 2350 2500 3790	7.1 1000 175 170 170 185	9.1 1900 300 2390 2580 3890	1780 1900 178 165 169	3520 1100 2400 3000	2240 178 158.7 170	3320 2000 2440 3400	
	DETTERED CR	ODD BECTION	W ON BITEC.	LIVE FIS							
ET X1 GR GR GR GR GR	314.40 185 181 180 170 165 170 INSERTED CR	7.1 29 445 1075 1605 1945 2055 3175 OSS-SECTION	7.1 1975 181 180 181 165 170 175	7.1 2055 695 1095 1715 1975 2120 3705	7.1 600 181 178 181 165 171 180 PROP. SITE (	9.1 600 740 1180 1790 1975 2165 3755	1790 1252 181 178 180 159.1 170 185	3855 951 1275 1820 2000 2225 3855	1950 181 178 175 165 169	3335 960 1530 1870 2055 2410	
ET X1 GR GR GR	320 190 159.4 200	11 100 1765 3020	1720 185 170	1810 330 1810	900 180 170	9.1 550 760 1900	900 175 175	1430 2140	1500 170 180	2100 1720 2870	
		OSS-SECTION ODWAY TO RED		RCHARGES							
ET X1 GR GR GR GR	331.60 185 174 165 180	17 1280 1825 2040 2240	1955 180 170 165 185	2040 1335 1950 2040 2245	820 178 165 170	7.11 820 1480 1955 2050	1400 820 175 165 173	2240 1695 1955 2150	174 159.6 175	1725 2000 2215	
		OSS-SECTION ODWAY TO RED		RCHARGES							
ET X1 GR GR GR GR	344.95 190 175 165 169 190	21 1290 1855 2050 2265 2810	1950 185 170 165 170	2050 1325 1900 2050 2335	1335 180 165 170 175	7.11 1335 1370 1950 2090 2410	1600 1335 177 165 173 180	2450 1600 1950 2180 2530	177 159 170 185	1750 2000 2250 2625	
	LETTERED CR SOUTHERN RA	OSS-SECTION	Z								
1	04MAY11	12:33:46								PAGE	6
ET X1 GR GR GR	350.00 190 165 170 DIVIDED FL	14 1230 1965 2055 OW REACH	1965 185 165 175	2030 1350 1965 2105	505 180 160 180	7.11 505 1590 2000 2600	1840 505 175 165 185	2280 1835 2030 2670	170 165	1940 2030	

NC	0.1	0.07	0.045	0.1	0.3						
QΤ	5	8930	15300	18100	26100	18100					
ET						7.11	1600	3900			
X1	-180.0	28	1970	2035	1000	1000	1000	4000		4.400	
GR	185	1140	180	1205	175	1285	170	1370	165	1480	
GR	163	1570	162.5	1710	161	1860	160.0	1945	155	1970	
GR	153.3	1975	153.3	2000	153.3	2030	155	2035	157	2075	
GR	162	2270	164	3000	165	3285	166	3330	165	3380	
GR	164	3680	165	3800	168	4000	170	4200	173	4500	
GR	175	4630	180	4790	185	5000					
	LETTERED (	CROSS SECTION	T ON THE E	FFECTIVE FI	S						
		LOCATION OF RO									
QT	5	5905	12820	15880	20850	15880					
		EL ROUGHNESS					ΝΔΤΊΤΡ ΔΤ.				
		ASLO 1EFT IS				E II IS NOI	NATORAL				
NC	0.1	0.07	0.045	0.1	0.3						
ET	0.1	7.1	7.1	7.1	7.1	9.1	4435	6255	4485	5800	
X1	190.00	28	1970	2020	1100	550	1100	0233	1103	3000	
GR	185	1920	155	1970	153.8	2000	155	2020	160	2030	
GR	161	2250	162.5	2455	163	2750	162.5	3000	160	3150	
GR	162.5	3350	162.5	3625	160	3730	163	3915	165	4100	
GR	168	4435	164	4625	160	4645	160	4665	164	4675	
GR	166	4955	168	5060	170	5335	172	5665	174	5815	
GR	176	5925	178	6135	180	6255	1/2	3003	1/1	3013	
OIC	170	3,72,5	170	0133	100	0233					
NC	0.07	0.07	0.07			0 1			222	605	
ET	200 0	1.4	220	420	000	9.1	0.00		220	685	
X1	200.0 200	14	220 177.6	430	820	890	820	1 - 0	170	200	
GR		0	164	1 260	176	90	174	150	170 172	200 760	
GR GR	168 174	220 910	176		166 178	430	167 180	750	1/2	760	
GR	1/4	910	176	1035	176	1200	100	1320			
ET						9.1			200	710	
X1	225	13	240	280	460	460	460				
GR	177.9	0	177.1	50	176	95	174	160	172	180	
GR	170	205	168	240	166	260	168	280	168	475	
GR	170	710	172	730	177	810					
1											
	04MAY11	12:33:46								PAGE	7
NC	0.07	0.07	.045								
ET		7.1	7.1	7.1	7.1	9.1	3750	5050	3870	4400	
X1	250.12	18	3650	3695	490	260	490				
GR	180	0	175	450	174	2850	174	3270	172	3450	
GR	170	3600	160	3650	157	3675	160	3695	168	3730	
GR	168	3920	165.3	3980	168	4100	170	4225	172	4300	
GR	168	4430	180	4700	194	5050	-	-			
1	0.4										
	04MAY11	12:33:46								PAGE	8
T1		OUNTY, VIRGIN			CORP. ARLING						
T2 T3		SSAS MUNICIPA			D RUNWAY FIS		Q				
13	BRUAL	O RUN	100-YEAR FL	OODWAI	r G	04/200	O				

METRIC HVINS

Q

WSEL

FQ

J1 ICHECK

INQ

NINV

IDIR

STRT

		6							175.21			
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE		
	2		-1									
1	04MAY11	12:33:	: 46								PAGE	9
T1 T2 T3	MANA		CIPAL AIRPO	DRT - TAXIV LO-YEAR	VAY AND RUI							
J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ		
		2			.0006							
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE		
	3		-1									
1	04MAY11	12:33:	: 46								PAGE	10
T1 T2 T3	MANA	OUNTY, VIF SSAS MUNIC D RUN	CIPAL AIRPO	ORT - TAXIV 50-YEAR		NWAY FIS A						
J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ		
		3			.0006							
Ј2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE		
	4		-1									
1	04MAY11	12:33:	: 46								PAGE	11
T1 T2 T3	MANA		CIPAL AIRPO	ORT - TAXIV 500-YEAR	NAY AND RUI							
J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ		
		5			.0006							
Ј2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE		
	5		-1									
1	04MAY11	12:33:	: 46								PAGE	12

THIS RUN EXECUTED 04MAY11 12:33:47

NOTE- ASTERISK (\*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

BROAD RUN

SUMMARY PRINTOUT TABLE 110

	SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
						-	_						
	170.000	174.47	.00	174.48	3112.90	8136.63	2753.13	7210.25	.00	.00	1965.00	2040.00	.00
	170.000	175.21	.74	175.22	2300.00	8057.99	2875.35	7166.65	2300.00	925.00	1965.00	2040.00	3225.00
	170.000	164.64	.00	164.75	1699.67	2900.13	3628.58	2401.29	.00	.00	1965.00	2040.00	.00
	170.000	166.64	.00	166.75	2068.57	6111.35	4686.91	4501.74	.00	.00	1965.00	2040.00	.00
	170.000	168.96	.00	169.08	2668.49	11447.21	6159.08	8493.71	.00	.00	1965.00	2040.00	.00
	180.000	174.52	.00	174.53	3305.23	3788.54	2409.01	11902.45	.00	.00	1970.00	2035.00	.00
	180.000	175.26	.74	175.27	2415.00	1463.37	2711.42	13925.21	2415.00	1820.00	1970.00	2035.00	4235.00
	180.000	165.29	.00	165.44	2278.18	1641.26	3685.21	3603.53	.00	.00	1970.00	2035.00	.00
	180.000	167.26	.00	167.38	2520.32	3104.38	4353.12	7842.50	.00	.00	1970.00	2035.00	.00
	180.000	169.58	.00	169.68	2777.54	5437.45	5384.75	15277.81	.00	.00	1970.00	2035.00	.00
	190.000	174.54	.00	174.54	2497.59	17.22	217.08	1985.70	4435.00	.00	1970.00	2020.00	4435.00
*	190.000	175.31	.76	175.31	499.61	60.65	727.55	1431.80	499.61	1937.39	1970.00	2020.00	2437.00
	190.000	165.74	-9.57	165.75	2230.55	31.08	742.29	2251.63	4435.00	.00	1970.00	2020.00	4435.00
	190.000	167.58	1.84	167.58	2438.97	21.93	441.56	2016.51	4435.00	.00	1970.00	2020.00	4435.00
	190.000	169.88	2.31	169.89	2489.81	42.21	709.77	4498.02	4435.00	.00	1970.00	2020.00	4435.00
*	243.000	174.55	.00	174.55	1430.00	410.08	559.06	1250.86	1430.00	1080.00	1250.00	1350.00	2510.00
*	243.000	175.34	.80	175.36	100.00	.00	2220.00	.00	100.00	1250.00	1250.00	1350.00	1350.00
*	243.000	166.02	-9.32	166.06	1011.84	941.20	1848.01	235.79	1430.00	1080.00	1250.00	1350.00	2510.00
*	243.000	167.64	1.62	167.65	1173.59	702.91	1216.16	560.93	1430.00	1080.00	1250.00	1350.00	2510.00
*	243.000	169.96	2.32	169.97	1430.00	1246.46	1921.24	2082.30	1430.00	1080.00	1250.00	1350.00	2510.00
*	243.200	174.55	.00	174.55	700.00	147.75	901.31	1170.94	700.00	3445.00	3485.00	3560.00	4145.00
*	243.200	175.37	.82	175.41	75.00	.00	2220.00	.00	75.00	3485.00	3485.00	3560.00	3560.00
*	243.200	166.11	-9.25	166.37	217.14	150.68	2720.54	153.78	700.00	3445.00	3485.00	3560.00	4145.00
*	243.200	167.64	1.52	167.73	446.86	170.27	2034.59	275.14	700.00	3445.00	3485.00	3560.00	4145.00
*	243.200	169.95	2.31	170.07	700.00	386.01	3266.74	1597.26	700.00	3445.00	3485.00	3560.00	4145.00
1													
_	04MAY11	12:33:40	5									PAGE 13	
	SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
*	243.380	174.54	.00	174.57	95.00	.00	2220.00	.00	.00	.00	3845.00	3940.00	.00
	243.380	175.42	.88	175.45	95.00	.00	2220.00	.00	155.00	3835.00	3845.00	3940.00	3990.00
	243.380	166.69	-8.73	166.91	95.00	.00	3025.00	.00	.00	.00	3845.00	3940.00	.00
	243.380	167.83	1.14	167.95	95.00	.00	2480.00	.00	.00	.00	3845.00	3940.00	.00
*	243.380	170.15	2.33	170.49	95.00	.00	5250.00	.00	.00	.00	3845.00	3940.00	.00
*	245.000	175.00	.00	175.23	35.00	.00	2220.00	.00	.00	.00	3940.00	3975.00	.00
*	245.000	175.90	.90	176.11	35.00	.00	2220.00	.00	160.00	3890.00	3940.00	3975.00	4050.00
*	245.000	166.31	-9.59	168.16	35.00	.00	3025.00	.00	.00	.00	3940.00	3975.00	.00
*	245.000	167.62	1.30	168.54	35.00	.00	2480.00	.00	.00	.00	3940.00	3975.00	.00
*	245.000	172.13	4.51	173.98	35.00	.00	5250.00	.00	.00	.00	3940.00	3975.00	.00
*	246.000	175.26	.00	175.29	160.00	367.16	1405.99	446.84	160.00	3880.00	3930.00	3980.00	4040.00
*	246.000	176.14	.88	176.16	160.00	376.82	1383.89	459.30	160.00	3880.00	3930.00	3980.00	4040.00
*	246.000	168.47	-7.67	168.74	143.12	301.00	2361.37	362.62	160.00	3880.00	3930.00	3980.00	4040.00

*	246.000	168.64	.17	168.82	145.10	251.94	1924.54	303.52	160.00	3880.00	3930.00	3980.00	4040.00
*	246.000	174.48	5.83	174.55	2893.05	1480.89	2430.92	1338.18	.00	.00	3930.00	3980.00	.00
*	250.000	175.23	.00	175.33	50.00	.00	2220.00	.00	.00	.00	3930.00	3980.00	.00
*	250.000	176.10	.88	176.20	50.00	.00	2220.00	.00	150.00	3880.00	3930.00	3980.00	4030.00
	250.000	168.37	-7.74	168.94	50.00	.00	3025.00	.00	.00	.00	3930.00	3980.00	.00
	250.000	168.57	.21	168.94	50.00	.00	2480.00	.00	.00	.00	3930.00	3980.00	.00
*	250.000	174.18	5.61	174.87	50.00	.00	5250.00	.00	.00	.00	3930.00	3980.00	.00
	250.120	176.35	.00	176.47	45.00	.00	2220.00	.00	420.00	3330.00	3650.00	3695.00	3750.00
	250.120	177.24	.89	177.35	45.00	.00	2220.00	.00	210.00	3540.00	3650.00	3695.00	3750.00
*	250.120	169.11	-8.13	169.74	45.00	.00	3025.00	.00	420.00	3330.00	3650.00	3695.00	3750.00
*	250.120	169.05	06	169.48	45.00	.00	2480.00	.00	420.00	3330.00	3650.00	3695.00	3750.00
*	250.120	178.28	9.23	178.33	420.00	2196.06	2244.64	809.30	420.00	3330.00	3650.00	3695.00	3750.00
*	264.000	176.94	.00	177.13	585.50	11842.56	5505.19	352.25	600.00	4470.00	4970.00	5025.00	5070.00
*	264.000	177.69	.75	177.82	652.91	12447.63	4916.29	336.08	652.91	4400.00	4970.00	5025.00	5052.91
*	264.000	170.97	-6.72	171.17	574.75	5075.10	3565.87	139.03	600.00	4470.00	4970.00	5025.00	5070.00
*	264.000	171.56	.59	172.04	575.81	8897.06	5860.15	242.79	600.00	4470.00	4970.00	5025.00	5070.00
*	264.000	178.76	7.20	179.04	588.76	17524.00	7629.52	546.48	600.00	4470.00	4970.00	5025.00	5070.00
	201.000	2,01,0	,.20	173.01	300.70	1,321.00	,023.32	310.10	000.00	11/0.00	13,0.00	3023.00	5070.00
*	270.000	177.05	.00	177.84	453.96	5792.48	11852.79	54.73	560.00	3150.00	3550.00	3655.00	3710.00
*	270.000	177.70	.65	178.37	456.76	6063.83	11573.78	62.38	490.00	3210.00	3550.00	3655.00	3700.00
*	270.000	170.85	-6.85	172.81	419.72	343.59	8436.01	.40	560.00	3150.00	3550.00	3655.00	3710.00
*	270.000	172.62	1.78	175.13	429.51	2317.01	12674.70	8.29	560.00	3150.00	3550.00	3655.00	3710.00
*	270.000	178.90	6.28	179.98	464.22	9430.69	16157.53	111.78	560.00	3150.00	3550.00	3655.00	3710.00
	270.000	170.50	0.20	1,5.50	101.22	7130.03	10137.33	111.70	300.00	3130.00	3330.00	3033.00	3710.00
*	280.550	178.77	.00	178.97	1323.05	4571.72	8581.92	4546.36	1735.00	3545.00	4945.00	5045.00	5280.00
*	280.550	179.24	.48	179.53	600.00	4080.64	9841.32	3778.04	600.00	4585.00	4945.00	5045.00	5185.00
*	280.550	174.47	-4.77	174.67	798.87	885.08	5624.59	2270.33	1735.00	3545.00	4945.00	5045.00	5280.00
*	280.550	177.01	2.54	177.26	1097.15	2913.14	8145.19	3941.67	1735.00	3545.00	4945.00	5045.00	5280.00
*	280.550	181.02	4.01	181.25	1611.37	8560.36	10849.97	6289.67	1735.00	3545.00	4945.00	5045.00	5280.00
	200.550	101.02	1.01	101.23	1011.57	0300.30	100101	0203.07	1733.00	3313.00	1313.00	5015.00	3200.00
1													
1	04MAY11	12:33:40	6									PAGE 14	
	04MAY11	12:33:40	б									PAGE 14	
	04MAY11	12:33:40	6									PAGE 14	
	04MAY11 SECNO	12:33:40	6 DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	PAGE 14	STENCR
		CWSEL					QCH	QROB	PERENC		STCHL		STENCR
			DIFKWS	EG 179.12	TOPWID 1284.76	QLOB 8275.31	QCH 6421.78	QROB 3002.91	PERENC 1330.00	STENCL 2040.00	STCHL 3060.00		STENCR 3370.00
	SECNO	CWSEL	DIFKWS									STCHR	STENCR 3370.00 3240.00
	SECNO 285.000	CWSEL	DIFKWS	179.12	1284.76	8275.31	6421.78	3002.91	1330.00	2040.00	3060.00	STCHR 3130.00	STENCR 3370.00
	SECNO 285.000 285.000	CWSEL 178.95 179.48	DIFKWS .00 .53	179.12 179.71	1284.76 605.00	8275.31 7932.50	6421.78 7215.36	3002.91 2552.14	1330.00	2040.00 2635.00	3060.00 3060.00	STCHR 3130.00 3130.00	STENCR 3370.00 3240.00
	SECNO 285.000 285.000 285.000	CWSEL 178.95 179.48 174.67	DIFKWS .00 .53 -4.81	179.12 179.71 174.84	1284.76 605.00 817.48	8275.31 7932.50 3050.34	6421.78 7215.36 4348.63	3002.91 2552.14 1381.03	1330.00 605.00 1330.00	2040.00 2635.00 2040.00	3060.00 3060.00 3060.00	STCHR 3130.00 3130.00 3130.00	STENCR 3370.00 3240.00 3370.00
	SECNO 285.000 285.000 285.000 285.000	CWSEL 178.95 179.48 174.67 177.25 181.22	.00 .53 -4.81 2.58	179.12 179.71 174.84 177.46	1284.76 605.00 817.48 1241.69	8275.31 7932.50 3050.34 6302.46	6421.78 7215.36 4348.63 6156.87	3002.91 2552.14 1381.03 2540.68	1330.00 605.00 1330.00 1330.00	2040.00 2635.00 2040.00 2040.00	3060.00 3060.00 3060.00 3060.00	STCHR 3130.00 3130.00 3130.00 3130.00	STENCR 3370.00 3240.00 3370.00 3370.00 3370.00
*	SECNO 285.000 285.000 285.000 285.000 285.000	CWSEL 178.95 179.48 174.67 177.25 181.22	DIFKWS .00 .53 -4.81 2.58 3.97	179.12 179.71 174.84 177.46 181.41	1284.76 605.00 817.48 1241.69 1296.09	8275.31 7932.50 3050.34 6302.46 13330.84	6421.78 7215.36 4348.63 6156.87 8067.09 5138.40	3002.91 2552.14 1381.03 2540.68 4302.08	1330.00 605.00 1330.00 1330.00 1330.00	2040.00 2635.00 2040.00 2040.00 2040.00	3060.00 3060.00 3060.00 3060.00 3060.00	STCHR 3130.00 3130.00 3130.00 3130.00 3130.00	STENCR  3370.00 3240.00 3370.00 3370.00 3370.00
*	SECNO 285.000 285.000 285.000 285.000	CWSEL 178.95 179.48 174.67 177.25 181.22	DIFKWS .00 .53 -4.81 2.58 3.97	179.12 179.71 174.84 177.46 181.41	1284.76 605.00 817.48 1241.69 1296.09	8275.31 7932.50 3050.34 6302.46 13330.84	6421.78 7215.36 4348.63 6156.87 8067.09	3002.91 2552.14 1381.03 2540.68 4302.08	1330.00 605.00 1330.00 1330.00	2040.00 2635.00 2040.00 2040.00 2040.00	3060.00 3060.00 3060.00 3060.00 3060.00	STCHR 3130.00 3130.00 3130.00 3130.00 3130.00	STENCR 3370.00 3240.00 3370.00 3370.00 3370.00
*	SECNO 285.000 285.000 285.000 285.000 285.000	CWSEL 178.95 179.48 174.67 177.25 181.22	DIFKWS .00 .53 -4.81 2.58 3.97	179.12 179.71 174.84 177.46 181.41	1284.76 605.00 817.48 1241.69 1296.09	8275.31 7932.50 3050.34 6302.46 13330.84	6421.78 7215.36 4348.63 6156.87 8067.09 5138.40	3002.91 2552.14 1381.03 2540.68 4302.08	1330.00 605.00 1330.00 1330.00 1330.00	2040.00 2635.00 2040.00 2040.00 2040.00	3060.00 3060.00 3060.00 3060.00 3060.00	STCHR 3130.00 3130.00 3130.00 3130.00 3130.00	STENCR  3370.00 3240.00 3370.00 3370.00 3370.00
*	SECNO  285.000  285.000  285.000  285.000  300.000  300.000	CWSEL  178.95 179.48 174.67 177.25 181.22  179.66 180.31	DIFKWS .00 .53 -4.81 2.58 3.97 .00 .65	179.12 179.71 174.84 177.46 181.41 179.73 180.40	1284.76 605.00 817.48 1241.69 1296.09 1740.00 1080.00	8275.31 7932.50 3050.34 6302.46 13330.84 1126.19 848.17	6421.78 7215.36 4348.63 6156.87 8067.09 5138.40 5716.89	3002.91 2552.14 1381.03 2540.68 4302.08 11435.41 11134.94	1330.00 605.00 1330.00 1330.00 1330.00	2040.00 2635.00 2040.00 2040.00 2040.00 1780.00 2240.00	3060.00 3060.00 3060.00 3060.00 3060.00 2400.00 2400.00	STCHR 3130.00 3130.00 3130.00 3130.00 3130.00 2480.00	STENCR  3370.00 3240.00 3370.00 3370.00 3370.00 3520.00 3320.00
* * *	SECNO  285.000 285.000 285.000 285.000 300.000 300.000 300.000	CWSEL  178.95 179.48 174.67 177.25 181.22  179.66 180.31 175.50	DIFKWS .00 .53 -4.81 2.58 3.97 .00 .65 -4.81	179.12 179.71 174.84 177.46 181.41 179.73 180.40 175.58	1284.76 605.00 817.48 1241.69 1296.09 1740.00 1080.00 1233.05	8275.31 7932.50 3050.34 6302.46 13330.84 1126.19 848.17 143.68	6421.78 7215.36 4348.63 6156.87 8067.09 5138.40 5716.89 3576.39	3002.91 2552.14 1381.03 2540.68 4302.08 11435.41 11134.94 5059.93 9562.68	1330.00 605.00 1330.00 1330.00 1330.00 1740.00 1740.00	2040.00 2635.00 2040.00 2040.00 2040.00 1780.00 2240.00 1780.00	3060.00 3060.00 3060.00 3060.00 3060.00 2400.00 2400.00 2400.00	STCHR 3130.00 3130.00 3130.00 3130.00 3130.00 2480.00 2480.00 2480.00	STENCR  3370.00 3240.00 3370.00 3370.00 3370.00 3520.00 3520.00 3520.00
* * *	SECNO  285.000 285.000 285.000 285.000 300.000 300.000 300.000 300.000 300.000	CWSEL  178.95 179.48 174.67 177.25 181.22  179.66 180.31 175.50 178.14 181.95	00 .53 -4.81 2.58 3.97 .00 .65 -4.81 2.64 3.81	179.12 179.71 174.84 177.46 181.41 179.73 180.40 175.58 178.23 182.03	1284.76 605.00 817.48 1241.69 1296.09 1740.00 1080.00 1233.05 1740.00	8275.31 7932.50 3050.34 6302.46 13330.84 1126.19 848.17 143.68 563.79 2644.43	6421.78 7215.36 4348.63 6156.87 8067.09 5138.40 5716.89 3576.39 4873.53 6464.91	3002.91 2552.14 1381.03 2540.68 4302.08 11435.41 11134.94 5059.93 9562.68 16590.66	1330.00 605.00 1330.00 1330.00 1330.00 1740.00 1740.00 1740.00 1740.00	2040.00 2635.00 2040.00 2040.00 2040.00 1780.00 1780.00 1780.00 1780.00	3060.00 3060.00 3060.00 3060.00 3060.00 2400.00 2400.00 2400.00 2400.00	STCHR  3130.00 3130.00 3130.00 3130.00 2480.00 2480.00 2480.00 2480.00	STENCR  3370.00 3240.00 3370.00 3370.00 3370.00 3520.00 3520.00 3520.00 3520.00
* * *	SECNO  285.000 285.000 285.000 285.000 300.000 300.000 300.000 300.000 314.400	CWSEL  178.95 179.48 174.67 177.25 181.22  179.66 180.31 175.50 178.14 181.95	DIFKWS .00 .53 -4.81 2.58 3.97 .00 .65 -4.81 2.64 3.81	179.12 179.71 174.84 177.46 181.41 179.73 180.40 175.58 178.23 182.03	1284.76 605.00 817.48 1241.69 1296.09 1740.00 1080.00 1233.05 1740.00 1740.00	8275.31 7932.50 3050.34 6302.46 13330.84 1126.19 848.17 143.68 563.79 2644.43	6421.78 7215.36 4348.63 6156.87 8067.09 5138.40 5716.89 3576.39 4873.53 6464.91	3002.91 2552.14 1381.03 2540.68 4302.08 11435.41 11134.94 5059.93 9562.68 16590.66	1330.00 605.00 1330.00 1330.00 1330.00 1740.00 1740.00 1740.00 1740.00 2065.00	2040.00 2635.00 2040.00 2040.00 2040.00 1780.00 1780.00 1780.00 1780.00	3060.00 3060.00 3060.00 3060.00 3060.00 2400.00 2400.00 2400.00 2400.00	STCHR  3130.00 3130.00 3130.00 3130.00 2480.00 2480.00 2480.00 2480.00 2480.00	STENCR  3370.00 3240.00 3370.00 3370.00 3370.00 3520.00 3520.00 3520.00 3520.00 3520.00
* * *	SECNO  285.000 285.000 285.000 285.000 300.000 300.000 300.000 300.000 300.000	CWSEL  178.95 179.48 174.67 177.25 181.22  179.66 180.31 175.50 178.14 181.95	00 .53 -4.81 2.58 3.97 .00 .65 -4.81 2.64 3.81	179.12 179.71 174.84 177.46 181.41 179.73 180.40 175.58 178.23 182.03	1284.76 605.00 817.48 1241.69 1296.09 1740.00 1080.00 1233.05 1740.00	8275.31 7932.50 3050.34 6302.46 13330.84 1126.19 848.17 143.68 563.79 2644.43	6421.78 7215.36 4348.63 6156.87 8067.09 5138.40 5716.89 3576.39 4873.53 6464.91	3002.91 2552.14 1381.03 2540.68 4302.08 11435.41 11134.94 5059.93 9562.68 16590.66	1330.00 605.00 1330.00 1330.00 1330.00 1740.00 1740.00 1740.00 1740.00	2040.00 2635.00 2040.00 2040.00 2040.00 1780.00 1780.00 1780.00 1780.00	3060.00 3060.00 3060.00 3060.00 3060.00 2400.00 2400.00 2400.00 2400.00	STCHR  3130.00 3130.00 3130.00 3130.00 3130.00 2480.00 2480.00 2480.00 2480.00 2480.00	STENCR  3370.00 3240.00 3370.00 3370.00 3370.00 3520.00 3520.00 3520.00 3520.00 3520.00 3520.00
* * *	SECNO  285.000 285.000 285.000 285.000 300.000 300.000 300.000 300.000 314.400	CWSEL  178.95 179.48 174.67 177.25 181.22  179.66 180.31 175.50 178.14 181.95	DIFKWS .00 .53 -4.81 2.58 3.97 .00 .65 -4.81 2.64 3.81	179.12 179.71 174.84 177.46 181.41 179.73 180.40 175.58 178.23 182.03	1284.76 605.00 817.48 1241.69 1296.09 1740.00 1080.00 1233.05 1740.00 1740.00	8275.31 7932.50 3050.34 6302.46 13330.84 1126.19 848.17 143.68 563.79 2644.43	6421.78 7215.36 4348.63 6156.87 8067.09 5138.40 5716.89 3576.39 4873.53 6464.91	3002.91 2552.14 1381.03 2540.68 4302.08 11435.41 11134.94 5059.93 9562.68 16590.66	1330.00 605.00 1330.00 1330.00 1330.00 1740.00 1740.00 1740.00 1740.00 2065.00	2040.00 2635.00 2040.00 2040.00 2040.00 1780.00 1780.00 1780.00 1780.00	3060.00 3060.00 3060.00 3060.00 3060.00 2400.00 2400.00 2400.00 2400.00	STCHR  3130.00 3130.00 3130.00 3130.00 2480.00 2480.00 2480.00 2480.00 2480.00	STENCR  3370.00 3240.00 3370.00 3370.00 3370.00 3520.00 3520.00 3520.00 3520.00 3520.00
* * *	SECNO  285.000 285.000 285.000 285.000 300.000 300.000 300.000 314.400 314.400 314.400 314.400	CWSEL  178.95 179.48 174.67 177.25 181.22  179.66 180.31 175.50 178.14 181.95  179.85 180.53	00 .53 -4.81 2.58 3.97 .00 .65 -4.81 2.64 3.81 .00 .68	179.12 179.71 174.84 177.46 181.41 179.73 180.40 175.58 178.23 182.03 179.88 180.57 175.78 175.78	1284.76 605.00 817.48 1241.69 1296.09 1740.00 1233.05 1740.00 1740.00 1931.98 1385.00 1849.86 1902.52	8275.31 7932.50 3050.34 6302.46 13330.84 1126.19 848.17 143.68 563.79 2644.43 784.93 281.15 312.60 622.33	6421.78 7215.36 4348.63 6156.87 8067.09 5138.40 5716.89 3576.39 4873.53 6464.91 3948.30 4351.59 2816.82	3002.91 2552.14 1381.03 2540.68 4302.08 11435.41 11134.94 5059.93 9562.68 16590.66 12966.77 13067.25 5650.58 10659.35	1330.00 605.00 1330.00 1330.00 1330.00 1740.00 1740.00 1740.00 1740.00 2065.00 2065.00 2065.00	2040.00 2635.00 2040.00 2040.00 2040.00 1780.00 1780.00 1780.00 1780.00 1790.00 1950.00	3060.00 3060.00 3060.00 3060.00 3060.00 2400.00 2400.00 2400.00 2400.00 2400.00	STCHR  3130.00 3130.00 3130.00 3130.00 3130.00 2480.00 2480.00 2480.00 2480.00 2480.00	STENCR  3370.00 3240.00 3370.00 3370.00 3520.00 3520.00 3520.00 3520.00 3520.00 3555.00 3855.00 3855.00
* * *	SECNO  285.000 285.000 285.000 285.000 300.000 300.000 300.000 300.000 314.400 314.400 314.400	CWSEL  178.95 179.48 174.67 177.25 181.22  179.66 180.31 175.50 178.14 181.95  179.85 180.53 175.74	00 .53 -4.81 2.58 3.97 .00 .65 -4.81 2.64 3.81 .00 .68 -4.79	179.12 179.71 174.84 177.46 181.41 179.73 180.40 175.58 178.23 182.03 179.88 180.57 175.78	1284.76 605.00 817.48 1241.69 1296.09 1740.00 1080.00 1233.05 1740.00 1740.00 1931.98 1385.00 1849.86	8275.31 7932.50 3050.34 6302.46 13330.84 1126.19 848.17 143.68 563.79 2644.43 784.93 281.15 312.60	6421.78 7215.36 4348.63 6156.87 8067.09 5138.40 5716.89 3576.39 4873.53 6464.91 3948.30 4351.59 2816.82	3002.91 2552.14 1381.03 2540.68 4302.08 11435.41 11134.94 5059.93 9562.68 16590.66 12966.77 13067.25 5650.58	1330.00 605.00 1330.00 1330.00 1330.00 1740.00 1740.00 1740.00 1740.00 2065.00 1385.00 2065.00	2040.00 2635.00 2040.00 2040.00 2040.00 1780.00 1780.00 1780.00 1780.00 1790.00 1790.00	3060.00 3060.00 3060.00 3060.00 3060.00 2400.00 2400.00 2400.00 2400.00 2400.00	STCHR  3130.00 3130.00 3130.00 3130.00 3130.00 2480.00 2480.00 2480.00 2480.00 2480.00 2055.00 2055.00	STENCR  3370.00 3240.00 3370.00 3370.00 3370.00 3520.00 3520.00 3520.00 3520.00 3520.00 3855.00 3335.00
* * * * *	SECNO  285.000 285.000 285.000 285.000 300.000 300.000 300.000 314.400 314.400 314.400 314.400	CWSEL  178.95 179.48 174.67 177.25 181.22  179.66 180.31 175.50 178.14 181.95  179.85 180.53 175.74 178.38 182.15	00 .53 -4.81 2.58 3.97 .00 .65 -4.81 2.64 3.81 .00 .68 -4.79 2.63	179.12 179.71 174.84 177.46 181.41 179.73 180.40 175.58 178.23 182.03 179.88 180.57 175.78 178.41 182.20	1284.76 605.00 817.48 1241.69 1296.09 1740.00 1233.05 1740.00 1740.00 1931.98 1385.00 1849.86 1902.52 2008.08	8275.31 7932.50 3050.34 6302.46 13330.84 1126.19 848.17 143.68 563.79 2644.43 784.93 281.15 312.60 622.33 1266.32	6421.78 7215.36 4348.63 6156.87 8067.09 5138.40 5716.89 3576.39 4873.53 6464.91 3948.30 4351.59 2816.82 3718.31	3002.91 2552.14 1381.03 2540.68 4302.08 11435.41 11134.94 5059.93 9562.68 16590.66 12966.77 13067.25 5650.58 10659.35	1330.00 605.00 1330.00 1330.00 1330.00 1740.00 1740.00 1740.00 1740.00 2065.00 2065.00 2065.00	2040.00 2635.00 2040.00 2040.00 2040.00 1780.00 1780.00 1780.00 1780.00 1790.00 1790.00 1790.00	3060.00 3060.00 3060.00 3060.00 3060.00 2400.00 2400.00 2400.00 2400.00 1975.00 1975.00 1975.00	STCHR  3130.00 3130.00 3130.00 3130.00 2480.00 2480.00 2480.00 2480.00 2480.00 2055.00 2055.00 2055.00	STENCR  3370.00 3240.00 3370.00 3370.00 3520.00 3520.00 3520.00 3520.00 3520.00 3555.00 3855.00 3855.00
* * * * *	SECNO  285.000 285.000 285.000 285.000 300.000 300.000 300.000 300.000 314.400 314.400 314.400 314.400 314.400	CWSEL  178.95 179.48 174.67 177.25 181.22  179.66 180.31 175.50 178.14 181.95  179.85 180.53 175.74 178.38	00 .53 -4.81 2.58 3.97 .00 .65 -4.81 2.64 3.81 .00 .68 -4.79 2.63	179.12 179.71 174.84 177.46 181.41 179.73 180.40 175.58 178.23 182.03 179.88 180.57 175.78 178.41 182.20	1284.76 605.00 817.48 1241.69 1296.09 1740.00 1080.00 1233.05 1740.00 1740.00 1931.98 1385.00 1849.86 1902.52 2008.08	8275.31 7932.50 3050.34 6302.46 13330.84 1126.19 848.17 143.68 563.79 2644.43 784.93 281.15 312.60 622.33 1266.32	6421.78 7215.36 4348.63 6156.87 8067.09 5138.40 5716.89 3576.39 4873.53 6464.91 3948.30 4351.59 2816.82 3718.31	3002.91 2552.14 1381.03 2540.68 4302.08 11435.41 11134.94 5059.93 9562.68 16590.66 12966.77 13067.25 5650.58 10659.35 19405.93	1330.00 605.00 1330.00 1330.00 1330.00 1740.00 1740.00 1740.00 1740.00 2065.00 2065.00 2065.00	2040.00 2635.00 2040.00 2040.00 2040.00 1780.00 1780.00 1780.00 1790.00 1790.00 1790.00 1790.00	3060.00 3060.00 3060.00 3060.00 3060.00 2400.00 2400.00 2400.00 2400.00 1975.00 1975.00 1975.00	STCHR  3130.00 3130.00 3130.00 3130.00 2480.00 2480.00 2480.00 2480.00 2480.00 2055.00 2055.00 2055.00	STENCR  3370.00 3240.00 3370.00 3370.00 3370.00 3520.00 3520.00 3520.00 3520.00 3520.00 3550.00 3855.00 3855.00 3855.00
* * * * *	SECNO  285.000 285.000 285.000 285.000 300.000 300.000 300.000 314.400 314.400 314.400 314.400 314.400 314.400	CWSEL  178.95 179.48 174.67 177.25 181.22  179.66 180.31 175.50 178.14 181.95  179.85 180.53 175.74 178.38 182.15  179.94 180.56	00 .53 -4.81 2.58 3.97 .00 .65 -4.81 2.64 3.81 .00 .68 -4.79 2.63 3.78 .00 .62	179.12 179.71 174.84 177.46 181.41 179.73 180.40 175.58 178.23 182.03 179.88 180.57 175.78 178.41 182.20	1284.76 605.00 817.48 1241.69 1296.09 1740.00 1080.00 1233.05 1740.00 1740.00 1931.98 1385.00 1849.86 1902.52 2008.08	8275.31 7932.50 3050.34 6302.46 13330.84 1126.19 848.17 143.68 563.79 2644.43 784.93 281.15 312.60 622.33 1266.32 4527.93 3573.80	6421.78 7215.36 4348.63 6156.87 8067.09 5138.40 5716.89 3576.39 4873.53 6464.91 3948.30 4351.59 2816.82 3718.31 5027.75 7437.71 8920.66	3002.91 2552.14 1381.03 2540.68 4302.08 11435.41 11134.94 5059.93 9562.68 16590.66 12966.77 13067.25 5650.58 10659.35 19405.93	1330.00 605.00 1330.00 1330.00 1330.00 1740.00 1740.00 1740.00 1740.00 2065.00 2065.00 2065.00	2040.00 2635.00 2040.00 2040.00 2040.00 1780.00 1780.00 1780.00 1790.00 1790.00 1790.00	3060.00 3060.00 3060.00 3060.00 3060.00 2400.00 2400.00 2400.00 2400.00 1975.00 1975.00 1975.00	STCHR  3130.00 3130.00 3130.00 3130.00 2480.00 2480.00 2480.00 2480.00 2480.00 2055.00 2055.00 2055.00	STENCR  3370.00 3240.00 3370.00 3370.00 3370.00 3520.00 3520.00 3520.00 3520.00 3520.00 3555.00 3355.00 3855.00 3855.00
* * * * * * * * * * * * * * * * * * *	SECNO  285.000 285.000 285.000 285.000 300.000 300.000 300.000 314.400 314.400 314.400 314.400 314.400 314.400 314.400	CWSEL  178.95 179.48 174.67 177.25 181.22  179.66 180.31 175.50 178.14 181.95  179.85 180.53 175.74 178.38 182.15	00 .53 -4.81 2.58 3.97 .00 .65 -4.81 2.64 3.81 .00 .68 -4.79 2.63 3.78 .00	179.12 179.71 174.84 177.46 181.41 179.73 180.40 175.58 178.23 182.03 179.88 180.57 175.78 178.41 182.20 180.14 180.90 176.17	1284.76 605.00 817.48 1241.69 1296.09 1740.00 1080.00 1233.05 1740.00 1740.00 1931.98 1385.00 1849.86 1902.52 2008.08 2092.36 600.00 939.65	8275.31 7932.50 3050.34 6302.46 13330.84 1126.19 848.17 143.68 563.79 2644.43 784.93 281.15 312.60 622.33 1266.32	6421.78 7215.36 4348.63 6156.87 8067.09 5138.40 5716.89 3576.39 4873.53 6464.91 3948.30 4351.59 2816.82 3718.31 5027.75	3002.91 2552.14 1381.03 2540.68 4302.08 11435.41 11134.94 5059.93 9562.68 16590.66 12966.77 13067.25 5650.58 10659.35 19405.93	1330.00 605.00 1330.00 1330.00 1330.00 1740.00 1740.00 1740.00 1740.00 2065.00 2065.00 2065.00	2040.00 2635.00 2040.00 2040.00 2040.00 1780.00 1780.00 1780.00 1790.00 1790.00 1790.00 1790.00	3060.00 3060.00 3060.00 3060.00 3060.00 2400.00 2400.00 2400.00 2400.00 1975.00 1975.00 1975.00 1975.00	STCHR  3130.00 3130.00 3130.00 3130.00 2480.00 2480.00 2480.00 2480.00 2480.00 2055.00 2055.00 2055.00 2055.00	STENCR  3370.00 3240.00 3370.00 3370.00 3370.00 3520.00 3520.00 3520.00 3520.00 3520.00 3550.00 3855.00 3855.00 3855.00
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	331.600 331.600 331.600	176.63 179.16 182.63	-4.58 2.52 3.48	177.01 179.64 183.15	645.12 839.63 936.60	1048.79 3097.87 8039.65	6780.18 9748.71 13363.76	951.04 2153.42 4296.59	.00	.00	1955.00 1955.00 1955.00	2040.00 2040.00 2040.00	.00
* * * *	344.950 344.950 344.950 344.950 344.950	181.48 182.06 177.53 180.27 183.79	.00 .58 -4.53 2.73 3.52	181.65 182.23 177.67 180.44 184.00	1201.31 850.00 911.70 1167.42 1266.10	3083.65 2890.15 850.84 2224.76 5580.12	8893.77 8966.07 5582.54 8108.16 11390.04	5722.58 5843.78 2346.62 4667.08 8729.84	.00 850.00 .00 .00	.00 1600.00 .00 .00	1950.00 1950.00 1950.00 1950.00	2050.00 2050.00 2050.00 2050.00 2050.00	.00 2450.00 .00 .00
* * * *	350.000 350.000 350.000 350.000 350.000	181.56 182.01 177.56 180.32 183.93	.00 .45 -4.45 2.76 3.60	182.03 182.67 178.03 180.86 184.38	1106.62 440.00 648.78 1030.01 1253.44	4139.51 3241.78 1392.16 3191.95 6869.01	9241.63 10447.45 6296.25 8761.46 11052.51	4318.86 4010.77 1091.59 3046.59 7778.49	.00 440.00 .00 .00	.00 1840.00 .00 .00	1965.00 1965.00 1965.00 1965.00	2030.00 2030.00 2030.00 2030.00 2030.00	.00 2280.00 .00 .00
	-180.000 -180.000 -180.000 -180.000 -180.000	174.52 175.26 165.29 167.26 169.58	.00 .74 -9.97 1.97 2.32	174.52 175.27 165.39 167.33 169.64	3305.43 2300.00 2278.18 2520.32 2778.24	2955.54 2367.65 1399.27 2545.25 4346.86	1879.04 2000.56 3141.86 3569.09 4301.72	13265.42 13731.79 4388.87 9185.66 17451.43	.00 2300.00 .00 .00	.00 1600.00 .00 .00	1970.00 1970.00 1970.00 1970.00 1970.00	2035.00 2035.00 2035.00 2035.00 2035.00	.00 3900.00 .00 .00
1	04MAY11	12:33:4	6									PAGE 15	
	SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
* * * * * * * *	190.000 190.000 190.000 190.000 200.000 200.000 200.000 200.000	174.53 175.27 166.34 167.60 169.70 175.10 175.75 170.78 173.07	.00 .74 -8.94 1.27 2.09 .00 .65 -4.97 2.28	174.58 175.32 167.26 168.86 170.49 175.24 175.94 170.87 173.24	1409.58 1315.00 458.83 585.43 858.96 861.96 465.00 567.36 677.73	.00 .00 .00 .00 .00 .00 525.13 .00 43.43 254.53	.00 .00 .00 .00 .00 .00 6741.29 7965.70 2955.84 5866.67	15880.00 15880.00 5905.00 12820.00 20850.00 8613.57 7914.30 2905.73 6698.81	1820.00 1315.00 1820.00 1820.00 1820.00 .00 465.00 .00	4435.00 4485.00 4435.00 4435.00 4435.00 220.00 .00	1970.00 1970.00 1970.00 1970.00 1970.00 220.00 220.00 220.00 220.00	2020.00 2020.00 2020.00 2020.00 2020.00 430.00 430.00 430.00	6255.00 5800.00 6255.00 6255.00 6255.00 .00 685.00 .00
* * *	200.000 225.000 225.000 225.000 225.000 225.000	174.56 175.76 176.47 171.82 174.17 175.89	1.49 .00 .71 -4.65 2.34 1.72	174.83 176.00 176.71 172.01 174.44 176.28	811.91 687.53 510.00 546.03 610.11 693.57	609.39 1426.59 1039.66 325.61 978.29 1896.78	1656.45 824.93 1411.46	11200.03 12868.88 13183.89 4754.46 10430.24 16886.62	.00 .00 510.00 .00 .00	.00 200.00 .00 .00	220.00 240.00 240.00 240.00 240.00 240.00	430.00 280.00 280.00 280.00 280.00 280.00	.00 .00 710.00 .00 .00
* * *	250.120 250.120 250.120 250.120 250.120	176.34 177.04 172.59 174.95 176.79	.00 .69 -4.45 2.36 1.85	176.45 177.23 172.65 175.05 176.95	867.70 530.00 783.06 836.25 877.80	.00 .00 .00 .00	.00 .00 .00 .00	15880.00 15880.00 5905.00 12820.00 20850.00	1300.00 530.00 1300.00 1300.00	3750.00 3870.00 3750.00 3750.00 3750.00	3650.00 3650.00 3650.00 3650.00	3695.00 3695.00 3695.00 3695.00	5050.00 4400.00 5050.00 5050.00 5050.00
1	04MAY11	12:33:4	6									PAGE 16	
BR	OAD RUN												
SU	MMARY PRINTO	OUT TABLE	150										
	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	170.000 170.000	.00	.00	.00		18100.00 18100.00	174.47 175.21	.00	174.48 175.22	.45 .44	1.70 1.72	31921.84 29608.68	

	170.000	.00	.00	.00	152.70	8930.00	164.64	.00	164.75	5.97	4.13	6551.53	3653.95
	170.000	.00	.00	.00	152.70	15300.00	166.64	.00	166.75	5.88	4.56	10318.94	6308.53
	170.000	.00	.00	.00	152.70	26100.00	168.96	.00	169.08	6.03	5.12	15863.91	10625.14
	180.000	1000.00	.00	.00	153.30	18100.00	174.52	.00	174.53	.49	1.76	32116.92	25805.23
	180.000	1000.00	.00	.00	153.30	18100.00	175.26	.00	175.27	.56	1.91	28153.52	
	180.000	1000.00	.00	.00	153.30	8930.00	165.29	.00	165.44	7.84	4.78		3189.47
	180.000	1000.00	.00	.00	153.30	15300.00	167.26	.00	167.38	6.55	4.84	10879.82	
	180.000	1000.00	.00	.00	153.30	26100.00	169.58	.00	169.68	5.99	5.13	16981.36	10663.00
	100 000	1000 00	0.0	0.0	152.00	0000 00	154.54	0.0	154 54	0.1	0.0	20055 56	05164 45
*	190.000	1000.00	.00	.00	153.80	2220.00	174.54	.00	174.54	.01	.22	30055.76	
*	190.000	1000.00	.00	.00	153.80	2220.00	175.31	.00	175.31	.08	.70	7371.99	7988.70
	190.000	1000.00	.00	.00	153.80	3025.00	165.74	.00	165.75	.62	1.31	8416.90	3848.66
	190.000 190.000	1000.00 1000.00	.00	.00	153.80 153.80	2480.00 5250.00	167.58	.00	167.58 169.89	.13	.67	12710.64	6814.08
	190.000	1000.00	.00	.00	153.60	5250.00	169.88	.00	109.09	.20	.92	18435.77	11/39.99
*	243.000	3938.00	.00	.00	153.20	2220.00	174.55	.00	174.55	.02	.31	14291.28	16034 25
*	243.000	3938.00	.00	.00	153.20	2220.00	175.34	.00	175.36	.37	1.18	1874.13	3636.37
*	243.000	3938.00	.00	.00	153.20	3025.00	166.02	.00	166.06	1.80	1.96	2728.65	2256.86
*	243.000	3938.00	.00	.00	153.20	2480.00	167.64	.00	167.65	.46	1.10	4496.04	3661.51
*	243.000	3938.00	.00	.00	153.20	5250.00	169.96	.00	169.97	.61	1.44	7728.31	6744.37
	213.000	3330.00	.00	.00	133.20	3230.00	103.50	.00	100.07	.01		7720.31	0,11.5,
*	243.200	730.00	.00	.00	155.10	2220.00	174.55	.00	174.55	.11	.71	6124.63	6816.33
*	243.200	730.00	.00	.00	155.10	2220.00	175.37	.00	175.41	.87	1.66	1335.74	2383.40
*	243.200	730.00	.00	.00	155.10	3025.00	166.11	.00	166.37	9.49	4.24	865.48	981.73
*	243.200	730.00	.00	.00	155.10	2480.00	167.64	.00	167.73	3.07	2.69	1373.92	1415.72
*	243.200	730.00	.00	.00	155.10	5250.00	169.95	.00	170.07	3.99	3.51	2905.13	2628.64
*	243.380	600.00	.00	.00	156.70	2220.00	174.54	.00	174.57	.53	1.44	1538.90	3038.59
	243.380	600.00	.00	.00	156.70	2220.00	175.42	.00	175.45	.45	1.37	1621.72	3316.03
	243.380	600.00	.00	.00	156.70	3025.00	166.69	.00	166.91	8.69	3.82	792.04	1026.00
	243.380	600.00	.00	.00	156.70	2480.00	167.83	.00	167.95	3.87	2.75		1260.96
*	243.380	600.00	.00	.00	156.70	5250.00	170.15	.00	170.49	8.58	4.68	1121.31	1792.77
	0.45 0.00			450.00	4=- 00		4== 00						
*	245.000	230.00	176.60	170.90	156.80	2220.00	175.00	.00	175.23	3.23	3.82	580.99	1234.71
*	245.000	230.00	176.60	170.90	156.80	2220.00	175.90	.00	176.11	2.71	3.62	612.54	1348.46
*	245.000	230.00	176.60	170.90	156.80	3025.00	166.31	.00	168.16	70.77	10.91	277.16	359.59
*	245.000 245.000	230.00 230.00	176.60 176.60	170.90 170.90	156.80 156.80	2480.00	167.62	.00	168.54 173.98	28.66	7.69 10.93	322.65	463.26 899.66
	245.000	230.00	170.00	170.90	150.60	5250.00	172.13	.00	1/3.90	34.05	10.93	480.49	099.00
*	246.000	50.00	.00	.00	156.80	2220.00	175.26	.00	175.29	.60	1.67	1971.84	2875.17
*	246.000	50.00	.00	.00	156.80	2220.00	176.14	.00	176.16	.49	1.56	2111.98	3178.37
*	246.000	50.00	.00	.00	156.80	3025.00	168.47	.00	168.74	9.39	4.69	897.42	987.21
*	246.000	50.00	.00	.00	156.80	2480.00	168.64	.00	168.82	5.88	3.76	923.43	1022.90
*	246.000	50.00	.00	.00	156.80	5250.00	174.48	.00	174.55	2.09	3.02	4754.81	3631.40
1													
	04MAY11	12:33:46										PAGE 17	
	GEOMA.	VI CII	DI USS	DI I C	THE RETAIN	^	GM CET	OD THIS	E.C.	10+**	17011	7 D T 7	0177
	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
*	250.000	40.00	.00	.00	156.84	2220.00	175.23	.00	175.33	1.50	2.64	840 30	1811.18
*	250.000	40.00	.00	.00	156.84	2220.00	176.10	.00	176.20	1.27	2.51		1971.73
	250.000	40.00	.00	.00	156.84	3025.00	168.37	.00	168.94	16.03	6.08	497.26	755.46
	250.000	40.00	.00	.00	156.84	2480.00	168.57	.00	168.94	10.06	4.89	507.66	781.96
*	250.000	40.00	.00	.00	156.84	5250.00	174.18	.00	174.87	10.41	6.66		1627.35
	250.120	482.00	177.40	169.50	157.00	2220.00	176.35	.00	176.47	1.52	2.76	803.41	1801.73
	250.120	482.00	177.40	169.50	157.00	2220.00	177.24	.00	177.35	1.29	2.63		1953.83
*	250.120	482.00	177.40	169.50	157.00	3025.00	169.11	.00	169.74	15.97	6.33	477.53	757.03
*	250.120	482.00	177.40	169.50	157.00	2480.00	169.05	.00	169.48	10.94	5.22	474.83	749.93
*	250.120	482.00	177.40	169.50	157.00	5250.00	178.28	.00	178.33	1.10	2.52	4025.60	4999.36
*	264.000	1338.00	.00	.00	157.50	17700.00	176.94	.00	177.13	5.83	5.50	7493.25	7328.48

* * *	264.000 264.000 264.000 264.000	1338.00 1338.00 1338.00 1338.00	.00 .00 .00	.00 .00 .00	157.50	17700.00 8780.00 15000.00 25700.00	177.69 170.97 171.56 178.76	.00 .00 .00	177.82 171.17 172.04 179.04	4.07 9.21 21.28 8.16	4.72 5.30 8.32 6.93	8821.66 8776.02 4031.17 2893.13 4368.60 3251.96 8558.24 8995.93
* * * *	270.000 270.000 270.000 270.000 270.000	520.00 520.00 520.00 520.00 520.00	.00 .00 .00 .00	.00 .00 .00 .00	157.70 157.70	17700.00 17700.00 8780.00 15000.00 25700.00	177.05 177.70 170.85 172.62 178.90	.00 .00 170.73 172.62	177.84 178.37 172.81 175.13 179.98	22.29 18.11 93.27 99.36 26.70	8.55 7.96 11.47 13.76 10.22	3707.77 3749.21 4003.12 4159.03 1002.45 909.12 1753.95 1504.81 4560.45 4973.40
* * * *	280.550 280.550 280.550 280.550 280.550	1140.00 1140.00 1140.00 1140.00	.00 .00 .00 .00	.00 .00 .00 .00	158.00 158.00	17700.00 17700.00 8780.00 15000.00 25700.00	178.77 179.24 174.47 177.01 181.02	.00 .00 .00 .00	178.97 179.53 174.67 177.26 181.25	5.14 6.17 5.73 6.62 5.46	4.97 5.55 4.34 5.25 5.56	8592.00 7806.11 6459.22 7123.82 4075.75 3668.94 6467.46 5829.38 11904.45 11001.80
	285.000 285.000 285.000 285.000 285.000	320.00 320.00 320.00 320.00 320.00	.00 .00 .00 .00	.00 .00 .00 .00	158.20 158.20	17700.00 17700.00 8780.00 15000.00 25700.00	178.95 179.48 174.67 177.25 181.22	.00 .00 .00 .00	179.12 179.71 174.84 177.46 181.41	5.28 6.05 6.04 6.78 5.60	5.14 5.61 4.58 5.44 5.73	9135.84 7699.93 7081.49 7196.11 4526.35 3573.77 6967.74 5761.86 12059.41 10860.99
* * * *	300.000 300.000 300.000 300.000 300.000	1900.00 1900.00 1900.00 1900.00	.00 .00 .00 .00	.00 .00 .00 .00	158.70 158.70 158.70	17700.00 17700.00 8780.00 15000.00 25700.00	179.66 180.31 175.50 178.14 181.95	.00 .00 .00 .00	179.73 180.40 175.58 178.23 182.03	2.61 2.86 3.06 3.15 2.75	3.87 3.27 3.74	13650.78 10961.45 11564.88 10460.97 7313.09 5018.34 11014.63 8445.18 17645.72 15483.70
	314.400 314.400 314.400 314.400	1252.00 1252.00 1252.00 1252.00	.00 .00 .00	.00 .00 .00	159.10 159.10	17700.00 17700.00 8780.00 15000.00	179.85 180.53 175.74	.00	179.88 180.57 175.78 178.41	1.54 1.65 1.88		18091.07 14252.08 15755.81 13765.39 10327.64 6400.82 15267.04 11105.39
	314.400	1252.00	.00	.00	159.10	25700.00	178.38 182.15	.00	182.20	1.82 1.67	3.13	22647.49 19908.17
1			.00									
1	314.400	1252.00	.00									22647.49 19908.17
1 * * * *	314.400 04MAY11	1252.00	.00	.00	159.10 ELMIN 159.40	25700.00	182.15	.00	182.20	1.67	3.13	22647.49 19908.17 PAGE 18
* * *	314.400 04MAY11 SECNO 320.000 320.000 320.000 320.000	12:33:46  XLCH  900.00 900.00 900.00 900.00	.00 ELTRD .00 .00 .00	.00 ELLC .00 .00 .00 .00	ELMIN  159.40 159.40 159.40 159.60 159.60 159.60	Q 17700.00 17700.00 8780.00 15000.00	CWSEL 179.94 180.56 175.82 178.46	.00  CRIWS  .00 .00 .00 .00	EG 180.14 180.90 176.17 178.75	1.67 10*KS 7.40 9.31 12.75 10.26	3.13 VCH 5.42 6.25 5.77 5.97	PAGE 18  AREA .01K  9619.62 6505.84 5979.61 5799.53 3378.50 2458.79 6841.14 4682.41 14785.76 10709.80  6054.46 5866.24 6644.99 6591.38 3047.75 3057.52 4921.26 4761.01
* * *	314.400 04MAY11 SECNO 320.000 320.000 320.000 320.000 320.000 331.600 331.600 331.600 331.600	1252.00 12:33:46 XLCH 900.00 900.00 900.00 900.00 820.00 820.00 820.00 820.00	.00 ELTRD .00 .00 .00 .00 .00 .00 .00	.00 ELLC .00 .00 .00 .00 .00 .00 .00	ELMIN  159.40 159.40 159.40 159.60 159.60 159.60 159.60 159.60	Q 17700.00 17700.00 15000.00 25700.00 17700.00 17700.00 17700.00 8780.00 15000.00	CWSEL 179.94 180.56 175.82 178.46 182.27 180.44 181.21 176.63 179.16	.00 CRIWS .00 .00 .00 .00 .00 .00 .00 .00	EG  180.14 180.90 176.17 178.75 182.43  180.89 181.57 177.01 179.64	1.67 10*KS 7.40 9.31 12.75 10.26 5.76 9.10 7.21 8.25 9.93	3.13 VCH 5.42 6.25 5.77 5.97 5.26 6.84 6.26 5.57 6.80	PAGE 18  AREA .01K  9619.62 6505.84 5979.61 5799.53 3378.50 2458.79 6841.14 4682.41 14785.76 10709.80  6054.46 5866.24 6644.99 6591.38 3047.75 3057.52 4921.26 4761.01

	-180.000 -180.000 -180.000 -180.000 -180.000	1000.00 1000.00 1000.00 1000.00	.00 .00 .00 .00	.00 .00 .00 .00	153.30 153.30	18100.00 18100.00 8930.00 15300.00 26100.00	174.52 175.26 165.29 167.26 169.58	.00 .00 .00 .00	174.52 175.27 165.39 167.33 169.64	.30 .30 5.70 4.41 3.82	1.37 1.41 4.08 3.97 4.10		
*	190.000	1100.00	.00	.00	153.80	15880.00	174.53	.00	174.58	5.08	.00	8680.13 7043.47	
*	190.000	1100.00	.00	.00	153.80	15880.00	175.27	.00	175.32	3.99	.00	9285.68 7950.65	
*	190.000	1100.00	.00	.00	153.80	5905.00	166.34	166.34	167.26	411.11	.00	764.49 291.23	
*	190.000	1100.00	.00	.00		12820.00	167.60	167.60	168.86	404.96	.00	1425.49 637.06	
*	190.000	1100.00	.00	.00	153.80	20850.00	169.70	.00	170.49	156.23	.00	2927.51 1668.09	
*	200.000	820.00	.00	.00	164.00	15880.00	175.10	.00	175.24	10.95	3.24	5538.90 4800.00	
*	200.000	820.00	.00	.00		15880.00	175.75	.00	175.94	12.98	3.59	4603.37 4408.37	
*	200.000	820.00	.00	.00	164.00	5905.00	170.78	.00	170.87	14.17	2.52	2599.11 1568.55	
*	200.000	820.00	.00	.00	164.00	12820.00	173.07	.00	173.24	17.89	3.55	3969.11 3031.12	
*	200.000	820.00	.00	.00	164.00	20850.00	174.56	.00	174.83	23.74	4.59	5086.04 4279.66	
*	225.000	460.00	.00	.00	166.00	15880.00	175.76	.00	176.00	25.26	4.52	4124.05 3159.73	
	225.000	460.00	.00	.00		15880.00	176.47	.00	176.71	21.32	4.37	4078.69 3439.50	
*	225.000	460.00	.00	.00	166.00	5905.00	171.82	.00	172.01	50.10	4.28	1738.20 834.22	
*	225.000	460.00	.00	.00	166.00	12820.00	174.17	.00	174.44	39.18	4.92	3088.28 2048.15	
	225.000	460.00	.00	.00	166.00	20850.00	175.89	.00	176.28	40.99	5.81	4210.02 3256.57	
1													
1	04MAY11	12:33:46										PAGE 19	
	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA .01K	
*	250.120	490.00	.00	.00	157.00	15880.00	176.34	.00	176.45	10.47	.00	6088.66 4908.48	
	250.120	490.00	.00	.00		15880.00	177.04	.00	177.23	16.58	.00	4435.51 3899.52	
*	250.120	490.00	.00	.00	157.00	5905.00	172.59	.00	172.65	12.54	.00	2983.60 1667.49	
*	250.120	490.00	.00	.00		12820.00	174.95	.00	175.05	13.26	.00	4897.72 3520.76	
*	250.120	490.00	.00	.00	157.00	20850.00	176.79	.00	176.95	14.92	.00	6480.51 5398.68	
1	04MAY11	12:33:46										PAGE 20	
BR	OAD RUN												
SU	MMARY PRINT	OUT TABLE	150										
	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH					
	170.000	18100.00	174.47	.00	.00	.00	3112.90	.00					
	170.000	18100.00	175.21	.74	.00	.74	2300.00	.00					
	170.000	8930.00	164.64	-10.57	.00	.00	1699.67	.00					
		15300.00	166.64	2.01	.00	.00	2068.57	.00					
	170.000	26100.00	168.96	2.32	.00	.00	2668.49	.00					
	180.000	18100.00	174.52	.00	.05	.00	3305.23	1000.00					
	180.000	18100.00	175.26	.74	.05	.74	2415.00	1000.00					
	180.000	8930.00	165.29	-9.97	.65	.00	2278.18	1000.00					
	180.000	15300.00	167.26	1.97	.62	.00	2520.32	1000.00					
	180.000	26100.00	169.58	2.32	.62	.00	2777.54	1000.00					
	190.000	2220.00	174.54	.00	.03	.00	2497.59	1000.00					
*	190.000	2220.00	175.31	.76	.05	.76	499.61	1000.00					
	190.000	3025.00	165.74	-9.57	.45	-9.57	2230.55	1000.00					
	190.000	2480.00	167.58	1.84	.32	1.84	2438.97	1000.00					
	190.000	5250.00	169.88	2.31	.31	2.31	2489.81	1000.00					

*	243.000	2220.00	174.55	.00	.00	.00	1430.00	3938.00
*	243.000	2220.00	175.34	.80	.03	.80	100.00	3938.00
*	243.000	3025.00	166.02	-9.32	.28	-9.32	1011.84	3938.00
*	243.000	2480.00	167.64	1.62	.06	1.62	1173.59	3938.00
*								
•	243.000	5250.00	169.96	2.32	.07	2.32	1430.00	3938.00
*	243.200	2220.00	174.55	.00	.00	.00	700.00	730.00
*	243.200	2220.00	175.37	.82	.02	.82	75.00	730.00
*	243.200				.02			
*		3025.00	166.11	-9.25		-9.25	217.14	730.00
	243.200	2480.00	167.64	1.52	.00	1.52	446.86	730.00
*	243.200	5250.00	169.95	2.31	01	2.31	700.00	730.00
*	243.380	2220.00	174.54	.00	.00	.00	95.00	600.00
		2220.00	175.42	.88	.05			
	243.380					.88	95.00	600.00
	243.380	3025.00	166.69	-8.73	.57	-8.73	95.00	600.00
	243.380	2480.00	167.83	1.14	.19	1.14	95.00	600.00
*	243.380	5250.00	170.15	2.33	.21	2.33	95.00	600.00
*	245.000	2220.00	175.00	.00	.46	.00	35.00	230.00
*								
*	245.000	2220.00	175.90	.90	.48	.90	35.00	230.00
	245.000	3025.00	166.31	-9.59	37	-9.59	35.00	230.00
*	245.000	2480.00	167.62	1.30	21	1.30	35.00	230.00
*	245.000	5250.00	172.13	4.51	1.97	4.51	35.00	230.00
*	246 000	2220 00	175 26	0.0	26	0.0	160 00	E0 00
*	246.000	2220.00	175.26	.00	. 26	.00	160.00	50.00
	246.000	2220.00	176.14	.88	. 24	.88	160.00	50.00
*	246.000	3025.00	168.47	-7.67	2.15	-7.67	143.12	50.00
*	246.000	2480.00	168.64	.17	1.02	.17	145.10	50.00
*	246.000	5250.00	174.48	5.83	2.35	5.83	2893.05	50.00
1								
1	04MAY11	12:33:46						
	U4MAIII	12.33.40						
	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
*	250.000	2220.00	175.23	.00	04	.00	50.00	40.00
*	250.000	2220.00	176.10	.88	03	.88	50.00	40.00
	250.000	3025.00	168.37	-7.74	10	-7.74	50.00	40.00
	250.000	2480.00	168.57	.21	07	.21	50.00	40.00
*	250.000	5250.00	174.18	5.61	29	5.61	50.00	40.00
	250.120	2220.00	176.35	.00	1.13	.00	45.00	482.00
	250.120	2220.00	177.24	.89	1.14	.89	45.00	482.00
*	250.120	3025.00	169.11	-8.13	.75	-8.13	45.00	482.00
*	250.120	2480.00	169.05	06	.48	06	45.00	482.00
*	250.120	5250.00	178.28	9.23	4.10	9.23	420.00	482.00
	250.220	3230.00	170120	,.23	1.10	,.23	120.00	102.00
*	264.000	17700.00	176.94	.00	.59	.00	585.50	1338.00
*	264.000	17700.00	177.69	.75	.45	.75	652.91	1338.00
*	264.000	8780.00	170.97	-6.72	1.86	-6.72	574.75	1338.00
*		15000.00	171.56	.59	2.51	.59	575.81	1338.00
*						7.20		
	264.000	25700.00	178.76	7.20	. 47	7.20	588.76	1338.00
*	270.000	17700.00	177.05	.00	.10	.00	453.96	520.00
*	270.000	17700.00	177.70	.65	.01	.65	456.76	520.00
*	270.000	8780.00	170.85	-6.85	13	-6.85	419.72	520.00
*	270.000	15000.00	170.63	1.78	1.06	1.78	429.51	520.00
*								
^	270.000	25700.00	178.90	6.28	.15	6.28	464.22	520.00
*	280.550	17700.00	178.77	.00	1.72	.00	1323.05	1140.00
*	280.550	17700.00	179.24	.48	1.55	.48	600.00	1140.00
*	280.550	8780.00	174.47	-4.77	3.62	-4.77	798.87	1140.00
	200.550	0/00.00	エ/エ・エ/	-1.//	J. UZ	= 1 . / /	100.01	TT40.00

280.550 15000.00 177.01 280.550 25700.00 181.02

2.54 4.39 2.54 1097.15 1140.00 4.01 2.12 4.01 1611.37 1140.00 PAGE 21

	285.000 285.000 285.000 285.000 285.000	17700.00 17700.00 8780.00 15000.00 25700.00	178.95 179.48 174.67 177.25 181.22	.00 .53 -4.81 2.58 3.97	.18 .24 .20 .24	.00 .53 -4.81 2.58 3.97	1284.76 605.00 817.48 1241.69 1296.09	320.00 320.00 320.00 320.00 320.00	
* * * *	300.000 300.000 300.000 300.000 300.000	17700.00 17700.00 8780.00 15000.00 25700.00	179.66 180.31 175.50 178.14 181.95	.00 .65 -4.81 2.64 3.81	.71 .83 .83 .90	.00 .65 -4.81 2.64 3.81	1740.00 1080.00 1233.05 1740.00	1900.00 1900.00 1900.00 1900.00	
	314.400 314.400 314.400 314.400 314.400	17700.00 17700.00 8780.00 15000.00 25700.00	179.85 180.53 175.74 178.38 182.15	.00 .68 -4.79 2.63 3.78	.19 .22 .24 .23	.00 .68 -4.79 2.63 3.78	1931.98 1385.00 1849.86 1902.52 2008.08	1252.00 1252.00 1252.00 1252.00 1252.00	
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* * * *	320.000 320.000 320.000 320.000 320.000	17700.00 17700.00 8780.00 15000.00 25700.00	179.94 180.56 175.82 178.46 182.27	.00 .62 -4.74 2.64 3.81	.09 .03 .08 .09	.00 .62 -4.74 2.64 3.81	2092.36 600.00 939.65 1679.89 2322.37	900.00 900.00 900.00 900.00 900.00	
	331.600 331.600 331.600 331.600 331.600	17700.00 17700.00 8780.00 15000.00 25700.00	180.44 181.21 176.63 179.16 182.63	.00 .77 -4.58 2.52 3.48	.50 .65 .81 .69	.00 .77 -4.58 2.52 3.48	910.26 840.00 645.12 839.63 936.60	820.00 820.00 820.00 820.00 820.00	
* * * *	344.950 344.950 344.950 344.950 344.950	17700.00 17700.00 8780.00 15000.00 25700.00	181.48 182.06 177.53 180.27 183.79	.00 .58 -4.53 2.73 3.52	1.04 .85 .90 1.11 1.16	.00 .58 -4.53 2.73 3.52	1201.31 850.00 911.70 1167.42 1266.10	1335.00 1335.00 1335.00 1335.00	
* * * *	350.000 350.000 350.000 350.000 350.000	17700.00 17700.00 8780.00 15000.00 25700.00	181.56 182.01 177.56 180.32 183.93	.00 .45 -4.45 2.76 3.60	.08 05 .02 .06	.00 .45 -4.45 2.76 3.60	1106.62 440.00 648.78 1030.01 1253.44	505.00 505.00 505.00 505.00 505.00	
	-180.000 -180.000 -180.000 -180.000 -180.000	18100.00 18100.00 8930.00 15300.00 26100.00	174.52 175.26 165.29 167.26 169.58	.00 .74 -9.97 1.97 2.32	-7.04 -6.75 -12.27 -13.06 -14.35	.00 .74 -9.97 1.97 2.32	3305.43 2300.00 2278.18 2520.32 2778.24	1000.00 1000.00 1000.00 1000.00 1000.00	

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		15880.00	176.47			.72	.71		460.00
*	223.000	5905.00	171.82	-4.			-4.65		460.00
*		12820.00	174.17			.10	2.34		460.00
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250.120 PROFILE= 3 BRIDGE DECK DEFINITION ERROR

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FLOODWAY DATA, BROAD RUN PROFILE NO. 2

	STATION	WIDTH	FLOODWAY SECTION AREA	MEAN	WATER S WITH FLOODWAY		DIFFERENCE
	170 000	0200	20600		175 0	174 5	-
	170.000	2300.	29609.	.6	175.2	174.5	. 7
	180.000	2415.	28154.	. 6	175.2		. 7
	190.000	500.	7372.	.3	175.3	174.5	. 8
	243.000	100.	1874.	1.2	175.3	174.5	.8
	243.200	75.	1336.	1.7	175.3		.8
	243.380	95.	1622.	1.4	175.4	174.5	.9
	245.000	35.	613.	3.6	175.9	175.0	.9
	246.000	160.	2112.	1.1	176.2	175.3	.9
	250.000	50.	884.	2.5	176.1	175.2	.9
	250.120	45.	843.	2.6	177.3	176.4	.9
	264.000	653.	8822.	2.0	177.6	176.9	. 7
	270.000	457.	4003.	4.4	177.6	177.0	.6
	280.550	600.	6459.	2.7	179.3	178.8	.5
	285.000	605.	7081.	2.5	179.5	179.0	.5
	300.000	1080.	11565.	1.5	180.4	179.7	.7
	314.400	1385.	15756.	1.1	180.5		.7
	320.000	600.	5980.	3.0	180.5	179.9	.6
	331.600	840.	6645.	2.7	181.2	180.4	.8
	344.950	850.	8865.	2.7	182.1	181.5	.6
	350.000	440.	4506.	3.9	182.1	181.6	.5
	-180.000	2300.	28779.	.6	175.2	174.5	
							. 7
	190.000	1315.	9286.	1.7	175.2		. 7
	200.000	465.	4603.	3.4	175.8	175.1	. 7
	225.000	510.	4079.	3.9	176.5	175.8	. 7
	250.120	530.	4436.	3.6	177.0	176.3	. 7
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			2 - 4 -				

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FLOODWAY DATA, BROAD RUN PROFILE NO. 3

----- FLOODWAY ----- WATER SURFACE ELEVATION STATION WIDTH SECTION MEAN WITH WITHOUT DIFFERENCE

		AREA	VELOCITY	FLOODWAY	FLOODWAY	
170.000	1700.	6552.	1.4	164.6	174.5	-9.9
180.000	2346.	6111.	1.5	165.3	174.5	-9.2
190.000	2231.	8417.	. 4	165.7	174.5	-8.8
243.000	1430.	2729.	1.1	166.0	174.5	-8.5
243.200	700.	865.	3.5	166.1	174.5	-8.4
243.380	95.	792.	3.8	166.7	174.5	-7.8
245.000	35.	277.	10.9	166.3	175.0	-8.7
246.000	143.	897.	3.4	168.5	175.3	-6.8
250.000	50.	497.	6.1	168.4	175.2	-6.8
250.120	45.	478.	6.3	169.1	176.4	-7.3
264.000	575.	4031.	2.2	171.0	176.9	-5.9
270.000	420.	1002.	8.8	170.8	177.0	-6.2
280.550	799.	4076.	2.2	174.5	178.8	-4.3
285.000	817.	4526.	1.9	174.7	179.0	-4.3
300.000	1233.	7313.	1.2	175.5	179.7	-4.2
314.400	1850.	10328.	.9	175.7	179.8	-4.1
320.000	940.	3379.	2.6	175.8	179.9	-4.1
331.600	645.	3048.	2.9	176.6	180.4	-3.8
344.950	912.	5038.	1.7	177.5	181.5	-4.0
350.000	649.	2751.	3.2	177.6	181.6	-4.0
-180.000	2346.	6111.	1.5	165.3	174.5	-9.2
190.000	459.	764.	7.7	166.3	174.5	-8.2
200.000	567.	2599.	2.3	170.8	175.1	-4.3
225.000	546.	1738.	3.4	171.8	175.8	-4.0
250.120	783.	2984.	2.0	172.6	176.3	-3.7
04MAY11	12:3	3:46				

FLOODWAY DATA, BROAD RUN PROFILE NO. 4

1

STATION	WIDTH	FLOODWAY SECTION AREA	MEAN VELOCITY	WITH	URFACE ELE WITHOUT FLOODWAY	EVATION DIFFERENCE
170.000 180.000 190.000 243.000 243.380 245.000 246.000 250.120 264.000 270.000 280.550 285.000 314.400 320.000 331.600 344.950 350.000 -180.000	2069. 2520. 2439. 1430. 700. 95. 35. 145. 50. 45. 576. 430. 1097. 1242. 1740. 1903. 1680. 840. 1167. 1030. 2520.	10319. 10880. 12711. 4496. 1374. 900. 323. 923. 508. 475. 4369. 1754. 6467. 6968. 11015. 15267. 6841. 4921. 7901. 5104. 10880. 1425.	3.4 8.6 2.3 2.2 1.4 1.0 2.2 3.0 1.9 2.9	166.6 167.3 167.6 167.6 167.8 167.6 168.6 169.1 171.6 172.6 177.0 177.2 178.1 178.4 178.5 179.2 180.3 180.3 167.3	174.5 174.5 174.5 174.5 174.5 175.0 175.3 175.2 176.4 176.9 177.0 178.8 179.0 179.7 179.8 179.9 180.4 181.5 181.6 174.5	-7.2 -6.9 -6.9 -6.7 -7.4 -6.7 -6.6 -7.3 -5.3 -4.4 -1.8 -1.6 -1.4 -1.2 -1.2 -1.2 -1.3 -7.2
200.000	678.	3969.	3.2	173.1	175.1	-2.0

PAGE 29

225.000 610. 3088. 4.2 174.2 175.8 -1.6 250.120 836. 4898. 2.6 174.9 176.3 -1.4

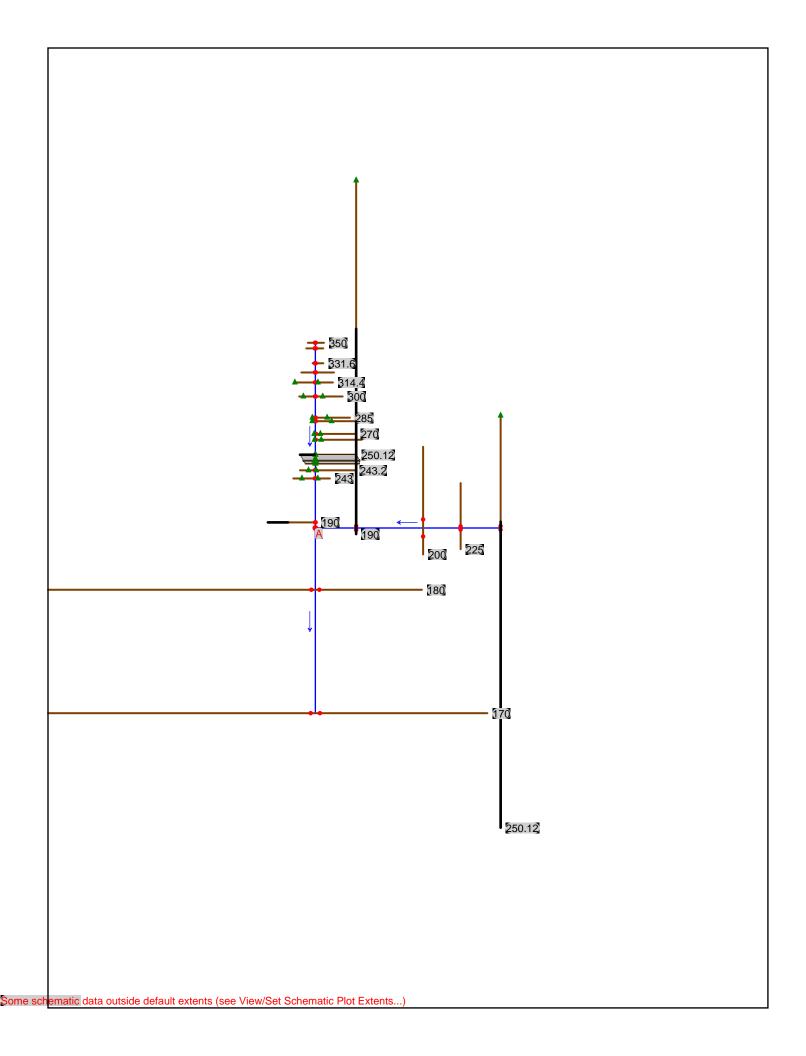
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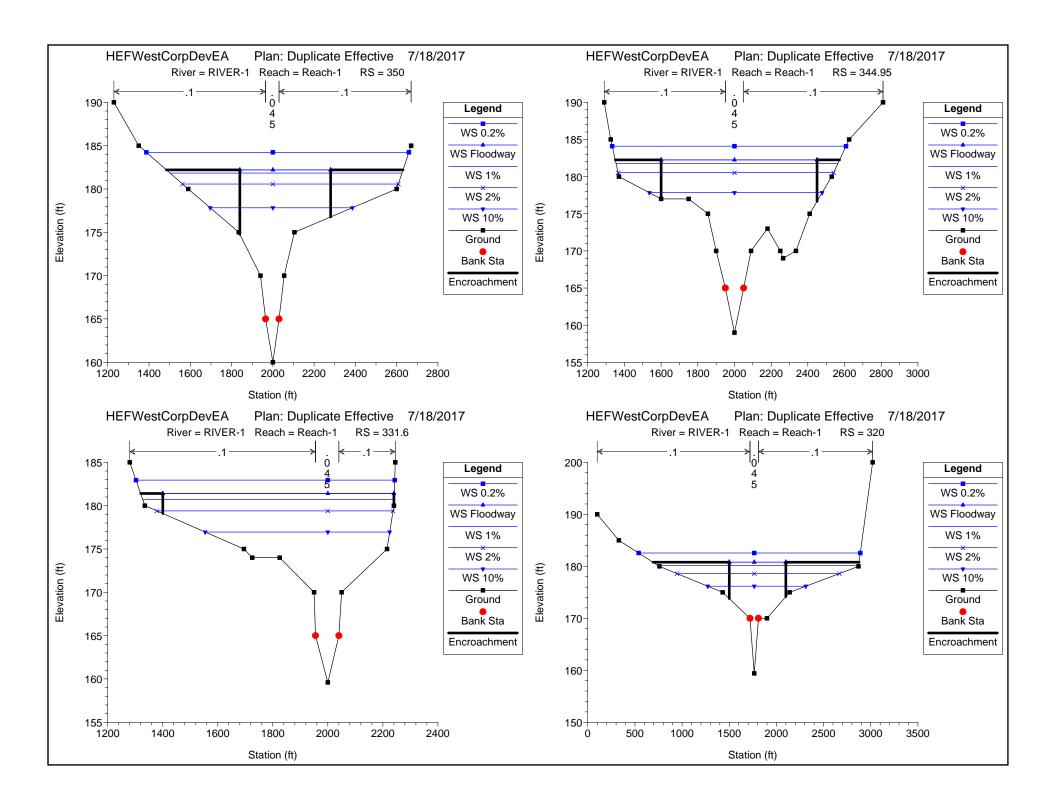
PAGE 30

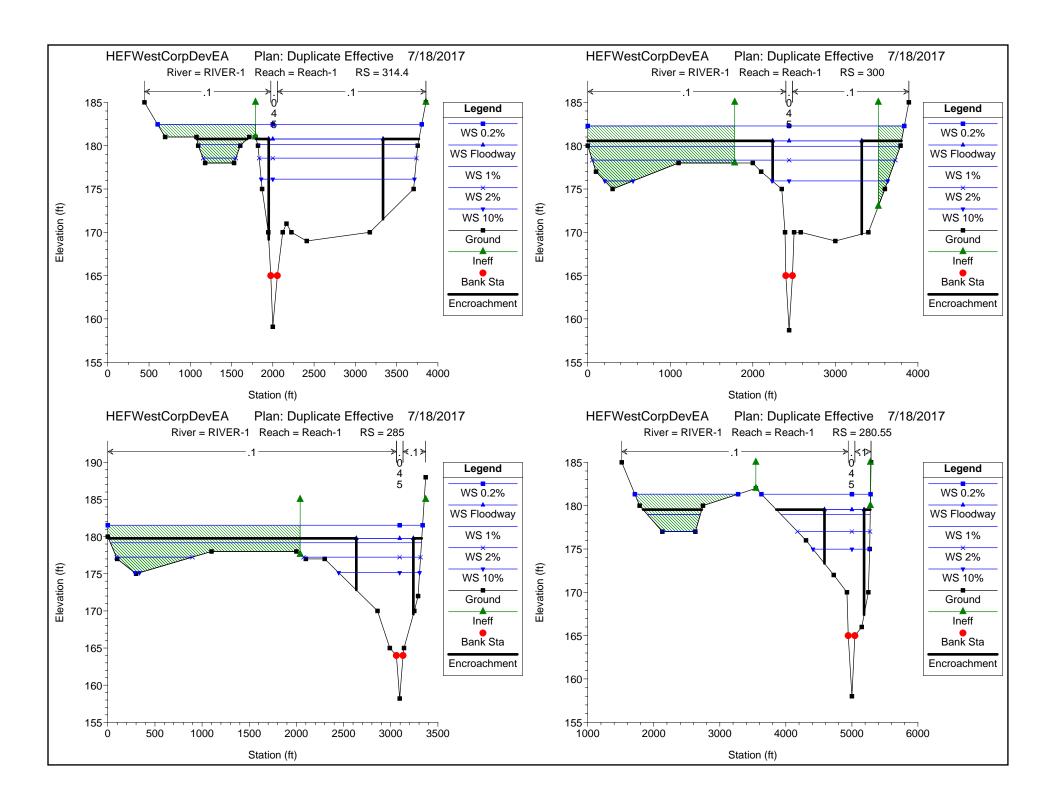
FLOODWAY DATA, BROAD RUN PROFILE NO. 5

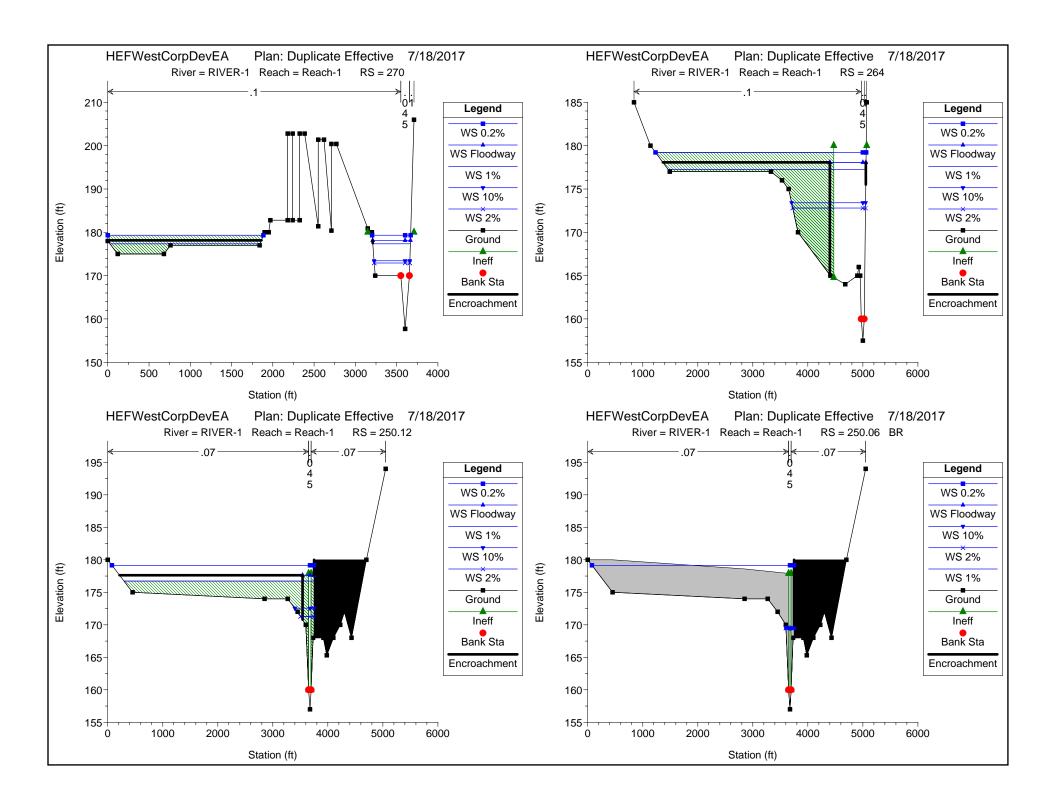
		FLOODWAY		WATER S	URFACE ELE	EVATION
STATION	WIDTH	SECTION	MEAN	WITH	WITHOUT	DIFFERENCE
		AREA	VELOCITY	FLOODWAY	FLOODWAY	
170.000	2668.	15864.	1.6	169.0	174.5	-5.5
180.000	2778.	16981.	1.5	169.6	174.5	-4.9
190.000	2490.	18436.	.3	169.9	174.5	-4.6
243.000	1430.	7728.	. 7	170.0	174.5	-4.5
243.200	700.	2905.	1.8	169.9	174.5	-4.6
243.380	95.	1121.	4.7	170.2	174.5	-4.3
245.000	35.	480.	10.9	172.1	175.0	-2.9
246.000	3734.	4755.	1.1	174.5	175.3	8
250.000	50.	788.	6.7	174.2	175.2	-1.0
250.120	420.	4026.	1.3	178.3	176.4	1.9
264.000	589.	8558.	3.0	178.8	176.9	1.9
270.000	464.	4560.	5.6	178.9	177.0	1.9
280.550	1611.	11904.	2.2	181.0	178.8	2.2
285.000	1296.	12059.	2.1	181.2	179.0	2.2
300.000	1740.	17646.	1.5	182.0	179.7	2.3
314.400	2008.	22647.	1.1	182.2	179.8	2.4
320.000	2322.	14786.	1.7	182.3	179.9	2.4
331.600	937.	8082.	3.2	182.6	180.4	2.2
344.950	1266.	12189.	2.1	183.8	181.5	2.3
350.000	1253.	9219.	2.8	183.9	181.6	2.3
-180.000	2778.	16997.	1.5	169.6	174.5	-4.9
190.000	859.	2928.	7.1	169.7	174.5	-4.8
200.000	812.	5086.	4.1	174.6	175.1	5
225.000	694.	4210.	5.0	175.9	175.8	.1
250.120	878.	6481.	3.2	176.8	176.3	.5

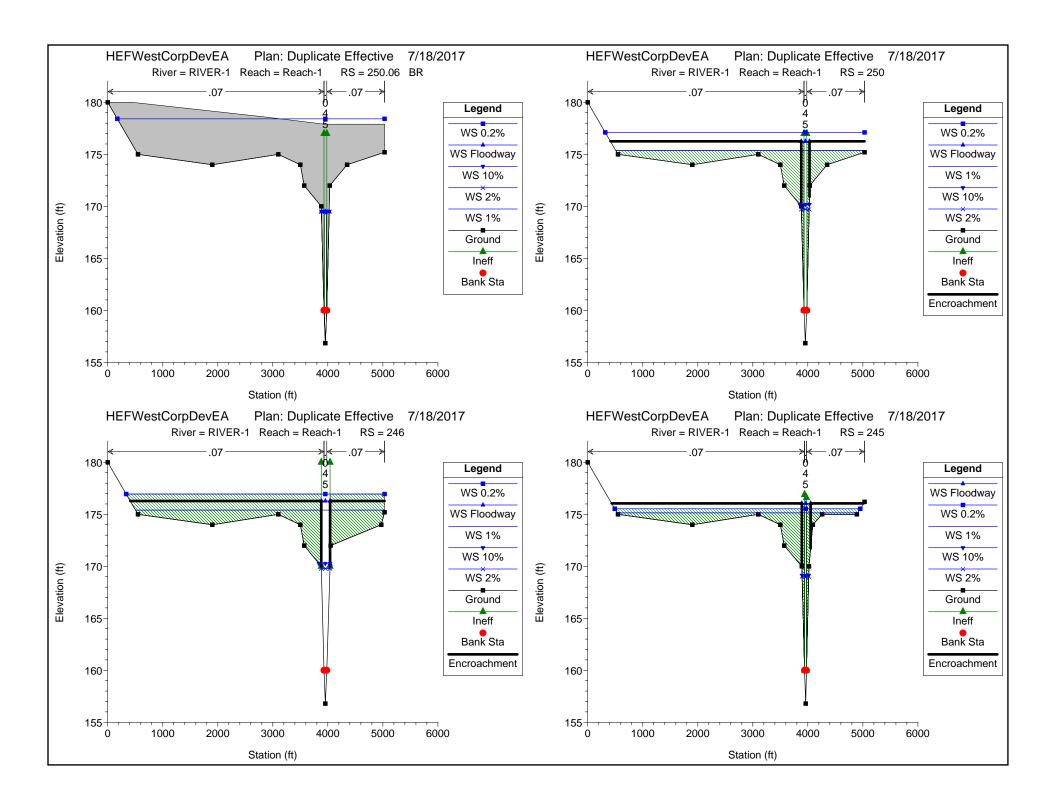
# APPENDIX C BROAD RUN DUPLICATE EFFECTIVE MODEL

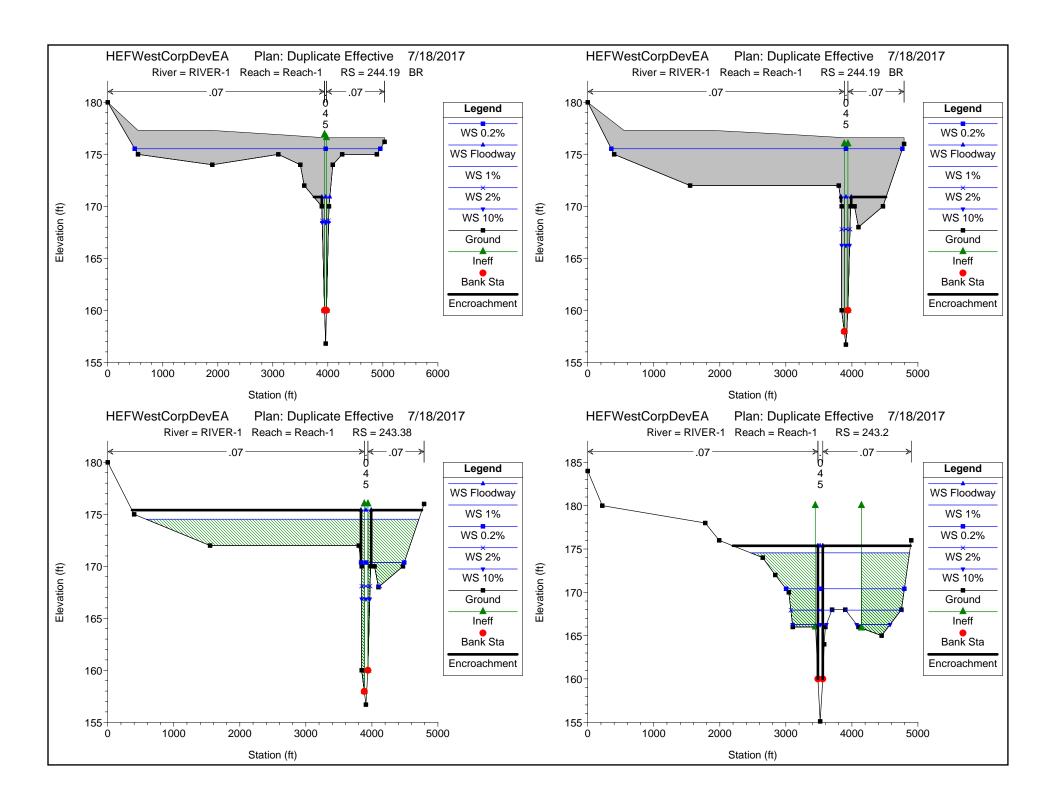


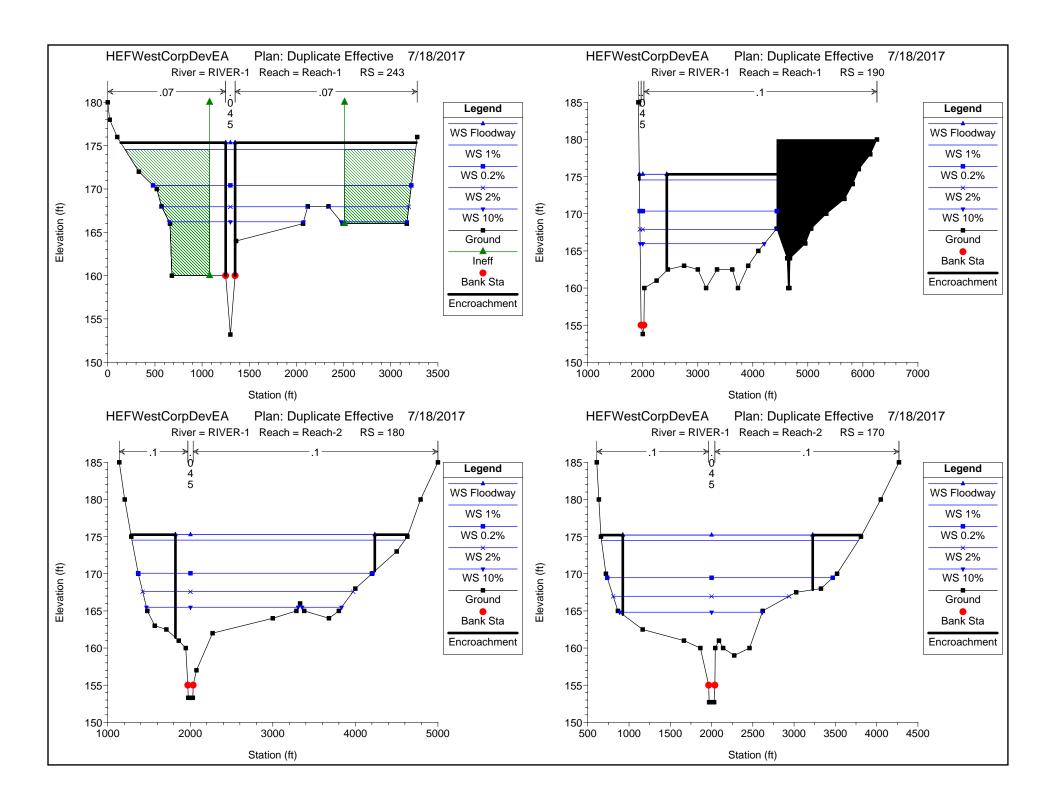


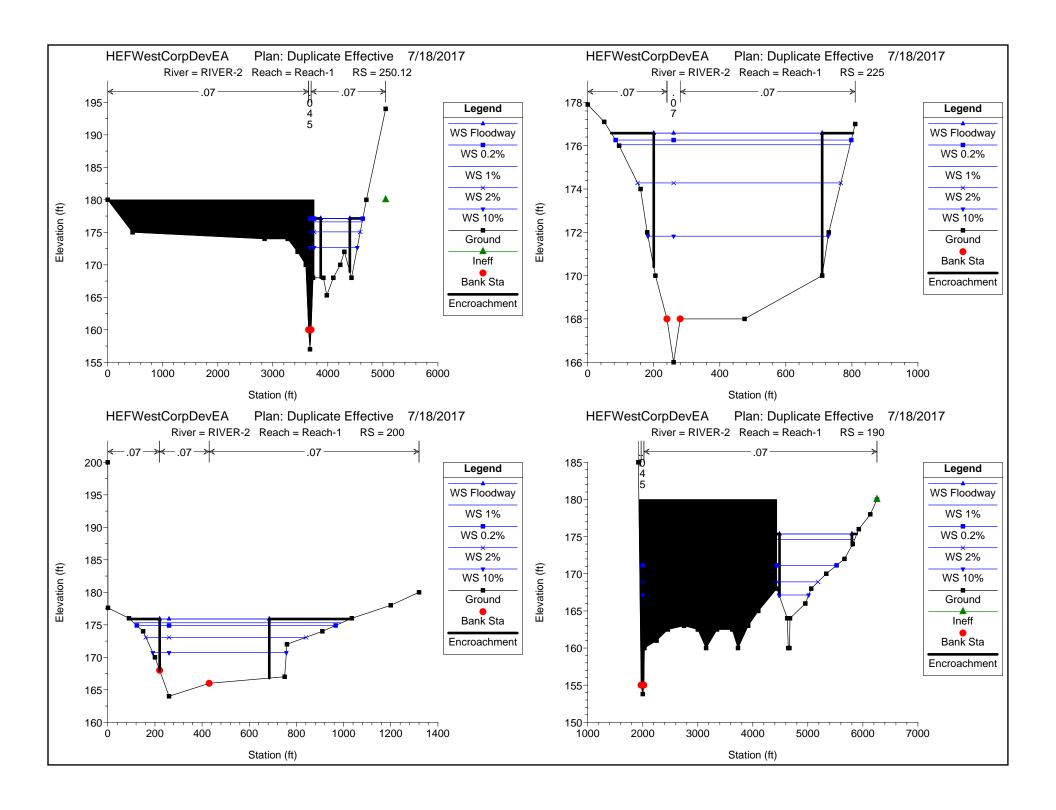




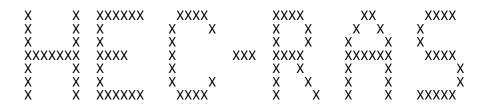








HEC-RAS HEC-RAS 5.0.1 April 2016 U.S. Army Corps of Engineers Hydrologic Engineering Center 609 Second Street Davis, California



\*

PROJECT DATA

Project Title: HEFWestCorpDevEA Project File: HEFWestCorpDevEA Project File: HEFWestCorpDevEA.prj Run Date and Time: 7/18/2017 4:18:28 PM

Project in English units

Project Description: All Elevations in NGVD 29 NGVD29 = NAVD88 + 0.827

Manassas, Prince William County, Virginia

Manassas Regional Airport - West Corporate Development and

East Side Parcel CLOMR

Broad Run

Model beings at FEMA X/S "R" STA. 170

Model

ends at FEMA X/S "Z" STA. 350

Duplicate Effective Model:

Effecti ve

including FEMA issued LOMRS - divided flow reach

Existing Conditions

Model:

2017 Manassas Regional Airport Runway 34R Extension Program LOMR -

Ongoing with FEMĂ

Proposed Conditions Model: West Corporate Development

Proposed Layout

Revisions to X/S 314.4 through X/S 264

PLAN DATA

Plan Title: Duplicate Effective

Plan File: C:\Users\wilsons\Desktop\HEF EA\Broad Run HEC-RAS\HEFWestCorpDevEA.p02

Geometry Title: Duplicate Effective

Page 1

Geometry File: C:\Users\wilsons\Desktop\HEF EA\Broad Run HEC-RAS\HEFWestCorpDevEA. g01

Flow Title : Duplicate Effective Flow File : C:\Users\wilsons\Desktop\HEF EA\Broad Run

HEC-RAS\HEFWestCorpDevEA. f01

Plan Summary Information:

Cross Sections = 24 Number of: Multiple Openings = 0 Culverts = 0 Inline Structures = 0 Bri dges 2 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01 Critical depth calculation tolerance = 0.01 Maximum number of iterations 20 Maximum difference tolerance 0.3 Flow tolerance factor = 0.001

Computation Options

Critical depth computed only where necessary

Conveyance Calculation Method: At breaks in n values only

Friction Slope Method: Computational Flow Regime: Average Conveyance Subcritical Flow

Encroachment Data

Equal Conveyance = True

Left Offset 0 0 Right Offset =

Ri ver = RS 350 344. 95 331. 6 320 314. 4 300 285 280. 55 270 264 250. 12 250 246 245 243. 38 243. 2 243 190	RIVER-1 Profile Floodway	Reach = Method	Reach-1 Val ue1 1840 1600 1400 1500 2240 2635 4585 3210 4400 3540 3880 3880 3890 3835 3485 1250 1937. 39	Val ue2 2280 2450 2240 2100 3335 3320 3240 5185 3700 5052. 91 3750 4030 4040 4050 3990 3560 1350 2437
Ri ver = RS 170 180	RIVER-1 Profile Floodway Floodway	Reach = Method 1	Reach-2 Val ue1 925 1820	Val ue2 3225 4235
Ri ver = RS 250. 12 225 200 190	RIVER-2 Profile Floodway Floodway Floodway Floodway	Reach = Method 1 1 1 1	Reach-1 Val ue1 3870 200 220 4485	Val ue2 4400 710 685 5800

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# FLOW DATA

Flow Title: Duplicate Effective

Flow File: C:\Users\wilsons\Desktop\HEF EA\Broad Run HEC-RAS\HEFWestCorpDevEA. f01

_			/ - \
ᄓ	$\alpha$	112+2	(cfs)
ГΙ	I OW	vala	(CIS)

_	****	* * * * * * * * * * * * * * * * * * * *	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~		~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ <i>~</i> ~ ~ ~ ~ ~	
*	*****	*****	*****			
*	Ri ver 10%	Reach 2%	RS 0. 2% *	*	1%	FI oodway
*	RI VER-1 8780	Reach-1 15000	350 25700 *	*	17700	17700
*	RI VER-1 3025	Reach-1 2480	250. 12 5250 *	*	2220	2220
*	RI VER-1 8930	Reach-2 15300	180 26100 *	*	18100	18100
*	RI VER-2 5905	Reach-1 12820	250. 12 20850 *	*	15880	15880
*	RI VER-2 5905	Reach-1 12820	190 20850 *	*	15880	15880
*	*****	******	*****	*****	******	*******

\*\*\*\*\*\*\*\*\*\*

# Boundary Conditions

******	******	******	****	*******	*****
*****	****				
* Ri ver	Reach	Profile	*	Upstream	

Downstream	*	TIOTILE		ops tream
*****	*****	******	******	******
*****	* * *			
* RI VER-1 Known WS = 174.47	Reach-2	1%	*	
* RI VER-1 Known WS = 175. 21	Reach-2	Floodway	*	
* RI VER-1 Normal S = 0.0006	Reach-2	10%	*	
* RI VER-1 Normal S = 0.0006	Reach-2	2%	*	
* RIVER-1 Normal S = 0.0006		0. 2%	*	****
****				

# GEOMETRY DATA

Geometry Title: Duplicate Effective Geometry File: C:\Users\wilsons\Desktop\HEF EA\Broad Run HEC-RAS\HEFWestCorpDevEA.g01

# 

* Ri ver	Reach	* ***	Upstream Boundary	* D	ownstream Boundary	*
* RI VER-1	Reach-1	*		*	Α	*
* RI VER-1	Reach-2	*	Α	*		*
* RI VER-2	Reach-1	*		*	Α	*
*****	******	***	* * * * * * * * * * * * * * * * * * * *	* * * *	*****	< *

# JUNCTION INFORMATION

Name: A Description: Junction at section 180 Energy computation Method

Length across Juncti Ri ver Rea RI VER-1 Reach-1 RI VER-2 Reach-1	ch to	Tri butary Ri ver RI VER-1 RI VER-1	Reach-2 Reach-2			gth Ang 000 000	gl e 0 0
CROSS SECTION							
RI VER: RI VER-1 REACH: Reach-1	RS: 350						
INPUT Description: XS 350 (LET SOUTHERN RAILROAD	TERED CROSS	S-SECTION Z)					
Station Elevation Data Sta Elev Sta		12 Sta El ev		El ev *****	Sta	El ev ****	
1230 190 1350 1965 165 2000 2600 180 2670	160	1590 180 2030 165	1835 2055	175 170	1940 2105	170 175	
Manning's n Values Sta n Val Sta	num= n Val ******	3 Sta n Val					
1230 . 1 1965	. 045	2030 . 1					
Bank Sta: Left Right 1965 2030	Lengths:	Left Channel 505 505	Ri ght 505	Coeff	Contr. .1	Expan. . 3	
CROSS SECTION OUTPUT Pr		******	*****	*****	****	* * * * * * * *	**
* E.G. Elev (ft)	* 182.36	* Element		* Le	ft OB *	Channel	*
Ri ght OB * * Vel Head (ft) 0.100 *	* 0.53	* Wt. n-Val.		* 0	. 100 *	0. 045	*
* W.S. Elev (ft)	* 181.84	* Reach Len.	(ft)	* 50	5.00 *	505.00	*
* Crit W.S. (ft)	*	* Flow Area	(sq ft)	* 248	3. 02 *	1257. 00	*
* E.G. Slope (ft/ft)	*0.001074	* Area (sq f	t)	* 248	3. 02 *	1257. 00	*
2996.55 * * Q Total (cfs) 4279.07 *	*17700.00	* Flow (cfs)		* 369	9. 03 *	9721. 90	*
* Top Width (ft) 595.74 *	* 1123.98	* Top Width	(ft)	* 46	3. 24 *	65.00	*
* Vel Total (ft/s) 1.43 *	* 2.63	* Avg. Vel.	(ft/s)	*	1. 49 *	7. 73	*
* Max Chl Dpth (ft) 5.03 *	* 21.84	* Hydr. Depth	n (ft)	*	5. 36 *	19. 34	*
* Conv. Total (cfs) *130593.8 *	*540190. 4	* Conv. (cfs)	)	*1128	91.5 *:	296705. 1	
* Length Wtd. (ft)	* 505.00	* Wetted Per.	(ft)	* 46	3. 93 *	65. 77	*
596.57 * * Min Ch El (ft) 0.34 *	* 160.00	* Shear (Ib/s	sq ft)	*	0. 36 *	1. 28	*
* Al pha	* 4.90	* Stream Powe Page 4	er (Ib/ft s	s) *	0. 53 *	9. 91	*

0.48 * * Frctn Loss (ft)	*	0. 30	*	Cum	Volume (acre-ft)	*	2069. 68	*	528. 72	*
2354.81 * * C & E Loss (ft)	*	0. 10	*	Cum	SA (acres)	*	455. 71	*	27. 82	*
199. 28 * * * * * * * * * * * * * * * * * *	****	*****	* * *	****	******	* * * *	*****	***	*****	* *

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

# 

*****	***	*****	××	******	× × :	****	× × 7	· × × × × × × × ×	× ×
*****									
* E.G. Elev (ft) Right OB *	*	182. 87	*	Element	*	Left OB	*	Channel	*
* Vel Head (ft)	*	0. 66	*	Wt. n-Val.	*	0. 100	*	0. 045	*
0.100 * * W.S. Elev (ft)	*	182. 21	*	Reach Len. (ft)	*	505.00	*	505.00	*
505.00 *	*				*	1250 /0	*		*
* Crit W.S. (ft) 1960.38 *				Flow Area (sq ft)		1350. 68		1281. 16	
* E.G. Slope (ft/ft)	*0	. 001188	*	Area (sq ft)	*	1350. 68	*	1281. 16	*
1960.38 * * Q Total (cfs)	*1	7700. 00	*	Flow (cfs)	*	3243. 46	* 1	10557. 45	*
3899. 09 *	+	440.00	4	T W: J+b (6+)	*	105.00	4	<b>45.00</b>	*
* Top Width (ft) 250.00 *	^	440. 00	^	Top Width (ft)	^	125. 00	*	65. 00	^
* Vel Total (ft/s) 1.99 *	*	3. 85	*	Avg. Vel. (ft/s)	*	2. 40	*	8. 24	*
* Max Chl Dpth (ft) 7.84 *	*	22. 21	*	Hydr. Depth (ft)	*	10. 81	*	19. 71	*
* Conv. Total (cfs)	*5	13479. 0	*	Conv. (cfs)	*	94093. 1	* 3	306272. 8	
*113113.1 *  * Length Wtd. (ft)	*	505.00	*	Wetted Per. (ft)	*	133. 06	*	65. 77	*
256.20 * * Min Ch El (ft)	*	160. 00	*	Shear (Ib/sq ft)	*	0. 75	*	1. 45	*
0. 57 * * Al pha	*	2. 86	*	Stream Power (lb/ft s)	*	1. 81	*	11. 91	*
1. 13 *		2.00		Stream Fower (16/11 3)		1.01		11.71	
* Frctn Loss (ft) 1182.38 *	*	0. 29	*	Cum Volume (acre-ft)	*	607.80	*	548. 97	*
* C & E Loss (ft)	*	0. 15	*	Cum SA (acres)	*	63. 67	*	27. 82	*
74.48 * *********************************	***	*****	* *	*****	* * :	*****	* * *	****	**
*****									

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

# CROSS SECTION OUTPUT Profile #10%

****	*****	******	× × × 7	*****	*****	· × ×
*	178. 38	* Element	*	Left OB *	Channel	*
*	0. 54	* Wt. n-Val.	*	0. 100 *	0.045	*
*	177. 83	* Reach Len. (ft)	*	505.00 *	505.00	*
*		* Flow Area (sq ft)	*	1015. 34 *	996. 75	*
	*	* 178.38 * 0.54 * 177.83	<ul> <li>* 178.38 * Element</li> <li>* 0.54 * Wt. n-Val.</li> <li>* 177.83 * Reach Len. (ft)</li> </ul>	* 178.38 * Element *  * 0.54 * Wt. n-Val. *  * 177.83 * Reach Len. (ft) *	* 178.38 * Element	* 0.54 * Wt. n-Val.

	Du	plicate Effective					
* E.G. Slope (ft/ft) 922.81 *	*0. 001107	* Area (sq ft)	*	1015. 34	*	996. 75	*
* 0 Total (cfs) 860.11 *	* 8780.00	* Flow (cfs)	*	1215. 03	*	6704. 87	*
* Top Width (ft) 355.62 *	* 689.51	* Top Width (ft)	*	268. 89	*	65.00	*
* Vel Total (ft/s) 0.93 *	* 2.99	* Avg. Vel. (ft/s)	*	1. 20	*	6. 73	*
* Max Chl Dpth (ft) 2.59 *	* 17.83	* Hydr. Depth (ft)	*	3. 78	*	15. 33	*
* Conv. Total (cfs) 25856.7 *	*263944.9	* Conv. (cfs)	*	36526. 2	*2	01562. 0	*
* Length Wtd. (ft) 356.38 *	* 505.00	* Wetted Per. (ft)	*	269. 54	*	65. 77	*
* Min Ch El (ft) 0.18 *	* 160.00	* Shear (Ib/sq ft)	*	0. 26	*	1. 05	*
* Al pha 0. 17 *	* 3.89	* Stream Power (lb/ft s)	*	0. 31	*	7. 04	*
* Frctn Loss (ft) 791.69 *	* 0. 27	* Cum Volume (acre-ft)	*	640. 93	*	366. 02	*
* C & E Loss (ft) 156.25 *	* 0.12	* Cum SA (acres)	*	141. 15	*	27. 97	*
	*****	*******	**	*****	***	*****	**

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

# 

****	~ ~ ~	~ ~ ~ ~ ~ ~ ~ ~ ~ ~	~ ~ .	* * * * * * * * * * * * * * * * * * * *	^ ^ '	^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	~ ~ /		~ ~
*****									
* E.G. Elev (ft) Right OB *	*	181. 18	*	Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.100 *	*	0. 61	*	Wt. n-Val.	*	0. 100	*	0. 045	*
* W. S. Elev (ft) 505.00 *	*	180. 57	*	Reach Len. (ft)	*	505.00	*	505.00	*
* Crit W.S. (ft) 2252.43 *	*		*	Flow Area (sq ft)	*	1934. 22	*	1174. 58	*
* E.G. Slope (ft/ft) 2252.43 *	*0	. 001219	*	Area (sq ft)	*	1934. 22	*	1174. 58	*
* Q Total (cfs) 2891.52 *	*1	5000. 00	*	Flow (cfs)	*	2855. 30	*	9253. 18	*
* Top Width (ft)	*	1045. 37	*	Top Width (ft)	*	402. 38	*	65.00	*
* Vel Total (ft/s)	*	2. 80	*	Avg. Vel. (ft/s)	*	1. 48	*	7. 88	*
* Max Chl Dpth (ft)	*	20. 57	*	Hydr. Depth (ft)	*	4. 81	*	18. 07	*
* Conv. Total (cfs)	*4	29574. 2	*	Conv. (cfs)	*	81770. 9	* 2	264995. 2	*
* Length Wtd. (ft)	*	505.00	*	Wetted Per. (ft)	*	403. 05	*	65. 77	*
* Min Ch El (ft)	*	160.00	*	Shear (Ib/sq ft)	*	0. 37	*	1. 36	*
* Al pha	*	4. 98	*	Stream Power (lb/ft s)	*	0. 54	*	10. 71	*
* Frctn Loss (ft)	*	0. 33	*	Cum Volume (acre-ft)	*	924. 25	*	417. 28	*
* C & E Loss (ft)	*	0. 12	*	Cum SA (acres)	*	228. 08	*	27. 97	*
177.84 * * * * * * * * * * * * * * * * * * *	***	****	* * :	*******	**:	****	* * >	******	* *

\*\*\*\*\*

CROSS SECTION OUTPUT Profile #0.2%

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

### \*\*\*\*\* \* E.G. Elev (ft) Right OB \* 184. 73 \* Element Left OB \* Channel \* 0.50 \* Wt. n-Val. 0.100 0.045 Vel Head (ft) 0.100 \* W.S. Elev (ft) 184. 23 \* Reach Len. (ft) 505.00 505.00 505.00 \* Crit W.S. (ft) \* Flow Area (sq ft) \* 3725.55 \* 1412.15 4458. 49 \* E.G. Slope (ft/ft) \* Area (sq ft) \*0.001042 \* 3725.55 \* 1412.15 4458. 49 \* Q Total (cfs) \*25700.00 \* Flow (cfs) \* 6186.40 \*11630.04 7883.56 Top Width (ft) \* 1271.98 \* Top Width (ft) 577.82 65.00 629. 16 Vel Total (ft/s) 2.68 \* Avg. Vel. (ft/s) 1.66 8.24

Max Chl Dpth (ft) 24.23 \* Hydr. Depth (ft) 6.45 21.73 7.09 \* Conv. (cfs) \* Conv. Total (cfs) \*796018.8 \*191614.5 \*360223.1 \*244181.3 Length Wtd. (ft) 505.00 \* Wetted Per. (ft) 578.53 65.77 630. Ŏ8 \* Shear (lb/sq ft) \* Min Ch El (ft) 160.00 0.42 1.40 0.46 \* Stream Power (lb/ft s) \* 4.51 Al pha 0.70 11.51

\*\*\*\*\*

0.81

1.77

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

## CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 344.95

I NPUT

Description: XS 344.95 (LETTERED CROSS-SECTION Y)

WI DENED FLOODWAY TO REDUCE U/S SURCHARGES

Station Elevation Data 19 num= Sta Sta Sta El ev El ev El ev Sta El ev Sta El ev 1290 190 1325 185 1370 180 1600 177 1750 177 1855 175 1900 170 1950 2000 159 2050 165 165 2090 170 2180 173 2250 170 2265 169 2335 170 2410 175 2530 180 2625 185 2810 190 Page 7

Manning's n Values Sta n Val Sta	*****		
1290 . 1 1950	. 045	2050 . 1	
Bank Sta: Left Right 1950 2050	Lengths:	Left Channel Right 1335 1335 1335	Coeff Contr. Expan 3
CROSS SECTION OUTPUT Pro		******	*******
* E.G. Elev (ft) Right OB *	* 181.96	* Element	* Left OB * Channel *
* Vel Head (ft)	* 0.19	* Wt. n-Val.	* 0.100 * 0.045 *
0.100 * * W.S. Elev (ft) 1335.00 *	* 181.77	* Reach Len. (ft)	* 1335.00 * 1335.00 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 3218.40 * 1977.03 *
4494.54 * * E.G. Slope (ft/ft)	*0.000382	* Area (sq ft)	* 3218.40 * 1977.03 *
4494.54 * * * * * * * * * * * * * * * * * * *	*17700.00	* Flow (cfs)	* 2875.52 * 9286.32 *
5538.16 * * Top Width (ft) 513.64 *	* 1209.57	* Top Width (ft)	* 595.93 * 100.00 *
513.64 * * Vel Total (ft/s) 1.23 *	* 1.83	* Avg. Vel. (ft/s)	* 0.89 * 4.70 *
<pre>* Max Chl Dpth (ft)</pre>	* 22.77	* Hydr. Depth (ft)	* 5.40 * 19.77 *
8.75 * * Conv. Total (cfs) *283307 9 *	*905453.8	* Conv. (cfs)	*147098.7 *475047.2
* Length Wtd. (ft)	* 1335.00	* Wetted Per. (ft)	* 596.60 * 100.72 *
* Min Ch El (ft)	* 159.00	* Shear (Ib/sq ft)	* 0.13 * 0.47 *
* Al pha	* 3.65	* Stream Power (lb/ft s	) * 0.11 * 2.20 *
0.26 * * Frctn Loss (ft) 2311.39 *	* 0.75	* Cum Volume (acre-ft)	* 2036.63 * 509.97 *
* C & E Loss (ft) 192.85 *	* 0.03	* Cum SA (acres)	* 449.57 * 26.86 *
	*****	*******	*******
is less than 0.7 or grea	ter than	tream conveyance divided l	by downstream conveyance) oss sections.
CROSS SECTION OUTPUT Pro	ofile #Floo *****	odway **********	******
* E.G. Elev (ft)	* 182.43	* Element	* Left OB * Channel *
Right OB *  * Vel Head (ft)	* 0.17	* Wt. n-Val.	* 0.100 * 0.045 *
0.100 * * W.S. Elev (ft)	* 182. 26	* Reach Len. (ft)	* 1335.00 * 1335.00 *
1335.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	* 2623.00 * 2025.86 *
4385.09 * * E.G. Slope (ft/ft)	*0.000339	* Area (sq ft)	* 2623.00 * 2025.86 *
4385.09 * * * * * * * * * * * * * * * * * * *	*17700.00	* Flow (cfs) Page 8	* 2720. 19 * 9116. 10 *

	ՄԱ	Jircate Errective					
5863. 71 *							
* Top Width (ft)	* 850.00	* Top Width (ft)	*	350. 00	*	100. 00	*
400.00 *							
<pre>* Vel Total (ft/s)</pre>	* 1. 96	* Avg. Vel. (ft/s)	*	1. 04	*	4. 50	*
1. 34 *			.1.				
* Max Chl Dpth (ft)	* 23. 26	* Hydr. Depth (ft)	*	7. 49	*	20. 26	*
10.96 *	+0/0/04 0	* 0 ( C )	4.4	47/00 0		0.4750 5	
* Conv. Total (cfs) *319242 1 *	*960634.9	* Conv. (cfs)	^ 1	47633. 3	^4	94759. 5	
310242. 1	* 1005 00	* W. LL. J. D (CL)	*	255 00	4	100 70	*
* Length Wtd. (ft)	* 1335.00	* Wetted Per. (ft)	^	355. 80	*	100. 72	^
400. 20	* 150 00	* Chaor (15/00 ft)	*	0 14	*	0.42	*
* Min Ch El (ft) 0.23 *	* 159.00	* Shear (Ib/sq ft)		0. 16		0. 43	
* Al pha	* 2.91	* Stream Power (lb/ft s)	*	0. 16	*	1. 92	*
0. 31 *	2. 91	Stream Fower (10/11/5)		0. 10		1. 72	
* Frctn Loss (ft)	* 0.64	* Cum Volume (acre-ft)	*	584. 76	*	529. 80	*
1145.60 *	0.04	cam vorame (acre-rt)		304.70		327.00	
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	*	60. 92	*	26. 86	*
70. 71 *	0.02	odiii ort (deres)		00. 72		20.00	
	*****	******	* * *	*****	***	*****	* *
*****							

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT							
****			~ ~	*****	~ ~ .	* * * * * * * * *	^ ^
* E.G. Elev (ft)	* 177. 98	* Element	*	Left OB	*	Channel	*
Right OB *  * Vel Head (ft)  0.100 *	* 0.15	* Wt. n-Val.	*	0. 100	*	0.045	*
* W. S. El ev (ft) 1335.00 *	* 177.84	* Reach Len. (ft)	*	1335.00	*	1335. 00	*
* Cri t W. S. (ft) 2633.04 *	*	* Flow Area (sq ft)	*	1102. 44	*	1583. 73	*
* E.G. Slope (ft/ft) 2633.04 *	*0.000320	* Area (sq ft)	*	1102. 44	*	1583. 73	*
* Q Total (cfs) 2346.72 *	* 8780.00	* Flow (cfs)	*	562. 25	*	5871.03	*
* Top Width (ft) 428.10 *	* 942.29	* Top Width (ft)	*	414. 19	*	100.00	*
* Vel Total (ft/s) 0.89 *	* 1.65	* Avg. Vel. (ft/s)	*	0. 51	*	3. 71	*
* Max Chl Dpth (ft) 6.15 *	* 18.84	* Hydr. Depth (ft)	*	2. 66	*	15. 84	*
* Conv. Total (cfs) *131199.0 *	*490866.6	* Conv. (cfs)	*	31434.0	* (	328233. 5	
* Length Wtd. (ft) 428.79 *	* 1335.00	* Wetted Per. (ft)	*	414. 75	*	100. 72	*
* Min Ch El (ft) 0.12 *	* 159.00	* Shear (Ib/sq ft)	*	0. 05	*	0. 31	*
* Al pha 0. 11 *	* 3.46	* Stream Power (lb/ft s)	*	0. 03	*	1. 16	*
* Frctn Loss (ft) 771.07 *	* 0.63	* Cum Volume (acre-ft)	*	628. 65	*	351. 06	*
* C & E Loss (ft) 151.71 *	* 0.02	* Cum SA (acres)	*	137. 19	*	27. 01	*
131.71	*****	******	**	*****	**:	*****	**
****							

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) Page 9

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT									
****									
* E.G. Elev (ft) Right OB *	* 180.73	* Element	*	Left OB	*	Channel	*		
* Vel Head (ft) 0.100 *	* 0.19	* Wt. n-Val.	*	0. 100	*	0. 045	*		
* W. S. El ev (ft) 1335.00 *	* 180.53	* Reach Len. (ft)	*	1335. 00	*	1335.00	*		
* Cri t W. S. (ft) 3873.22 *	*	* Flow Area (sq ft)	*	2487. 54	*	1853. 24	*		
* E. G. Slope (ft/ft) 3873.22 *	*0.000398	* Area (sq ft)	*	2487. 54	*	1853. 24	*		
* Q Total (cfs) 4552.50 *	*15000.00	* Flow (cfs)	*	1935. 35	*	8512. 15	*		
* Top Width (ft) 490.11 *	* 1174. 91	* Top Width (ft)	*	584. 79	*	100.00	*		
* Vel Total (ft/s) 1.18 *	* 1.83	* Avg. Vel. (ft/s)	*	0. 78	*	4. 59	*		
* Max Chl Dpth (ft) 7.90 *	* 21.53	* Hydr. Depth (ft)	*	4. 25	*	18. 53	*		
* Conv. Total (cfs) *228108.1 *	*751592.4	* Conv. (cfs)	*	96972. 9	* 4	426511. 4			
* Length Wtd. (ft) 490.87 *	* 1335.00	* Wetted Per. (ft)	*	585. 39	*	100. 72	*		
* Min Ch El (ft) 0.20 *	* 159.00	* Shear (Ib/sq ft)	*	0. 11	*	0. 46	*		
* Al pha	* 3.74	* Stream Power (lb/ft s)	*	0. 08	*	2. 10	*		
* Frctn Loss (ft)	* 0.80	* Cum Volume (acre-ft)	*	898. 62	*	399. 72	*		
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	*	222. 36	*	27. 01	*		
171.05	*****	*****	**	*****	* * :	****	**		
****									

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

# CROSS SECTION OUTPUT Profile #0.2%

****************************						
*****						
* E.G. Elev (ft)	* 184.32	* Element	* Left OB * Channel *			
Right OB *						
* Vel Head (ft)	* 0. 22	* Wt. n-Val.	* 0.100 * 0.045 *			
0. 100 *	* 104 10	* December 1 (64)	* 1225 00 * 1225 00 *			
* W.S. Elev (ft) 1335.00 *	* 184. 10	* Reach Len. (ft)	* 1335.00 * 1335.00 *			
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 4630.53 * 2209.90 *			
5742. 14 *		1100 700 (34 11)	1000.00 2207.70			
* E.G. Slope (ft/ft)	*0.000430	* Area (sq ft)	* 4630.53 * 2209.90 *			
5742. 14 *						
* 0 Total (cfs)	*25700.00	* Flow (cfs)	* 5467.68 *11865.01 *			
0307.32	* 1274.77	* Top Width (ft)	* 616.89 * 100.00 *			
* Top Width (ft) 557.88 *	12/4.//	* Top Width (ft)	010. 89 100. 00			
* Vel Total (ft/s)	* 2.04	* Avg. Vel. (ft/s)	* 1.18 * 5.37 *			
1. 46 *		3 ( )				
* Max Chl Dpth (ft)	* 25. 10	* Hydr. Depth (ft) Page 10	* 7.51 * 22.10 *			
		-				

40.00 #	Du	pricate Lifective					
10.29 * * Conv. Total (cfs) *402222 4 *	*1238795.0	) * Conv. (cfs)		*263553.7	*	571918. 6	
*403322.4 * * Length Wtd. (ft) 558.73 *	* 1335.00	* Wetted Per. (ft)	*	617. 68	*	100. 72	*
* Min Ch El (ft) 0.28 *	* 159.00	* Shear (Ib/sq ft)	*	0. 20	*	0. 59	*
* Al pha 0. 40 *	* 3.43	* Stream Power (lb/ft s)	*	0. 24	*	3. 17	*
* Frctn Loss (ft) 1956.64 *	* 0.83	* Cum Volume (acre-ft)	*	2458. 71	*	506. 75	*
* C & E Loss (ft) 200.41 *	* 0.03	* Cum SA (acres)	*	455. 95	*	27. 39	*
********** ********	******	********	* *	*****	***	*****	* *

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

# CROSS SECTION

RI VER: RI VER-1

RS: 331.6 REACH: Reach-1

LINDIT

INPUT			
Description: XS 331.6 (LE WIDENED FLOODWAY TO REDUC U/S SURCHARG	Œ	OSS-SECTION X)	
Station Elevation Data	num=	13	
Sta Elev Sta	El ev	Sta El ev Sta	Elev Sta Elev
1280 185 1335	180	1695 175 1725	174 1825 174
1950 170 1955	165	2000 159.6 2040	165 2050 170
2215 175 2240	180	2245 185	
Manning's n Values Sta n Val Sta		3 Sta n Val	
1280 .1 1955	. 045	2040 . 1	
Bank Sta: Left Right 1955 2040	Lengths:	Left Channel Right 820 820 820	Coeff Contr. Expan. .1 .3
CROSS SECTION OUTPUT Pro		*******	*******
****			
* E.G. Elev (ft) Right OB *	* 181. 18	* Element	* Left OB * Channel *
* Vel Head (ft) 0.100 *	* 0.46	* Wt. n-Val.	* 0.100 * 0.045 *
* W. S. Elev (ft) 820.00 *	* 180. 72	* Reach Len. (ft)	* 820.00 * 820.00 *
* Cri t W. S. (ft) 1569. 26 *	*	* Flow Area (sq ft)	* 3176.76 * 1565.70 *
* E.G. Slope (ft/ft)	*0.000904	* Area (sq ft)	* 3176.76 * 1565.70 *
* Q Total (cfs)	*17700.00	* Flow (cfs)	* 4172.87 *10784.03 *
2743.10 * * Top Width (ft)	* 913.64	* Top Width (ft)	* 627.92 * 85.00 *
200. 72 * * Vel Total (ft/s)	* 2.80		* 1.31 * 6.89 *

Page 11

```
1.75 *
 Max Chl Dpth (ft)
                          21.12 * Hydr. Depth (ft)
                                                             5.06 * 18.42 *
  7.82
* Conv. Total (cfs)
                       *588686.8
                                * Conv. (cfs)
                                                        *138785.9
                                                                  *358667.6
91233. 3
 Length Wtd. (ft)
                         820.00
                                 * Wetted Per. (ft)
                                                           630.14
                                                                      85.69
 202. 77
                                                                       1.03
* Min Ch El (ft)
                          159.60
                                 * Shear (lb/sq ft)
                                                             0.28
  0.44
* Al pha
                           3. 79
                                 * Stream Power (lb/ft s) *
                                                             0.37
                                                                       7. 10
  0.76
                           0.70
                                * Cum Volume (acre-ft)
* Frctn Loss (ft)
                                                        * 1938.63
                                                                     455.68
2218. 47
                                                        * 430.81
* C & E Loss (ft)
                           0.07 * Cum SA (acres)
                                                                      24.03 *
 181. 90 *
**************************
*****
CROSS SECTION OUTPUT Profile #Floodway
* E.G. Elev (ft)
                         181.78 * Element
                                                          Left OB *
                                                                     Channel *
Right OB 7
 Vel Head (ft)
                          0. 37
                                 * Wt. n-Val.
                                                            0.100
                                                                      0.045
 0. 100
* W.S. Elev (ft)
                         181. 41
                                 * Reach Len. (ft)
                                                           820.00
                                                                     820.00
 820.00 *
* Crit W.S. (ft)
                                 * Flow Area (sq ft)
                                                        * 3479.78
                                                                  * 1624.21
1706. 67
                       *0.000717
                                 * Area (sq ft)
* E.G. Slope (ft/ft)
                                                        * 3479.78
                                                                   * 1624.21
1706. 67
* Q Total (cfs)
                       *17700.00
                                 * Flow (cfs)
                                                        * 4682.99
                                                                  *10210.58
2806. 43
                                 * Top Width (ft)
* Top Width (ft)
                       * 840.00
                                                           555.00
                                                                      85.00
 200.00 *
* Vel Total (ft/s)
                           2.60
                                 * Avg. Vel. (ft/s)
                                                             1. 35
                                                                       6. 29
  1.64
 Max Chl Dpth (ft)
                          21.81
                                 * Hydr. Depth (ft)
                                                             6.27
                                                                      19. 11
8.53 *
* Conv. Total (cfs)
*104797.5 *
                       *660951.4
                                 * Conv. (cfs)
                                                        *174871.6
                                                                  *381282. 2
* Length Wtd. (ft)
                         820.00
                                 * Wetted Per. (ft)
                                                           559.49
                                                                      85.69
 203. 16
* Min Ch El (ft)
                          159.60
                                 * Shear (lb/sq ft)
                                                             0.28
                                                                       0.85
  0. 38
                           3.51
* Al pha
                                 * Stream Power (lb/ft s) *
                                                             0.37
                                                                       5.34
  0.62
* Frctn Loss (ft)
                           0.65
                                 * Cum Volume (acre-ft)
                                                           491. 24
                                                                     473.87
1052. 25
                           0.01
                                 * Cum SA (acres)
                                                            47.05 *
                                                                      24.03 *
* C & E Loss (ft)
 61.52 *
*************************************
*****
CROSS SECTION OUTPUT Profile #10%
                          * E.G. Elev (ft)
                       * 177.33 * Element
                                                           Left OB *
                                                                     Channel *
Right OB *
 Vel Head (ft)
                           0.37 * Wt. n-Val.
                                                            0. 100
                                                                      0.045
 0.100
* W.S. Elev (ft)
                       * 176. 96
                                * Reach Len. (ft)
                                                           820.00 *
                                                                     820.00 *
820.00
```

```
Duplicate Effective
* Crit W.S. (ft)
                                  * Flow Area (sq ft)
                                                          * 1175.36
                                                                     * 1246.09
840.09
                                                          * 1175.36
* E.G. Slope (ft/ft)
                        *0.000778
                                 * Area (sq ft)
                                                                     * 1246.09
840.09
                        * 8780.00
                                  * Flow (cfs)
                                                             993.70
* Q Total (cfs)
                                                                     * 6836.03
950. 27
* Top Width (ft)
                          670.91
                                  * Top Width (ft)
                                                             401.11
                                                                         85.00
184.80 *
* Vel Total (ft/s)
                            2.69
                                  * Avg. Vel. (ft/s)
                                                               0.85
                                                                          5.49
  1. 13
 Max Chl Dpth (ft)
                           17.36
                                  * Hydr. Depth (ft)
                                                               2.93
                                                                         14.66
4.55 *
* Conv. Total (cfs)
                        *314860.8
                                  * Conv. (cfs)
                                                            35635.1
                                                                     *245147.7
 Length Wtd. (ft)
                                  * Wetted Per. (ft)
                          820.00
                                                             403.28
                                                                         85.69
186. 25
* Min Ch El (ft)
                           159.60
                                  * Shear (lb/sq ft)
                                                               0.14
                                                                          0.71
  0. 22
                            3.26
                                  * Stream Power (lb/ft s) *
 Al pha
                                                               0. 12
                                                                          3.87
  0. 25
                            0.79
                                  * Cum Volume (acre-ft)
 Frctn Loss (ft)
                                                             593.75
                                                                        307.70
717.85
 C & E Loss (ft)
                                  * Cum SA (acres)
                                                             124.70
                            0.00
                                                                         24. 17
142. 32
******************
*****
CROSS SECTION OUTPUT Profile #2%
                              ***************
* E.G. Elev (ft)
                          179.90
                                  * Element
                                                             Left OB *
                                                                        Channel *
Right OB *
 Vel Head (ft)
                            0.50
                                  * Wt. n-Val.
                                                              0.100
                                                                         0.045
 0.100
* W.S. Elev (ft)
                          179.39
                                  * Reach Len. (ft)
                                                             820.00
                                                                        820.00
820.00
* Crit W.S. (ft)
                                  * Flow Area (sq ft)
                                                          * 2364.56
                                                                     * 1452.93
1304.57
* E.G. Slope (ft/ft)
1304.57 *
                        *0.001000
                                  * Area (sq ft)
                                                            2364. 56
                                                                     * 1452.93
* 0 Total (cfs)
                        *15000.00
                                                            2839.74
                                  * Flow (cfs)
                                                                     *10011.10
2149. 16
* Top Width (ft)
                          858.28
                                  * Top Width (ft)
                                                             576.31
                                                                         85.00
196, 97 *
* Vel Total (ft/s)
                            2.93
                                  * Avg. Vel. (ft/s)
                                                               1.20
                                                                          6.89
  1.65
* Max Chl Dpth (ft)
                           19.79
                                  * Hydr. Depth (ft)
                                                               4.10
                                                                         17.09
6.62 *
* Conv. Total (cfs)
                                  * Conv. (cfs)
                                                          * 89821.3
                        *474451.8
                                                                     *316652. 2
 Length Wtd. (ft)
                          820.00
                                  * Wetted Per. (ft)
                                                             578.50
                                                                         85.69
198. 66
* Min Ch El (ft)
                           159.60
                                  * Shear (lb/sq ft)
                                                               0.26
                                                                          1.06
  0.41
 Al pha
                                  * Stream Power (lb/ft s) *
                            3.77
                                                                          7.29
                                                               0. 31
  0.68
* Frctn Loss (ft)
                            0.89
                                  * Cum Volume (acre-ft)
                                                             824.27
                                                                        349.06
1130.77
* C & E Loss (ft)
                            0.04
                                  * Cum SA (acres)
                                                             204.56
                                                                         24. 17
```

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CROSS SECTION OUTPUT P	Duplicate Effect	i ve	
	************************	:*****	*****
* E.G. Elev (ft) Right OB *	* 183.46 * Element	* Let	ft OB * Channel *
* Ŭel Head (ft)	* 0.52 * Wt. n-Val.	* 0.	. 100 * 0. 045 *
0.100 * * W.S. Elev (ft) 820.00 *	* 182.95 * Reach Len.	(ft) * 820	0.00 * 820.00 *
* Crit W.S. (ft) 2018.59 *	* * Flow Area (	(sq ft) * 460°	1. 91 * 1754. 93 *
* E.G. Slope (ft/ft)	*0.000977 * Area (sq ft	* 460	1. 91 * 1754. 93 *
2018.59 * * 0 Total (cfs) 4294.99 *	*25700.00 * Flow (cfs)	* 7843	3. 95 *13561. 06 *
* Top Width (ft) 202.95 *	* 940.36 * Top Width (	(ft) * 652	2. 41 * 85. 00 *
* Vel Total (ft/s) 2.13 *	* 3.07 * Avg. Vel. (	(ft/s) * ´	1.70 * 7.73 *
* Max Chl Dpth (ft) 9.95 *	* 23.35 * Hydr. Depth	n (ft) *	7. 05 * 20. 65 *
* Conv. Total (cfs) *137387.1 *	*822085.1 * Conv. (cfs)	*2509	10. 3 *433787. 7
* Length Wtd. (ft) 205.92 *	* 820.00 * Wetted Per.	(ft) * 654	4. 73 * 85. 69 *
* Min Ch El (ft)	* 159.60 * Shear (Ib/s	sq ft) * (	0. 43 * 1. 25 *
0.60 * * Al pha 1 27 *	* 3.52 * Stream Powe	er (lb/ft s) * (	0.73 * 9.66 *
* Frctn Loss (ft)	* 0.62 * Cum Volume	(acre-ft) * 231	7. 23 * 445. 99 *
1837.72 * * C & E Loss (ft) 188.75 *	* 0.10 * Cum SA (acr	res) * 436	6.50 * 24.55 *
	*******	· * * * * * * * * * * * * * * * * * * *	******
CROSS SECTION			
RIVER: RIVER-1 REACH: Reach-1	RS: 320		
INPUT Description: XS 320 INSERTED CROSS-SECTION	O EVALUATE IMPACT OF PROF	P. SITE	
(5/21/01) Station Elevation Data	num= 11		
Sta Elev Sta		Sta Elev	Sta
100 190 330 1765 159.4 1810 3020 200		1430 175 2140 175	1720 170 2870 180
Manning's n Values Sta n Val Sta ************************************	********		
Bank Sta: Left Right 1720 1810	Lengths: Left Channel 900 900	Right Coeff (	Contr. Expan. .1 .3
CROSS SECTION OUTPUT PI	ofile #1%	******	******

* E.G. Elev (ft)	* 1	80. 42	*	Element	*	Left OB	*	Channel	*
Right OB *  * Vel Head (ft)	*	0. 24	*	Wt. n-Val.	*	0. 100	*	0. 045	*
0.100 * * W.S. Elev (ft)	* 1	80. 18	*	Reach Len. (ft)	*	900.00	*	900.00	*
550.00 * * Crit W.S. (ft)	*		*	Flow Area (sq ft)	*	4021. 23	*	1392. 93	*
* E.G. Slope (ft/ft)	*0.0	00806	*	Area (sq ft)	*	4021. 23	*	1392. 93	*
4712.69 *  * Q Total (cfs)	*177	00.00	*	Flow (cfs)	*	4362. 51	*	7966. 13	*
* Top Width (ft)	* 21	26. 55	*	Top Width (ft)	*	975. 22	*	90.00	*
* Vel Total (ft/s)	*	1. 75	*	Avg. Vel. (ft/s)	*	1. 08	*	5. 72	*
* Max Chl Dpth (ft)	*	20. 78	*	Hydr. Depth (ft)	*	4. 12	*	15. 48	*
* Conv. Total (cfs)	*623	366. 4	*	Conv. (cfs)	* 1	153640. 6	*2	280554.5	
* Length Wtd. (ft)	* 7	18. 14	*	Wetted Per. (ft)	*	975. 28	*	92. 46	*
* Min Ch El (ft)	* 1	59. 40	*	Shear (Ib/sq ft)	*	0. 21	*	0. 76	*
* Al pha	*	5. 04	*	Stream Power (Ib/ft s)	*	0. 23	*	4. 34	*
* Frctn Loss (ft)	*	0. 21	*	Cum Volume (acre-ft)	*	1870. 88	*	427. 84	*
* C & E Loss (ft)	*	0.06	*	Cum SA (acres)	*	415. 72	*	22. 38	*
170. 02 * **********************************	****	*****	* * *	*******	* * *	*****	* * *	******	* *

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

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*****				
* E.G. Elev (ft)	* 181.11	* Element	* Left OB	* Channel *
Right OB *	* 0.33	* W.+ V1	* 0.100	* 0.045 *
* Vel Head (ft) 0.100 *	0.32	* Wt. n-Val.	* 0.100	* 0.045 *
* W.S. Elev (ft)	* 180 79	* Reach Len. (ft)	* 900.00	* 900.00 *
550.00 *	100.77	Reden Zen. (11)	700.00	700.00
* Crit W.S. (ft)	*	<pre>* Flow Area (sq ft)</pre>	* 1957.60	* 1448.53 *
2713. 81 *				
* E.G. Slope (ft/ft)	*0. 000876	* Area (sq ft)	* 1957.60	* 1448.53 *
2713. 81 *	*17700 00	* Fl (-£-)	+ 0/10 07	* 0061 16 *
* Q Total (cfs) 5219.17 *	^ 17700.00	* Flow (cfs)	* 3619.37	* 8861.46 *
* Top Width (ft)	* 600.00	* Top Width (ft)	* 220.00	* 90.00 *
290.00 *	000.00	rop width (it)	220.00	70.00
* Vel Total (ft/s)	* 2.89	* Avg. Vel. (ft/s)	* 1.85	* 6.12 *
1. 92 * ` ` `				
<pre>* Max Chl Dpth (ft)</pre>	* 21. 39	* Hydr. Depth (ft)	* 8. 90	* 16.09 *
9. 36 *	*F004F0 /	* 0 ( 5 )	*400040 0	***************************************
* Conv. Total (cfs) *176378 0 *	*598158. 6	* Conv. (cfs)	*122313.9	*299466. 7
*176378.0 * * Length Wtd. (ft)	* 718.82	* Wetted Per. (ft)	* 227.03	* 92.46 *
296. 67 *	710.02	wetted ref. (It)	227.03	72.40
_,				

```
Duplicate Effective
                       159.40 * Shear (lb/sq ft)
* Min Ch El (ft)
                                                       0.47 *
                                                                0.86
  0.50
                                                                5. 24
 Al pha
                         2.45 * Stream Power (lb/ft s) *
                                                       0.87
  0.96
* Frctn Loss (ft)
                         0.22 * Cum Volume (acre-ft)
                                                     440.07
                                                              444.95
1010. 65
 C & E Loss (ft)
                         0.08 * Cum SA (acres)
                                                      39.75
                                                               22. 38
 56. 91 *
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
            This may indicate the need for additional cross sections.
       1.4.
CROSS SECTION OUTPUT Profile #10%
                            ,
**************************
```

#### \* E.G. Elev (ft) \* 176.54 \* Element Left OB \* Channel \* Right OB 0.36 \* Wt. n-Val. 0.100 0.045 Vel Head (ft) 0.100 \* W.S. Elev (ft) 176. 18 \* Reach Len. (ft) 900.00 900.00 550.00 \* Crit W.S. (ft) \* Flow Area (sq ft) \* 1160.24 \* 1033.15 1540. 76 \* E.G. Slope (ft/ft) \* Area (sq ft) \*0.001220 \* 1160.24 \* 1033.15 1540. 76 \* 8780.00 \* Flow (cfs) \* 1135.55 \* 5956.01 \* Q Total (cfs) 1688. 44 \* 1040.24 \* Top Width (ft) \* Top Width (ft) 448.04 90.00 502. 20 \* Vel Total (ft/s) 2.35 \* Avg. Vel. (ft/s) 0.98 5.76 1. 10 Max Chl Dpth (ft) 16.78 \* Hydr. Depth (ft) 2.59 11.48 3.07 \* Conv. Total (cfs) \* Conv. (cfs) \* 32508.3 \*170506.9 \*251351.3 48336. 1 Length Wtd. (ft) 502.25 \* 752.41 \* Wetted Per. (ft) 448.09 92.46 \* Min Ch El (ft) \* Shear (lb/sq ft) 159. 40 0.20 0.85 0.23 \* Stream Power (lb/ft s) \* Al pha 4.14 0.19 4.91 0. 26 \* Frctn Loss (ft) 0.27 \* Cum Volume (acre-ft) 571.77 286.25 695.44 \* C & E Loss (ft) 0.10 \* Cum SA (acres) 116. 71 22. 53 135.85

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

#### CROSS SECTION OUTPUT Profile #2% \* E.G. Elev (ft) \* 178.97 \* Element Channel \* Left OB \* Right OB \* Vel Head (ft) 0.35 \* Wt. n-Val. 0.100 0.045 0.100 \* W.S. Elev (ft) \* 178.61 \* Reach Len. (ft) 900.00 \* 900.00 \* Page 16

	սե	nicate Effective					
550.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	*	2646.06	*	1252. 02	*
* E.G. Slope (ft/ft)	*0.001172	* Area (sq ft)	*	2646.06	*	1252. 02	*
3193.76 * * * * * * * * * * * * * * * * * * *	*15000.00	* Flow (cfs)	*	3054.84	*	8040. 80	*
3904.36 * * Top Width (ft)	* 1721. 16	* Top Width (ft)	*	773. 91	*	90.00	*
857.25 * * Vel Total (ft/s)	* 2.12	* Avg. Vel. (ft/s)	*	1. 15	*	6. 42	*
* Max Chl Dpth (ft)	* 19. 21	* Hydr. Depth (ft)	*	3. 42	*	13. 91	*
* Conv. Total (cfs)	*438140. 1	* Conv. (cfs)	*	89229. 9	*2	234866. 4	
*114043.8 *  * Length Wtd. (ft)  857.31 *	* 729.79	* Wetted Per. (ft)	*	773. 97	*	92. 46	*
* Min Ch El (ft)	* 159.40	* Shear (Ib/sq ft)	*	0. 25	*	0. 99	*
* Al pha	* 5.09	* Stream Power (lb/ft s)	*	0. 29	*	6. 36	*
* Frctn Loss (ft)	* 0. 27	* Cum Volume (acre-ft)	*	777. 11	*	323. 60	*
* C & E Loss (ft)	* 0.09	* Cum SA (acres)	*	191. 85	*	22. 53	*
131. 20	*****	******	**	*****	* * *	*****	**
*****							

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

# 

*****						
* E.G. Elev (ft)	* 182.74	* Element	* Le	ft OB *	Channel	*
Right OB * * Vel Head (ft)	* 0.17	* Wt. n-Val.	* 0	. 100 *	0. 045	*
0.100 * * W.S. Elev (ft)	* 182.57	* Reach Len. (ft)	* 90	0.00 *	900.00	*
550.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	* 660	1. 36 *	1608. 31	*
7274.11 * * E.G. Slope (ft/ft)	*0.000598	* Area (sq ft)	* 660	1. 36 *	1608. 31	*
7274. 11 *' * 0 Total (cfs)	*25700.00	* Flow (cfs)	* 755	3. 80 *	8717. 55	*
* Top Width (ft)	* 2350.31	* Top Width (ft)	* 118	1. 03 *	90.00	*
1079. 28 * * Vel Total (ft/s)	* 1.66	* Avg. Vel. (ft/s)	*	1.14 *	5. 42	*
1.30 * * Max Chl Dpth (ft)	* 23. 17	* Hydr. Depth (ft)	*	5. 59 *	17. 87	*
6.74 * * Conv. Total (cfs) *385604.8 *	*1051057.0	* Conv. (cfs)	*308	928. 8	*356522. 9	
* Length Wtd. (ft)	* 703.32	* Wetted Per. (ft)	* 118	1. 11 *	92. 46	*
1079.52 * * Min Ch El (ft)	* 159.40	* Shear (Ib/sq ft)	*	0. 21 *	0. 65	*
* Al pha	* 3. 98	* Stream Power (lb/ft s)	*	0. 24 *	3. 52	*
0: 33 * * Frctn Loss (ft) 1750. 25 *	* 0. 20	* Cum Volume (acre-ft)	* 221	1. 78 *	414. 33	*

#### Duplicate Effective \* C & E Loss (ft) \* O. 04 \* Cum SA (acres) \* 419. 25 \* 22. 90 \*

176. 68 \* 

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

### CROSS SECTION

RI VER:	RI VER-1		
REACH:	Reach-1	RS:	314.4

ΙN	ΡU	T
----	----	---

Sta	tion	El evati on	Data	num=	23	-				
	Sta	ı Elev	Sta	El ev	Sta	Elev	Sta	El ev	Sta	El ev
* * *	****	*****	****	*****	*****	*****	*****	****	*****	****
	445	185	695	181	1075	181	1095	180	1180	178
	1530	178	1605	180	1715	181	1790	181	1820	180

* *	*****	*****	*****	*****	****	*****	*****	*****	****	*****
	445	185	695	181	1075	181	1095	180	1180	178
	1530	178	1605	180	1715	181	1790	181	1820	180
	1870	175	1945	170	1975	165	2000	159. 1	2055	165
	2120	170	2165	171	2225	170	2410	169	3175	170
	3705	175	3755	180	3855	185				

Manni	ng's r	n Values		num=	3	
	Sťa	n Val	Sta	n Val	Sta	n Val
****	****	*****	*****	*****	*****	*****
	445	1	1975	045	2055	1

Description: XS 314.4 (LETTERED CROSS-SECTION W)

Bank Sta: Left	Ri ght	Lengths:	Left	Channel	Ri ght	Coeff Contr.	Expan.
1975	2055		600	1252	600	.1	. 3
Ineffective Flow		2					

Sta L 445 3855 3855 185

#### CROSS SECTION OUTPUT Profile #1%

***********			*	*****	* * ;	*****	t <b>*</b> 1	*****	٠*
*****									
* E.G. Elev (ft) Right OB *	*	180. 15	*	Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.100 *	*	0. 03	*	Wt. n-Val.	*	0. 100	*	0. 045	*
* W.S. Elev (ft) 600.00 *	*	180. 11	*	Reach Len. (ft)	*	600.00	*	1252. 00	*
* Crit W.S. (ft) *16074.25 *	*	172. 28	*	Flow Area (sq ft)	*	1079. 93	*	1444. 90	
* E.G. Slope (ft/ft) *16074.25 *	*0.	000149	*	Area (sq ft)	*	1997. 47	*	1444. 90	
* 0 Total (cfs) *13022.30 *	*17	7700. 00	*	Flow (cfs)	*	701. 97	*	3975. 73	
* Top Width (ft) 1702.23 *	* 2	2465. 03	*	Top Width (ft)	*	682. 80	*	80. 00	*
* Vel Total (ft/s) 0.81 *	*	0. 95	*	Avg. Vel. (ft/s)	*	0. 65	*	2. 75	*
* Max Chl Dpth (ft) 9.44 *	*	21. 01	*	Hydr. Depth (ft)	*	6. 82	*	18. 06	*
* Conv. Total (cfs) *1066887.0 *	*14	450121.0		* Conv. (cfs)	7	57510. 7	*	<sup>4</sup> 325722. 4	
* Length Wtd. (ft) 1702.72 *	*	766. 87	*	Wetted Per. (ft)	*	159. 17	*	81. 00	*
-									

```
Duplicate Effective
                         159.10 * Shear (Ib/sq ft)
                                                                     0.17 *
* Min Ch El (ft)
                                                           0.06
  0.09
 Al pha
                           2.43 * Stream Power (lb/ft s) *
                                                           0.04
                                                                     0.46
  0.07
* Frctn Loss (ft)
                           0.14 * Cum Volume (acre-ft) * 1808.71
                                                                    398. 52
2028. 11
 C & E Loss (ft)
                           0.00 * Cum SA (acres)
                                                         398. 59
                                                                    20.62
152. 57
Warning: Divided flow computed for this cross-section.
       Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
CROSS SECTION OUTPUT Profile #Floodway
                                   ***********
* E.G. Elev (ft)
                      * 180.81 * Element
                                                         Left OB *
                                                                   Channel *
Right OB
                                * Wt. n-Val.
                                                          0.100
                                                                    0.045
 Vel Head (ft)
                          0.04
 0.100
* W.S. Elev (ft)
                         180. 77
                                * Reach Len. (ft)
                                                          600.00
                                                                 * 1252.00
600.00
* Crit W.S. (ft)
                         172.27
                                * Flow Area (sq ft)
                                                          342.10
                                                                 * 1497.40
*14246.69
* E.G. Slope (ft/ft)
                      *0.000156
                                * Area (sq ft)
                                                          342.10
                                                                 * 1497.40
*14246.69
* Q Total (cfs)
                      *17700.00
                                * Flow (cfs)
                                                          279.76
                                                                 * 4314.29
*13105.96
* Top Width (ft)
                                * Top Width (ft)
                      * 1385.00
                                                          25.00
                                                                    80.00
1280.00
 Vel Total (ft/s)
                          1. 10
                                * Avg. Vel. (ft/s)
                                                           0.82
                                                                     2.88
  0.92
 Max Chl Dpth (ft)
                          21.67
                                * Hydr. Depth (ft)
                                                                     18.72
                                                          13.68
 11. 13
* Conv. Total (cfs)
                                                        * 22415.7
                                                                  *345686.3
                      *1418230.0 * Conv. (cfs)
*1050128.0
                         783.84 * Wetted Per. (ft)
                                                          36.95
* Length Wtd. (ft)
                                                                    81.00
1289. 48
                               * Shear (lb/sq ft)
 Min Ch El (ft)
                         159. 10
                                                           0.09
                                                                     0.18
  0. 11
                                * Stream Power (lb/ft s) *
 Al pha
                           2. 20
                                                           0.07
                                                                     0.52
  0.10
* Frctn Loss (ft)
                           0. 16
                                * Cum Volume (acre-ft)
                                                          416.31
                                                                    414.51
903.57
* C & E Loss (ft)
                           0.00 * Cum SA (acres)
                                                          37. 22 *
                                                                    20.62
 46. 99 *
            ********************
       Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
CROSS SECTION OUTPUT Profile #10%
                      * E.G. Elev (ft)
                         176.17 * Element
                                                         Left OB *
                                                                   Channel *
Right OB '
 Vel Head (ft)
                          0.03
                                * Wt. n-Val.
                                                          0. 100
                                                                    0.045
 0.100
* W.S. Elev (ft)
                      * 176.14
                               * Reach Len. (ft)
                                                          600.00 * 1252.00 *
600.00
                                  Page 19
```

```
Duplicate Effective
* Crit W.S. (ft)
                        * 170.68 * Flow Area (sq ft)
                                                               538. 42
                                                                      * 1127.01
9393. 52
* E.G. Slope (ft/ft) 9393.52 *
                        *0.000167 * Area (sq ft)
                                                               538.42
                                                                       * 1127.01
                        * 8780.00
                                   * Flow (cfs)
                                                               285.63
                                                                       * 2778.17
* Q Total (cfs)
5716. 20
* Top Width (ft)
                        * 1857.75
                                   * Top Width (ft)
                                                               116.38
                                                                          80.00
1661<sup>.</sup> 38
                             0.79
                                   * Avg. Vel. (ft/s)
 Vel Total (ft/s)
                                                                 0.53
                                                                            2.47
  0. 61
 Max Chl Dpth (ft)
                                   * Hydr. Depth (ft)
                                                                           14.09
                            17.04
                                                                 4.63
5.65 *
* Conv. Total (cfs)
*442940.8 *
                        *680350.2
                                   * Conv. (cfs)
                                                            * 22133.0
                                                                       *215276.4
* Length Wtd. (ft)
                                   * Wetted Per. (ft)
                                                               117.01
                           832.04
                                                                          81.00
1661. 67
 Min Ch El (ft)
                           159. 10
                                   * Shear (lb/sq ft)
                                                                 0.05
                                                                            0.14
  0.06
 Al pha
                             3.45
                                   * Stream Power (lb/ft s) *
                                                                 0.03
                                                                            0.36
  0.04
                             0.17 * Cum Volume (acre-ft)
                                                               554.22
* Frctn Loss (ft)
                                                                          263.93
626. 41
 C & E Loss (ft)
                             0.00 * Cum SA (acres)
                                                               110.88
                                                                           20.77
122.19 *
______
*****
```

Note: Multiple critical depths were found at this location. The critical depth

#### CROSS SECTION OUTPUT Profile #2%

with the lowest, valid, energy was used.

	~ ~ ~				~ ~ ′				
*****									
* E.G. Elev (ft) Right OB *	*	178. 60	*	Element	*	Left OB	*	Channel	*
* Vel Head (ft)	*	0.04	*	Wt. n-Val.	*	0. 100	*	0. 045	*
0.100 * * W.S. Elev (ft) 600.00 *	*	178. 56	*	Reach Len. (ft)	*	600.00	*	1252. 00	*
* Cri t W. S. (ft) *13449.68 *	*	171. 92	*	Flow Area (sq ft)	*	849. 86	*	1320. 91	
* E.G. Slope (ft/ft) *13449.68 *	*0	. 000179	*	Area (sq ft)	*	1058. 95	*	1320. 91	
* Q Total (cfs) *10684.81 *	*1!	5000.00	*	Flow (cfs)	*	559. 11	*	3756. 08	
* Top Width (ft) 1685.61 *	* :	2301. 14	*	Top Width (ft)	*	535. 52	*	80.00	*
* Vel Total (ft/s) 0.79 *	*	0. 96	*	Avg. Vel. (ft/s)	*	0. 66	*	2. 84	*
* Max Chl Dpth (ft) 7.98 *	*	19. 46	*	Hydr. Depth (ft)	*	6. 04	*	16. 51	*
* Conv. Total (cfs) *797881.6 *	*1	120116. 0		* Conv. (cfs)	7	41751.0	7	*280482. 9	
* Length Wtd. (ft) 1686.03 *	*	787. 55	*	Wetted Per. (ft)	*	141. 37	*	81. 00	*
* Min Ch El (ft)	*	159. 10	*	Shear (Ib/sq ft)	*	0. 07	*	0. 18	*
* Al pha	*	2. 70	*	Stream Power (lb/ft s)	*	0. 04	*	0. 52	*
0.07 * * Frctn Loss (ft)	*	0. 18	*	Cum Volume (acre-ft)	*	738. 83	*	297. 02	*
* C & E Loss (ft)	*	0.00	*	Cum SA (acres)	*	178. 33	*	20. 77	*
135. 15 *									

\*\*\*\*\*

Warning: Divided flow computed for this cross-section. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

## CROSS SECTION OUTPUT Profile #0.2%

******	* * *	*****	* *	******	* *	****	<b>*</b> * :	*****	k *
*****									
* E.G. Elev (ft) Right OB *	*	182. 50	*	Element	*	Left OB	*	Channel	*
* Ŭel Head (ft)	*	0. 04	*	Wt. n-Val.	*	0. 100	*	0. 045	*
0.100 * * W.S. Elev (ft)	*	182. 46	*	Reach Len. (ft)	*	600.00	*	1252. 00	*
600.00 * * Crit W.S. (ft) *20132.15 *	*	173. 13	*	Flow Area (sq ft)	*	1503. 09	*	1633. 01	
* E.G. Slope (ft/ft) *20132.15 *	*C	0. 000163	*	Area (sq ft)	*	4606. 54	*	1633. 01	
* Q Total (cfs) *19454.75 *	*2	25700. 00	*	Flow (cfs)	*	1148. 35	*	5096. 90	
* Top Width (ft) 1749.25 *	*	3200. 67	*	Top Width (ft)	*	1371. 42	*	80.00	*
* Vel Total (ft/s)	*	1. 10	*	Avg. Vel. (ft/s)	*	0. 76	*	3. 12	*
0.97 * * Max Chl Dpth (ft) 11.51 *	*	23. 36	*	Hydr. Depth (ft)	*	8. 12	*	20. 41	*
* Conv. Total (cfs) *1524590.0 *	*2	2014004.0		* Conv. (cfs)		* 89991.4	;	*399423. 3	
* Length Wtd. (ft) 1749.80 *	*	745. 49	*	Wetted Per. (ft)	*	185. 85	*	81. 00	*
* Min Ch El (ft)	*	159. 10	*	Shear (Ib/sq ft)	*	0.08	*	0. 20	*
* Al pha	*	2. 18	*	Stream Power (lb/ft s)	*	0.06	*	0. 64	*
* Frctn Loss (ft)	*	0. 15	*	Cum Volume (acre-ft)	*	2096. 00	*	380. 85	*
1577.23 * * C & E Loss (ft)	*	0. 00	*	Cum SA (acres)	*	392. 88	*	21. 15	*
158.82 * *********************************	***	******	٠*	******	* *	*****	k * :	******	* *
*****									

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: RIVER-1 REACH: Reach-1

RS: 300

I NPUT

Description: XS 300 INSERTED CROSS-SECTION TO EVALUATE IMPACT OF PROP. SITE

(5/21/01)

Station Ele	evati on	Data	num=	18					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
******	*****	*****	*****	*****	*****	*****	*****	*****	****
0	180	100	177	300	175	1100	178	2000	178
2100	177	2350	175	2390	170	2400	165	2440	158. 7
2480	165	2500	170	2580	170	3000	169	3400	170
3600	175	3790	180	3890	185				
				Page	e 21				

```
Manning's n Values
                          num=
                     Sta
    Sta n Val
                          n Val
                                     Sta
                                            n Val
              . 1
                    2400
       0
                            . 045
                                     2480
                          Lengths: Left Channel
                                                             Coeff Contr.
Bank Sta: Left
                 Ri ght
                                                   Ri ght
                                                                             Expan.
          2400
                  2480
                                    1000
                                            1900
                                                   1900
                                                                   . 1
                                                                              . 3
                                 2
Ineffective Flow
                     num=
                          Permanent
   Sta L
           Sta R
                    El ev
       0
            1780
                     185
                               F
                               F
    3520
            3890
                     185
CROSS SECTION OUTPUT Profile #1%
                                    *****
* E.G. Elev (ft)
                         * 180.00 * Element
                                                              * Left OB *
                                                                            Channel *
Right OB *
  Vel Head (ft)
                              0.07
                                     * Wt. n-Val.
                                                                  0. 100
                                                                              0.045
  0.100
* W.S. Elev (ft)
                            179. 93
                                    * Reach Len. (ft)
                                                              * 1000.00
                                                                          * 1900.00
1900.00
* Cri t W. S. (ft)
                            172.50
                                    * Flow Area (sq ft)
                                                              * 2072.25
                                                                          * 1446.48
*10608.29
* E.G. Slope (ft/ft)
                         *0.000243
                                     * Area (sq ft)
                                                              * 7059.59
                                                                          * 1446.48
*11544.76
* Q Total (cfs)
                         *17700.00
                                     * Flow (cfs)
                                                              * 1070.62
                                                                          * 5084.28
*11545. 10
                                                              * 2397.70
* Top Width (ft)
                         * 3785.08
                                     * Top Width (ft)
                                                                              80.00
1307. 38
* Vel Total (ft/s)
                              1. 25
                                     * Avg. Vel. (ft/s)
                                                                   0.52
                                                                               3.51
   1.09
* Max Chl Dpth (ft)
                             21.23
                                     * Hydr. Depth (ft)
                                                                   3.34
                                                                              18.08
  10. 20
* Conv. Total (cfs)
                         *1136166.0
                                     * Conv. (cfs)
                                                               * 68723.0
                                                                           *326361.0
*741082.0
* Length Wtd. (ft)
                         * 1678.56 * Wetted Per. (ft)
                                                                 621.50
                                                                              80.99
1040. 66
 Min Ch El (ft)
0.15 *
                            158. 70
                                    * Shear (lb/sq ft)
                                                                   0.05
                                                                               0.27
 Al pha
                                    * Stream Power (lb/ft s) *
                              2.76
                                                                   0.03
                                                                               0.95
  0. 17
                                                              * 1746.33
* Frctn Loss (ft)
                              0.61
                                     * Cum Volume (acre-ft)
                                                                             356.97
1837. 90
* C & E Loss (ft)
                              0.01 * Cum SA (acres)
                                                              * 377.38
                                                                              18. 32
 131.85 *
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.
         Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
CROSS SECTION OUTPUT Profile #Floodway
* E.G. Elev (ft)
                            180.65 * Element
                                                                            Channel *
                                                                 Left OB *
Right OB *
  Vel Head (ft)
                              0.09
                                     * Wt. n-Val.
                                                                  0.100
                                                                              0.045
  0.100
* W.S. Elev (ft)
                            180. 56
                                     * Reach Len. (ft)
                                                              * 1000.00 * 1900.00
                                       Page 22
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	սե	nicate Lifective					
1900.00 *							
* Crit W.S. (ft)	* 172.53	* Flow Area (sq ft)	*	1016. 35	*	1496. 87	*
9323. 17 *	*0.0000/0	* A ( £4)	4	101/ 25	4	140/ 07	*
* E.G. Slope (ft/ft)	^0.000269	* Area (sq ft)	^	1016. 35	^	1496. 87	^
9323.17 * * Q Total (cfs)	*17700.00	* Flow (cfs)	*	828. 38	*	5667. 08	
*11204.55 *	17700.00	FIOW (CIS)		020. 30		3007.00	
* Top Width (ft)	* 1080.00	* Top Width (ft)	*	160.00	*	80.00	*
840.00 *	1000.00	rop wrath (1t)		100.00		00.00	
* Vel Total (ft/s)	* 1.50	* Avg. Vel. (ft/s)	*	0. 82	*	3. 79	*
1. 20 *		g (, .)		0.02		0	
* Max Chl Dpth (ft)	* 21.86	* Hydr. Depth (ft)	*	6. 35	*	18. 71	*
11. 10 * ' ` ` ´							
* Conv. Total (cfs)	*1079191.0	* Conv. (cfs)	•	* 50507.1	•	*345528.6	
*683155.1 *							
* Length Wtd. (ft)	* 1679.70	<pre>* Wetted Per. (ft)</pre>	*	166. 18	*	80. 99	*
851. 38 *	* 158 70	* Channe (1 h /an £4)	*	0.10	4	0 21	*
* Min Ch El (ft)	* 158. 70	<pre>* Shear (lb/sq ft)</pre>	^	0. 10	*	0. 31	^
0. 18 * * Al pha	* 2.47	* Stream Power (lb/ft s)	*	0. 08	*	1. 18	*
0. 22 *	2.47	Stream Fower (1b/1t s)		0.06		1. 10	
* Frctn Loss (ft)	* 0.64	* Cum Volume (acre-ft)	*	406. 95	*	371. 48	*
741. 25 *	0.01	cam vorame (acre re)		100. 70		071.10	
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	*	35. 95	*	18. 32	*
32. 39 *		(0.01.00)					
*****	*****	*******	* * :	*****	* * :	*****	* *
*****							

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT PR		******	**	*****	**:	*****	**
*****							
* E.G. Elev (ft)	* 176.00	* Element	*	Left OB	*	Channel	*
Right OB *  * Vel Head (ft)	* 0.06	* Wt. n-Val.	*	0. 100	*	0. 045	*
0.100 * * W.S. Elev (ft) 1900.00 *	* 175. 93	* Reach Len. (ft)	*	1000.00	*	1900. 00	*
* Crit W.S. (ft) 6450.18 *	* 170.83	* Flow Area (sq ft)	*	276. 03	*	1126. 63	*
* E.G. Slope (ft/ft) 6621.34 *	*0.000260	* Area (sq ft)	*	435. 57	*	1126. 63	*
* Q Total (cfs)	* 8780.00	* Flow (cfs)	*	92. 09	*	3471. 13	*
* Top Width (ft)	* 1744.11	* Top Width (ft)	*	508. 66	*	80.00	*
* Vel Total (ft/s)	* 1.12	* Avg. Vel. (ft/s)	*	0. 33	*	3. 08	*
* Max Chl Dpth (ft)	* 17. 23	* Hydr. Depth (ft)	*	1. 66	*	14. 08	*
6. 20 * * Conv. Total (cfs) *323402. 5 *	*544295.6	* Conv. (cfs)	*	5708.8	* 2	215184. 3	
* Length Wtd. (ft)	* 1752. 31	* Wetted Per. (ft)	*	168. 10	*	80. 99	*
* Min Ch El (ft)	* 158.70	* Shear (Ib/sq ft)	*	0. 03	*	0. 23	*
0. 10 *  * Al pha 0. 08 *	* 3.31	* Stream Power (lb/ft s)	*	0. 01	*	0. 70	*
0.00							

```
516. 12
* C & E Loss (ft)
                          0.01 * Cum SA (acres)
                                                     * 106.57 * 18.47 *
102. 79 *
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
       Multiple critical depths were found at this location. The critical depth
Note:
with the lowest, valid, energy was used.
CROSS SECTION OUTPUT Profile #2%
                    *****
* E.G. Elev (ft)
                     * 178.42 * Element
                                                     * Left OB *
                                                                 Channel *
Right OB *
 Vel Head (ft)
                        0.08 * Wt. n-Val.
                                                        0.100 *
                                                                  0.045
0.100 *
* W.S. Elev (ft)
                     * 178.33
                               * Reach Len. (ft)
                                                     * 1000.00
                                                               * 1900.00
1900.00
* Crit W.S. (ft)
                     * 172.09
                               * Flow Area (sq ft)
                                                     * 1082.31
                                                               * 1318.75
8947.74 *
* E.G. Slope (ft/ft)
                     *0.000303
                               * Area (sq ft)
                                                     * 3273.72
                                                               * 1318.75
9505.73
* Q Total (cfs)
                     *15000.00
                               * Flow (cfs)
                                                       405. 52
                                                               * 4873.52
9720. 97
* Top Width (ft) 1246.71 *
                     * 3671.19
                               * Top Width (ft)
                                                     * 2344.48
                                                                  80.00
* Vel Total (ft/s)
1.09 *
                               * Avg. Vel. (ft/s)
                     * 1.32
                                                         0.37
                                                                   3.70
* Max Chl Dpth (ft)
                               * Hydr. Depth (ft)
                     * 19.63
                                                         1.75
                                                                  16.48
  8.60
* Conv. Total (cfs)
                     *861049.9
                               * Conv. (cfs)
                                                     * 23278.2
                                                               *279756.0
*558015.7
                     * 1733.39 * Wetted Per. (ft)
* Length Wtd. (ft)
                                                       621.50
                                                                  80. 99
1040. 66
 Min Ch El (ft)
                     * 158.70
                               * Shear (lb/sq ft)
                                                         0.03
                                                                   0.31
  0.16
* Al pha
                          2.98
                               * Stream Power (lb/ft s) *
                                                         0.01
                                                                   1.14
  0. 18
* Frctn Loss (ft)
                          0.84
                               * Cum Volume (acre-ft)
                                                        708.99
                                                                 259.09
                                                                  18.47 *
* C & E Loss (ft)
                          0.02 * Cum SA (acres)
                                                        158.49 *
**************************
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
       1.4. This may indicate the need for additional cross sections.
       Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
CROSS SECTION OUTPUT Profile #0.2%
                              ***********
* E.G. Elev (ft)
                    * 182.35 * Element
                                                     * Left OB *
                                                                 Channel *
Right OB *
                    * 0.08 * Wt. n-Val.
 Vel Head (ft)
                                                        0. 100 *
                                                                  0.045 *
 0.100
```

	Dup	licate Effective		
* W.S. Elev (ft) 1900.00 *		* Reach Len. (ft)	* 1000.00	* 1900.00 *
* Crit W.S. (ft)	* 173.52	* Flow Area (sq ft)	* 3525.41	* 1633. 99
* E. G. Slope (ft/ft)	*0.000254	* Area (sq ft)	*12684.66	* 1633.99
*14666.81 * * Q Total (cfs)	*25700.00	* Flow (cfs)	* 2655.35	* 6372.80
*16671.86 * * Top Width (ft)	* 3835.50	* Top Width (ft)	* 2400.00	* 80.00 *
1355.50 * * Vel Total (ft/s)	* 1.41	* Avg. Vel. (ft/s)	* 0.75	* 3.90 *
1.28 * ` ´ * Max Chl Dpth (ft)	* 23.57	* Hydr. Depth (ft)	* 5.69	* 20.42 *
12.54 * * Conv. Total (cfs)		* Conv. (cfs)		*399874.8
*1046112.0 *	1012002.0	conv. (crs)	100013. 3	377074.0
* Length Wtd. (ft) 1040.66 *	* 1626. 30	* Wetted Per. (ft)	* 621.50	* 80.99 *
* Min Ch El (ft) 0.20 *	* 158.70	* Shear (Ib/sq ft)	* 0.09	* 0.32 *
* Al pha	* 2.45	* Stream Power (lb/ft s)	* 0.07	* 1.25 *
* Frctn Loss (ft)	* 0.60	* Cum Volume (acre-ft)	* 1976. 91	* 333.90 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 366.90	* 18.85 *
137.44 * * * * * * * * * * * * * * * * * *	*****	******	*****	*****
****				

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

#### CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 285

I NPUT

Description: XS 285

INSERTED CROSS-SECTION TO EVALUATE IMPACT OF PROP. SITE

(5/21/01)

Station E	levation	Data	num=	16					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
****	*****	*****	*****	*****	*****	*****	*****	*****	****
0	180	100	177	300	175	1100	178	2000	178
2100	177	2300	177	2860	170	2990	165	3060	164
3095	158. 2	3130	164	3140	165	3250	170	3290	172
3370	188								

Manni ng	g's n	Val ues		num=	3	
•				n Val		
*****	****	****	****	****	*****	****
	Ω	1	3060	045	3130	1

Bank Sta: Left Ri ght Lengths: Left Channel Ri ght Coeff Contr. Expan. . 3 3060 3130 220 320 320 . 1 Ineffective Flow 2 num=

Page 25

		Dupiicat	.c Liicctive
_ Sta R	El ev	Permanent	
2040	185	F	
3370	185	F	
ECTION OUTPU	Γ Pro	file #1%	
	2040 3370	2040 185 3370 185	_ Sta R Elev Permanent D 2040 185 F

******	*****	******	*****	*****
*****				
* E.G. Elev (ft) Right OB *	* 179.38	* Element	* Left OB	* Channel *
* Vel Head (ft) 0.100 *	* 0. 20	* Wt. n-Val.	* 0.100	* 0.045 *
* W.S. Elev (ft) 320.00 *	* 179.17	* Reach Len. (ft)	* 220.00	* 320.00 *
* Crit W.S. (ft) 1886.55 *	* 171.61	* Flow Area (sq ft)	* 6269.73	* 1265. 20 *
* E.G. Slope (ft/ft) 1886.55 *	*0.000597	* Area (sq ft)	*10234.54	* 1265. 20 *
* Q Total (cfs) 3091.71 *	*17700.00	* Flow (cfs)	* 7639.50	* 6968.79 *
* Top Width (ft) 195.87 *	* 3298.35	* Top Width (ft)	* 3032.48	* 70.00 *
* Vel Total (ft/s)	* 1.88	* Avg. Vel. (ft/s)	* 1. 22	* 5.51 *
1.64 * * Max Chl Dpth (ft) 9.63 *	* 20. 97	* Hydr. Depth (ft)	* 6.15	* 18.07 *
* Conv. Total (cfs) *126503.1 *	*724227. 9	* Conv. (cfs)	*312584.1	*285140.8
* Length Wtd. (ft) 196.79 *	* 286.70	* Wetted Per. (ft)	* 1020.15	* 70.95 *
* Min Ch El (ft)	* 158. 20	* Shear (Ib/sq ft)	* 0.23	* 0.66 *
* Al pha	* 3.70	* Stream Power (lb/ft s)	* 0. 28	* 3.66 *
* Frctn Loss (ft)	* 0.16	* Cum Volume (acre-ft)	* 1547.82	* 297.83 *
1544.97 * * C & E Loss (ft) 99.06 *	* 0.00	* Cum SA (acres)	* 315.05	* 15.05 *
, ,	*****	*****	*****	*****
*****				

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

## CROSS SECTION OUTPUT Profile #Floodway

************************											
*****											
* E.G. Elev (ft) Right OB *	* 179.99	* Element	*	Left OB	*	Channel	*				
* Vel Head (ft) 0.100 *	* 0. 23	* Wt. n-Val.	*	0. 100	*	0.045	*				
* W.S. Elev (ft) 320.00 *	* 179. 76	* Reach Len. (ft)	*	220. 00	*	320. 00	*				
* Crit W.S. (ft) 1401.87 *	* 171.52	* Flow Area (sq ft)	*	4543. 69	*	1306. 55	*				
* E.G. Slope (ft/ft) 1401.87 *	*0. 000585	* Area (sq ft)	*	4543. 69	*	1306. 55	*				
* 0 Total (cfs) 2588.15 *	*17700.00	* Flow (cfs)	*	7836. 79	*	7275. 06	*				
* Top Width (ft) 110.00 *	* 605.00	* Top Width (ft)	*	425. 00	*	70. 00	*				
* Vel Total (ft/s) 1.85 *	* 2.44	* Avg. Vel. (ft/s)	*	1. 72	*	5. 57	*				
* Max Chl Dpth (ft)	* 21.56	* Hydr. Depth (ft) Page 26	*	10. 69	*	18. 66	*				

* Conv. Total (cfs)	* 7	731935.6	*	Conv. (cfs)	*3	24069. 2	*3	00840. 4	
*107026.0 * * Length Wtd. (ft)	*	286. 14	*	Wetted Per. (ft)	*	432. 07	*	70. 95	*
120.37 * * Min Ch El (ft)	*	158. 20	*	Shear (Ib/sq ft)	*	0. 38	*	0. 67	*
0. 43 * * Al pha	*	2. 44	*	Stream Power (lb/ft s)	*	0. 66	*	3. 74	*
0.78 * * Frctn Loss (ft)	*	0. 17	*	Cum Volume (acre-ft)	*	343. 13	*	310. 34	*
507.34 *	*	0. 00	*	Cum SA (acres)	*	29. 23	*	15. 05	*
11. 68 *	***	*****		, ,	***	*****	***	*****	* *
*****									

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

### CROSS SECTION OUTPUT Profile #10%

12 74 \*

****									
* E.G. Elev (ft) Right OB *	*	175. 33	*	El ement	*	Left OB	*	Channel	*
* Vel Head (ft)	*	0. 18	*	Wt. n-Val.	*	0. 100	*	0. 045	*
* W.S. Elev (ft)	*	175. 14	*	Reach Len. (ft)	*	220.00	*	320.00	*
320.00 * * Crit W.S. (ft)	*	168. 58	*	Flow Area (sq ft)	*	2796. 05	*	982. 95	*
1137.41 * * E.G. Slope (ft/ft)	*0	. 000594	*	Area (sq ft)	*	2799. 75	*	982. 95	*
1137.41 * * * 0 Total (cfs)	*	8780. 00	*	Flow (cfs)	*	2789. 45	*	4562. 72	*
1427.83 * * Top Width (ft)	*	909. 17	*	Top Width (ft)	*	663. 46	*	70. 00	*
175.71 * * Vel Total (ft/s)	*	1. 79	*	Avg. Vel. (ft/s)	*	1. 00	*	4. 64	*
1.26 * * Max Chl Dpth (ft)	*	16. 94		Hydr. Depth (ft)	*	4. 57	*	14. 04	*
6.47 * '	*3	60259. 5		Conv. (cfs)	* *	114456. 2	* 1	87216. 7	*
58586.6 * * Length Wtd. (ft)	*	298. 99		Wetted Per. (ft)	*		*	70. 95	*
176. Ž4    *				, ,					
* Min Ch El (ft)	*	158. 20	*	Shear (Ib/sq ft)	*	0. 17	*	0. 51	*
* Al pha	*	3. 69	*	Stream Power (lb/ft s)	*	0. 17	*	2. 38	*
* Frctn Loss (ft)	*	0. 16	*	Cum Volume (acre-ft)	*	510. 37	*	185. 54	*
346.91 * * C & E Loss (ft)	*	0.00	*	Cum SA (acres)	*	93. 12	*	15. 20	*
73. 76  * ******************	***	*****	**	******	* * :	*****	* * *	*****	* *

Warning: Divided flow computed for this cross-section. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

\*\*\*\*\*

\*\*\*\*\*

\* Left OB \* Channel \*

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D' 11 0D #		սաբ		cate Effective					
Right OB * * Vel Head (ft) 0.100 *	*	0. 31	*	Wt. n-Val.	*	0. 100	*	0. 045	*
* W. S. Elev (ft) 320.00 *	*	177. 24	*	Reach Len. (ft)	*	220. 00	*	320.00	*
* Cri t W. S. (ft) 1516.86 *	*	170. 44	*	Flow Area (sq ft)	*	4302. 33	*	1129. 73	*
* E.G. Slope (ft/ft) 1516.86 *	*0	. 000907	*	Area (sq ft)	*	5219. 52	*	1129. 73	*
* Q Total (cfs) 2741.24 *	*1	5000.00	*	Flow (cfs)	*	5148. 08	*	7110. 68	*
* Top Width (ft) 186.20 *	*	2045. 14	*	Top Width (ft)	*	1788. 95	*	70. 00	*
* Vel Total (ft/s) 1.81 *	*	2. 16	*	Avg. Vel. (ft/s)	*	1. 20	*	6. 29	*
* Max Chl Dpth (ft) 8.15 *	*	19. 04	*	Hydr. Depth (ft)	*	4. 37	*	16. 14	*
* Conv. Total (cfs) 91017.4 *	*4	98044. 8	*	Conv. (cfs)	* *	170931. 6	*2	236095.8	*
* Length Wtd. (ft) 186.93 *	*	294. 40	*	Wetted Per. (ft)	*	984. 05	*	70. 95	*
* Min Ch El (ft) 0.46 *	*	158. 20	*	Shear (Ib/sq ft)	*	0. 25	*	0. 90	*
* Al pha 0. 83 *	*	4. 26	*	Stream Power (Ib/ft s)	*	0. 30	*	5. 68	*
* Frctn Loss (ft) 584.87 *	*	0. 24	*	Cum Volume (acre-ft)	*	611. 50	*	205. 69	*
* C & E Loss (ft) 83.70 *	*	0. 01	*	Cum SA (acres)	*	111. 05	*	15. 20	*
O3. /U *******************	***	****	* * :	*****	* * :	****	**	*****	**
*****									

Warning: Divided flow computed for this cross-section. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT												
*********  * E. G. El ev (ft)	* 181.74 * Element	* Left OB * Channel *										
Right OB *  * Vel Head (ft)  0.100 *	* 0.20 * Wt. n-Val.	* 0.100 * 0.045 *										
* W.S. Elev (ft) 320.00 *	* 181.53 * Reach Len. (ft)	* 220.00 * 320.00 *										
* Cri t W.S. (ft) 2362.66 *	* 173.59 * Flow Area (sq ft)	* 8676.58 * 1430.37 *										
* E.G. Slope (ft/ft)	*0.000583 * Area (sq ft)	*17443.75 * 1430.37 *										
2362.66 * Total (cfs)	*25700.00 * Flow (cfs)	*12975.82 * 8450.44 *										
* Top Width (ft)	* 3337.67 * Top Width (ft)	* 3060.00 * 70.00 *										
207.67 * * Vel Total (ft/s)	* 2.06 * Avg. Vel. (ft/s)	* 1.50 * 5.91 *										
1.81 * * Max Chl Dpth (ft)	* 23.33 * Hydr. Depth (ft)	* 8.51 * 20.43 *										
* Conv. Total (cfs)	*1063977.0 * Conv. (cfs)	*537197.5 *349847.0										
*176932.4 * * Length Wtd. (ft)	* 279.33 * Wetted Per. (ft)	* 1020.15 * 70.95 *										
208.83 * * Min Ch El (ft) 0.41 *	* 158.20 * Shear (Ib/sq ft)	* 0.31 * 0.73 *										
<b>.</b>	D 00											

```
Duplicate Effective
* Al pha
                              3.10 * Stream Power (lb/ft s) *
                                                                  0.46
                                                                             4.34
  0.75
 Frctn Loss (ft)
                              0.16 * Cum Volume (acre-ft)
                                                             * 1631.09
                                                                           267.07
 966. 18
* C & E Loss (ft)
                              0.00 * Cum SA (acres)
                                                                304.23
 103. 35
*******************
Warning: The cross-section end points had to be extended vertically for the computed
water surface.
         Multiple critical depths were found at this location. The critical depth
Note:
with the lowest, valid, energy was used.
CROSS SECTION
RIVER: RIVER-1
REACH: Reach-1
                          RS: 280.55
I NPUT
Description: XS 280.55 (LETTERED CROSS-SECTION V) INSERTED NEW GR TO ACCOUNT
             FOR EXTRA FILL PLACED
                                    16
Station Elevation Data
                         num=
                                            El ev
                                                     Sta
                                                            El ev
     Sta
           El ev
                     Sta
                           El ev
                                     Sta
                                                                     Sta
                                                                            El ev
    1515
             185
                    1785
                             180
                                    2130
                                             177
                                                    2630
                                                             177
                                                                    2745
                                                                             180
                                    4725
    3545
             182
                    4305
                                             172
                                                    4925
                                                             170
                                                                    4945
                             176
                                                                             165
    5000
             158
                    5045
                                                    5250
                             165
                                    5150
                                             166
                                                             170
                                                                    5270
                                                                             175
    5290
             185
Manning's n Values
                          num=
                     Sta
    Sťa n Val S†
                       a n Val
                                     Sta
                                           n Val
                    4945
                            . 045
    1515
             . 1
                                    5045
                          Lengths: Left Channel
Bank Sta: Left
                 Ri ght
                                                  Ri ght
                                                            Coeff Contr.
                                                                           Expan.
          4945
                  5045
                                           1140
                                                   1140
                                                                    . 1
                                                                             . 3
                                   1140
                                2
Ineffective Flow
                    num=
           Sta R
                          Permanent
   Sta L
                    El ev
    1515
            3545
                     185
                               F
            5290
    5280
                     185
CROSS SECTION OUTPUT Profile #1%
                                 .
.
* E.G. Elev (ft)
Right OB *
                            179. 21
                                    * Element
                                                                Left OB *
                                                                           Channel *
 Vel Head (ft)
                                    * Wt. n-Val.
                              0.22
                                                                 0. 100
                                                                            0.045
 0.100
* W.S. Elev (ft)
                            178.99
                                    * Reach Len. (ft)
                                                             * 1140.00
                                                                        * 1140.00
1140.00
* Crit W.S. (ft)
                           170. 94
                                    * Flow Area (sq ft)
                                                             * 4493.34
                                                                        * 1749.35
2661. 98
* E.G. Slope (ft/ft)
                         *0.000534
                                    * Area (sq ft)
                                                             * 5794.74
                                                                        * 1749.35
2661. 98
* Q Total (cfs)
                                                             * 4147.01
                                                                        * 8937.45
                         *17700.00
                                    * Flow (cfs)
4615. 54
                                    * Top Width (ft)
 Top Width (ft)
                         * 2157.83
                                                             * 1824.84
                                                                           100.00
 232. 99
* Vel Total (ft/s)
                             1. 99
                                    * Avg. Vel. (ft/s)
                                                                  0.92
                                                                             5. 11
   1.73
```

```
Duplicate Effective
* Max Chl Dpth (ft)
                          20.99 * Hydr. Depth (ft)
                                                           4.41 * 17.49 *
 11.43
* Conv. Total (cfs)
                      *765887.3 * Conv. (cfs)
                                                       *179442.9
                                                                 *386727.8
*199716.6
                      * 1140.00 * Wetted Per. (ft)
                                                       * 1019.83
                                                                   100. 98
 Length Wtd. (ft)
234. 63
* Min Ch El (ft)
                         158.00 * Shear (lb/sq ft)
                                                           0.15
                                                                      0.58
  0.38
                           3.58
 Al pha
                                * Stream Power (lb/ft s) *
                                                           0.14
                                                                      2.95
  0.66
* Frctn Loss (ft)
                           1.07 * Cum Volume (acre-ft)
                                                       * 1507.34
                                                                    286.76
1528. 27
 C & E Loss (ft)
                           0.05 * Cum SA (acres)
                                                          302.78
                                                                     14.43
*******************************
*****
```

Warning: Divided flow computed for this cross-section.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

\*\*\*\*\*\*\*\*\*\*\*\*

#### CROSS SECTION OUTPUT Profile #Floodway

*****							
* E.G. Elev (ft)	* 179.82	* Element	*	Left OB	*	Channel	*
Right OB *  * Vel Head (ft)  0.100 *	* 0. 27	* Wt. n-Val.	*	0. 100	*	0. 045	*
* W.S. Elev (ft)	* 179.55	* Reach Len. (ft)	*	1140. 00	*	1140.00	*
1140.00 * * Crit W.S. (ft) 1924.33 *	* 170.67	* Flow Area (sq ft)	*	2912. 95	*	1804. 52	*
* E.G. Slope (ft/ft)	*0.000580	* Area (sq ft)	*	2912. 95	*	1804. 52	*
1924. 33 * * Q Total (cfs) 3738. 77 *	*17700.00	* Flow (cfs)	*	4150. 15	*	9811. 08	*
* Top Width (ft) 140.00 *	* 600.00	* Top Width (ft)	*	360.00	*	100.00	*
* Vel Total (ft/s) 1.94 *	* 2.66	* Avg. Vel. (ft/s)	*	1. 42	*	5. 44	*
* Max Chl Dpth (ft) 13.75 *	* 21.55	* Hydr. Depth (ft)	*	8. 09	*	18. 05	*
* Conv. Total (cfs)	*734750.3	* Conv. (cfs)	*	172278. 4	* 4	407270. 8	
*155201.2 *  * Length Wtd. (ft)  152.18 *	* 1140.00	* Wetted Per. (ft)	*	366. 84	*	100. 98	*
* Min Ch El (ft)	* 158.00	* Shear (Ib/sq ft)	*	0. 29	*	0. 65	*
* Al pha	* 2.49	* Stream Power (lb/ft s)	*	0. 41	*	3. 52	*
0.89 * * Frctn Loss (ft)	* 1.03	* Cum Volume (acre-ft)	*	324. 30	*	298. 92	*
495.13 * * C & E Loss (ft) 10.76 *	* 0.03	* Cum SA (acres)	*	27. 25	*	14. 43	*
10.70							

\*\*\*\*\*

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth Note: with the lowest, valid, energy was used.

#### CROSS SECTION OUTPUT Profile #10%

```
*******************
* E.G. Elev (ft)
Right OB *
                      * 175.16 * Element
                                                          Left OB *
                                                                    Channel *
 Vel Head (ft)
                                * Wt. n-Val.
                           0. 18
                                                           0.100 *
                                                                      0.045
 0. 100
* W.S. Elev (ft)
                      * 174.98 * Reach Len. (ft)
                                                        * 1140.00 * 1140.00
1140.00
 Crit W.S. (ft)
                      * 167.87
                                 * Flow Area (sq ft)
                                                        * 1412.60
                                                                  * 1348.15
1743. 33
* E.G. Slope (ft/ft)
                      *0.000502
                                 * Area (sq ft)
                                                        * 1412.60
                                                                  * 1348.15
1743. 33
* 0 Total (cfs)
                       * 8780.00
                                 * Flow (cfs)
                                                           899.75
                                                                  * 5612.16
2268. 09
 Top Width (ft)
                      * 857.98
                                 * Top Width (ft)
                                                          533.05
                                                                    100.00
224. 93
* Vel Total (ft/s)
1.30 *
                      * 1.95
                                 * Avg. Vel. (ft/s)
                                                            0.64
                                                                       4.16
 Max Chl Dpth (ft)
                                 * Hydr. Depth (ft)
                      * 16.98
                                                            2.65
                                                                      13.48
  7. 75
* Conv. Total (cfs)
                      *391926.9
                                 * Conv. (cfs)
                                                        * 40163.6
                                                                  *250518.8
*101244.5
 Length Wtd. (ft)
                      * 1140.00 * Wetted Per. (ft)
                                                          533.69
                                                                  * 100.98
225. 62
* Min Ch El (ft)
                       * 158.00 * Shear (lb/sq ft)
                                                            0.08
                                                                       0.42
  0.24
 Al pha
                           3.04
                                 * Stream Power (lb/ft s) *
                                                            0.05
                                                                       1.74
  0.31
* Frctn Loss (ft)
                           1.06
                                 * Cum Volume (acre-ft)
                                                           499.74
                                                                     176. 97
336.33 *
 C & E Loss (ft)
                           0.04 * Cum SA (acres)
                                                            90.10 *
                                                                      14. 58
*************************
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

#### CROSS SECTION OUTPUT Profile #2%

```
* E.G. Elev (ft)
                  * 177.30 * Element
                                                       Left OB *
                                                                 Channel *
Right OB *
                 * 0.28 * Wt. n-Val.
 Vel Head (ft)
                                                        0.100 *
                                                                  0.045 *
                                 Page 31
```

\*\*\*\*\*\*\*\*\*\*\*\*\*\*

```
0.100
* W.S. Elev (ft)
                         * 177.02 * Reach Len. (ft)
                                                               * 1140.00 * 1140.00
1140.00
 Crit W.S. (ft)
                             169.97 * Flow Area (sq ft)
                                                               * 2730.53
                                                                           * 1552.24
2206.63
E.G. Slope (ft/ft)
                          *0.000720
                                     * Area (sq ft)
                                                               * 2741.76
                                                                           * 1552.24
2206. 63
* Q Total (cfs)
                          *15000.00
                                     * Flow (cfs)
                                                               * 2530.75
                                                                           * 8500.34
3968. 91
* Top Width (ft)
                          * 1601.98
                                     * Top Width (ft)
                                                               * 1272.93
                                                                              100.00
 229. 04
                               2.31
                                     * Avg. Vel. (ft/s)
                                                                    0.93
* Vel Total (ft/s)
                                                                                5.48
   1.80
 Max Chl Dpth (ft)
                                     * Hydr. Depth (ft)
                                                                    3.55
                                                                               15.52
                              19. 02
   9.63
* Conv. Total (cfs)
                          *559153.8
                                     * Conv. (cfs)
                                                               * 94338.5
                                                                           *316866.4
*147948.8
* Length Wtd. (ft)
                                     * Wetted Per. (ft)
                          * 1140.00
                                                                  770. 15
                                                                              100. 98
 230. 22
 Min Ch El (ft)
                             158.00
                                    * Shear (lb/sq ft)
                                                                    0.16
                                                                                0.69
  0.43
 Al pha
                               3.37
                                     * Stream Power (lb/ft s) *
                                                                    0.15
                                                                                3.78
  0.77
* Frctn Loss (ft)
                               1. 97
                                     * Cum Volume (acre-ft)
                                                                  591.40
                                                                              195.84
 571. 19
 C & E Loss (ft)
                               0.19 * Cum SA (acres)
                                                                  103.32
                                                                               14.58
  82. 18
*****
```

Warning: Divided flow computed for this cross-section.

Warning: The velocity head has changed by more than  $0.5~\rm{ft}$  ( $0.15~\rm{m}$ ). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

This may indicate the need for additional cross sections. 1.4.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.
Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

#### CROSS SECTION OUTPUT Profile #0.2%

******	*****	*****	*******
*****			
* E.G. Elev (ft) Right OB *	* 181.57	* Element	* Left OB * Channel *
* Vel Head (ft) 0.100 *	* 0. 24	* Wt. n-Val.	* 0.100 * 0.045 *
* W.S. Elev (ft) 1140.00 *	* 181.33	* Reach Len. (ft)	* 1140.00 * 1140.00 *
* Crit W.S. (ft) 3209.80 *	* 172.95	* Flow Area (sq ft)	* 7219.01 * 1982.89 *
* E.G. Slope (ft/ft) 3211.56 *	*0.000565	* Area (sq ft)	*11085.66 * 1982.89 *
* Q Total (cfs) 6442.81 *	*25700.00	* Flow (cfs)	* 7931.08 *11326.11 *
* Top Width (ft) 237.66 *	* 3215.98	* Top Width (ft)	* 2878.33 * 100.00 *
* Vel Total (ft/s) 2.01 *	* 2.07	* Avg. Vel. (ft/s)	* 1.10 * 5.71 *
* Max Chl Dpth (ft)	* 23.33	* Hydr. Depth (ft) Page 32	* 5.49 * 19.83 *

	וטעו	orreate Errective					
13.66 * * Copy Total (ofc)	*1001241 0	* Conv. (cfc)		*333704.3	*	174552 2	
* Conv. Total (cfs) *271084.6 *	*1081341.0	* Conv. (cfs)		333704.3		470552. 2	
* Length Wtd. (ft)	* 1140.00	* Wetted Per. (ft)	*	1315. 66	*	100. 98	*
236.88 * * Min Ch El (f+)	* 150 00	* Shoor (lh/cg ft)	*	0. 19	*	0. 69	*
* Min Ch El (ft) 0.48 *	* 158.00	* Shear (Ib/sq ft)		0. 19		0. 69	
* Al pha	* 3.68	* Stream Power (lb/ft s)	*	0. 21	*	3. 96	*
0. 96 *							
* Frctn Loss (ft)	* 1. 17	<pre>* Cum Volume (acre-ft)</pre>	*	1559. 04	*	254. 53	*
945. 70 * * C * F Look (ft)	* 0.08	* Cum SA (2252)	*	289. 24	*	14 05	*
* C & E Loss (ft) 101 71 *	* 0.08	* Cum SA (acres)		289. 24		14. 95	
101.71	*****	******	* *	*****	***	*****	<b>*</b> *
*****							

Warning: Divided flow computed for this cross-section.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may

indicate the need for additional cross

sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1 RS: 270

I NPUT

Description: XS 270

THIS CROSS SECTION IS THE INSERTED CROSS SECTION TO

REPRESENT
FILL PLACED SINCE THE EFFECTIVE FIS WAS
COMPLETED

THERE IS AN ENCR. IN THE NAT. RUN TO REFLECT EFFECTIVE FLOW

Station El	evati or	n Data	num=	28					
Sta	Elev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
*****	*****	*****		****			*****	****	****
0	178	120	175	680	175	760	177	1840	177
1900	180	1950	180	1970		2180	182.8	2180	202.8
2240	202.8	2240	182.8	2325		2325	202. 8	2385	202.8
2550	181. 4	2550	201. 4	2620		2710	180. 4	2710	200. 4
2770	200. 4	3150	180. 9	3200		3240	170	3550	170
3602.5	157. 7	3655	170	3710		3240	170	3330	170
3002. 3	137.7	3033	170	3710	200				
Manni ng's	n Value	76	num=	3					
Sta		Sta	n Val	Sta	n Val				
******									
0	1	2550	045	2455	1				
0	. 1	3550	. 045	3655	. 1				
Davida Cha	L . CL	D!l. t	1	L . C	01	Di ala	0	0 1	F
Bank Sta:			Lengths:			Ri ght	Соетт	Contr.	Expan.
	3550	3655		520	520	520		. 1	. 3
Ineffectiv		num=	2						
Sta L	Sta R	El ev	Permanen	t					
0	3150	180	F						

Duplicate Effective F 3710 3710 180

3/10	3/10	180	Г							
	ON OUTPUT	Profi	le #1% ******	**:	*****	* * ;	*****	k * *	:*****	**
********* * E.G. Elev Riaht OB *	(ft)	*	178. 10	*	Element	*	Left OB	*	Channel	*
* Vel Head 0.100 *	(ft)	*	0. 74	*	Wt. n-Val.	*	0. 100	*	0. 045	*
* W. S. El ev 520.00 *	(ft)	*	177. 35	*	Reach Len. (ft)	*	520. 00	*	520.00	*
* Cri t W.S. 41.28 *	(ft)	*	173. 39	*	Flow Area (sq ft)	*	2387. 03	*	1417. 65	*
* E. G. SI op	e (ft/ft)	*0	. 002039	*	Area (sq ft)	*	4303.30	*	1417. 65	*
* 0 Total ( 58.58 *	cfs)	*1	7700. 00	*	Flow (cfs)	*	5868. 46	*1	1772. 96	*
* Top Width 11.23 *	(ft)	*	2276. 72	*	Top Width (ft)	*	2160. 49	*	105.00	*
* Vel Total 1.42 *	(ft/s)	*	4. 60	*	Avg. Vel. (ft/s)	*	2. 46	*	8. 30	*
* Max Chl D 3.68 *	pth (ft)	*	19. 65	*	Hydr. Depth (ft)	*	7. 03	*	13. 50	*
* Conv. Tot 1297.3 *	al (cfs)	*3	92003. 7	*	Conv. (cfs)	* *	129969. 4	*2	260737.0	*
* Length Wt 13.42 *	d. (ft)	*	520.00	*	Wetted Per. (ft)	*	340. 31	*	107.84	*
* Min Ch El 0.39 *	(ft)	*	157. 70	*	Shear (Ib/sq ft)	*	0.89	*	1. 67	*
* Al pha 0. 56 *		*	2. 26	*	Stream Power (lb/ft s)	*	2. 19	*	13. 89	*
* Frctn Los 1492.89 *	s (ft)	*	0. 48	*	Cum Volume (acre-ft)	*	1375. 21	*	245. 31	*
* C & E Los 94. 29 *	s (ft)	*	0. 17	*	Cum SA (acres)	*	250. 63	*	11. 74	*
		*****	*****	**:	* * * * * * * * * * * * * * * * * * * *	**;	*****	***	*****	**
Warning: Divided flow computed for this cross-section. Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections. Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than										
13 1633 tild 1.	4. This n	nay ind	li cate th	e i	need for additional cros	SS	sections.			

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

## CROSS SECTION OUTPUT Profile #Floodway

	^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^		^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	^ ^
*****					
* E.G. Elev (ft)	* 178.76	* Element	* Left OB	* Channel	*
Right OB * * Vel Head (ft)					
* Vel Head (ft)	* 0. 61	* Wt. n-Val.	* 0. 100	* 0.045	*
0. 100 *					
* W.S. Elev (ft)	* 178.14	* Reach Len. (ft)	* 520.00	* 520.00	*
520.00 *					
* Crit W.S. (ft)	* 173. 39	<pre>* Flow Area (sq ft)</pre>	* 2655.67	* 1500.63	*
50. 64 *					
* E.G. Slope (ft/ft)	*0.001595	* Area (sq ft)	* 2655.67	* 1500.63	*
50. 64 *					
* Q Total (cfs)	*17700.00	* Flow (cfs)	* 6184.50	*11447.48	*
68.02 * ` ´		• ,			

```
Duplicate Effective
* Top Width (ft)
                          457.44 * Top Width (ft)
                                                             340.00 *
                                                                       105.00
 12.44
 Vel Total (ft/s)
1.34 *
                            4.21 * Avg. Vel. (ft/s)
                                                               2.33
                                                                         7.63
 Max Chl Dpth (ft)
                                  * Hydr. Depth (ft)
                           20.44
                                                               7.81
                                                                        14.29
  4.07
Conv. Total (cfs) 1703.3 *
                       *443238.8
                                  * Conv. (cfs)
                                                          *154870.6
                                                                     *286664.9
 Length Wtd. (ft)
                          520.00
                                  * Wetted Per. (ft)
                                                             341.56
                                                                       107.84
 14. 87 *
 Min Ch El (ft)
                                  * Shear (Ib/sq ft)
                                                                         1.39
                          157. 70
                                                               0.77
  0.34
 Al pha
                            2.23
                                  * Stream Power (lb/ft s) *
                                                               1.80
                                                                        10.57
  0.46
 Frctn Loss (ft)
                            0.39
                                  * Cum Volume (acre-ft)
                                                             251.43
                                                                       255.67
469. 28
                            0.14 * Cum SA (acres)
 C & E Loss (ft)
                                                              18.09
                                                                        11.74
  8.76 *
*****************************
*****
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

## CROSS SECTION OUTPUT Profile #10%

********	*****	*******	* *	*****	* * :	*****	* *
*****							
* E.G. Elev (ft) Right OB *	* 174.06	* Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.100 *	* 0.62	* Wt. n-Val.	*	0. 100	*	0.045	*
* W. S. Elev (ft) 520.00 *	* 173.44	* Reach Len. (ft)	*	520. 00	*	520. 00	*
* Crit W.S. (ft) 9.05 *	* 170.74	* Flow Area (sq ft)	*	1090. 72	*	1007. 16	*
* E.G. Slope (ft/ft) 9.05 *	*0.002276	* Area (sq ft)	*	1090. 72	*	1007. 16	*
* Q Total (cfs) 8.18 *	* 8780.00	* Flow (cfs)	*	1735. 98	*	7035. 84	*
* Top Width (ft)	* 434.03	* Top Width (ft)	*	323. 77	*	105. 00	*
5. 26 * * Vel Total (ft/s) 0. 90 *	* 4. 17	* Avg. Vel. (ft/s)	*	1. 59	*	6. 99	*
* Max Chl Dpth (ft) 1.72 *	* 15.74	* Hydr. Depth (ft)	*	3. 37	*	9. 59	*
* Conv. Total (cfs) 171.5 *	*184048.4	* Conv. (cfs)	*	36390. 1	* '	147486. 8	*
* Length Wtd. (ft) 6.28 *	* 520.00	* Wetted Per. (ft)	*	324. 19	*	107. 84	*
* Min Ch El (ft) 0.20 *	* 157. 70	* Shear (Ib/sq ft)	*	0. 48	*	1. 33	*
* Al pha	* 2. 28	* Stream Power (lb/ft s)	*	0. 76	*	9. 27	*
* Frctn Loss (ft)	* 0.40	* Cum Volume (acre-ft)	*	466. 98	*	146. 15	*
* C & E Loss (ft)	* 0.16	* Cum SA (acres)	*	78. 88	*	11. 89	*
69. 28 * *********************************	*****	*****	* *	*****	**:	*****	**
****							

Page 35

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may

indicate the need for additional cross

sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

#### CROSS SECTION OUTPUT Profile #2%

CRUSS SECTION OUTPUT PROTITE #2%												
****												
* E.G. Elev (ft) Right OB *	* 175.14	* Element	*	Left OB	*	Channel	*					
* Vel Head (ft) 0.100 *	* 2. 22	* Wt. n-Val.	*	0. 100	*	0. 045	*					
* W. S. Elev (ft) 520.00 *	* 172. 91	* Reach Len. (ft)	*	520.00	*	520.00	*					
* Crit W.S. (ft) 6.49 *	* 172.76	* Flow Area (sq ft)	*	920. 56	*	951. 80	*					
* E.G. Slope (ft/ft) 6.49 *	*0.008585	* Area (sq ft)	*	920. 56	*	951. 80	*					
* Q Total (cfs) 10.20 *	*15000.00	* Flow (cfs)	*	2552. 96	*1	2436. 85	*					
* Top Width (ft)	* 431.11	* Top Width (ft)	*	321. 66	*	105.00	*					
4.45 * * Vel Total (ft/s) 1.57 *	* 7. 98	* Avg. Vel. (ft/s)	*	2. 77	*	13. 07	*					
* Max Chl Dpth (ft)	* 15. 21	* Hydr. Depth (ft)	*	2. 86	*	9. 06	*					
1.46 * * Conv. Total (cfs)	*161886.1	* Conv. (cfs)	*	27552. 5	*1	34223. 5	*					
110.1 * * Length Wtd. (ft) 5.32 *	* 520.00	* Wetted Per. (ft)	*	322. 02	*	107. 84	*					
* Min Ch El (ft)	* 157.70	* Shear (Ib/sq ft)	*	1. 53	*	4. 73	*					
* Al pha	* 2. 24	* Stream Power (Ib/ft s)	*	4. 25	*	61. 81	*					
* Frctn Loss (ft)	* 1.43	* Cum Volume (acre-ft)	*	543. 48	*	163. 07	*					
542.23 * * C & E Loss (ft)	* 0.57	* Cum SA (acres)	*	82. 45	*	11. 89	*					
79. 12 * *********************************	****	******	**	*****	***	*****	**					
*****												

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

#### CROSS SECTION OUTPUT Profile #0.2%

\* E.G. Elev (ft) \* 180.33 \* Element Left OB \* Channel \* Right OB \* Vel Head (ft) 1.00 \* Wt. n-Val. 0.100 \* 0.045 \* Page 36

\*\*\*\*\*\*\*\*\*\*\*

0 100 *	սկ	officate Effective			
* W.S. Elev (ft)	* 179.32	* Reach Len. (ft)	* 520.00	* 520.00	*
520.00 * * Crit W.S. (ft)	* 174.95	* Flow Area (sq ft)	* 3064.33	* 1624.78	*
66.41 * * E.G. Slope (ft/ft)	*0. 002408	* Area (sq ft)	* 8654.60	* 1624.78	*
66.41 * * Q Total (cfs)	*25700.00	* Flow (cfs)	* 9519.98	*16060.03	*
* Top Width (ft)	* 2353.02	* Top Width (ft)	* 2233.78	* 105.00	*
14.25 * * Vel Total (ft/s)	* 5.40	* Avg. Vel. (ft/s)	* 3.11	* 9.88	*
1.81 * * Max Chl Dpth (ft)	* 21.62	* Hydr. Depth (ft)	* 8.82	* 15.47	*
* Conv. Total (cfs)	*523717. 2	* Conv. (cfs)	*193999. 1	*327272.8	*
* Length Wtd. (ft)	* 520.00	* Wetted Per. (ft)	* 348.44	* 107.84	*
17.03 * * Min Ch El (ft)	* 157.70	* Shear (Ib/sq ft)	* 1.32	* 2.26	*
* Al pha	* 2. 21	* Stream Power (lb/ft s)	* 4.11	* 22.39	*
1.06 * * Frctn Loss (ft)	* 0.63	* Cum Volume (acre-ft)	* 1300.73	* 207.32	*
902.81 * * C & E Loss (ft)	* 0. 22	* Cum SA (acres)	* 222.34	* 12.27	*
98. 42 * **********************************	*****	*******	*****	*****	**
~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~					

Warning: Divided flow computed for this cross-section. Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections. Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

#### CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1 RS: 264

I NPUT

AT

Description: XS 264 (LETTERED CROSS-SECTION U) THIS SECTION IS THE FIRST

SECTION U/S OF THE DIVIDED FLOW INSERTED

AN INEFFECTIVE FLOW

ENCROACHMENT AT 500' FROM LEFT CHANNEL BANK FOR THE

NATURAL RUN.

INEFFECTIVE FLOW AREA DUE TO FILL PLACED IN FLOODPLAIN

CROSS-SECTION 270

		011000	0_00	, -						
S	tation Ele	evati on	Data	num=	16					
	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	Elev
*	*****	*****	*****	*****	*****	*****	*****	****	*****	****
	840	185	1140	180	1490	177	3330	177	3530	176
	3650	175	3820	170	4410	165	4680	164	4900	165
					Page	e 37				
					-					

```
Duplicate Effective
                   4950
                                                   5000 157.5
    4925
            166
                            165
                                   4970
                                            160
                                                                   5025
                                                                            160
    5070
            185
Manning's n Values
                         num=
    Sťa n Val
                    Sta
                                    Sta
                          n Val
                                          n Val
     840
             . 1
                   4970
                           . 045
                                   5025
                                            . 1
                                                           Coeff Contr.
Bank Sta: Left
                Ri ght
                         Lengths: Left Channel
                                                 Ri ght
                                                                          Expan.
                 5025
          4970
                                  1338
                                          1338
                                                  1000
                                                           . 1
                                                                           . 3
Ineffective Flow
                               2
                    num=
   Sta L
           Sta R
                   El ev
                         Permanent
     840
            4470
                    180
                              F
                              F
    5070
           5070
                    180
CROSS SECTION OUTPUT Profile #1%
* E.G. Elev (ft)
Right OB *
                        * 177.44 * Element
                                                            * Left OB * Channel *
                             0.17 * Wt. n-Val.
                                                                0. 100
                                                                           0.045
 Vel Head (ft)
  0.100
* W.S. Elev (ft)
                           177. 27
                                   * Reach Len. (ft)
                                                            * 1338.00
                                                                       * 1338.00
1000.00
                           168.83
* Crit W.S. (ft)
                                   * Flow Area (sq ft)
                                                            * 6398.53
                                                                       * 1018.62
 268.44 *
* E.G. Slope (ft/ft)
                        *0.000529
                                   * Area (sq ft)
                                                            *14585. 26
                                                                       * 1018.62
 268.44
* Q Total (cfs)
                        *17700.00
                                   * Flow (cfs)
                                                            *11948.86
                                                                       * 5398.25
 352.89
* Top Width (ft)
                        * 3597.63
                                   * Top Width (ft)
                                                            * 3511.55
                                                                           55.00
  31.09 *
* Vel Total (ft/s)
                             2.30
                                   * Avg. Vel. (ft/s)
                                                                 1.87
                                                                            5.30
  1. 31
 Max Chl Dpth (ft)
                        * 19.77
                                   * Hydr. Depth (ft)
                                                                12.80
                                                                           18.52
   8. 64
* Conv. Total (cfs)
                                   * Conv. (cfs)
                                                            *519718.4
                                                                       *234798.3
                        *769865.8
15349. 1
 Length Wtd. (ft) 35.56 *
                        * 1332.01
                                   * Wetted Per. (ft)
                                                               500.66
                                                                           55. 23
 Min Ch El (ft)
                           157.50
                                   * Shear (lb/sq ft)
                                                                 0.42
                                                                            0.61
  0. 25
                                   * Stream Power (lb/ft s) *
 Al pha
                             2.07
                                                                 0.79
                                                                            3.23
  0.33
* Frctn Loss (ft)
                             0.58
                                   * Cum Volume (acre-ft)
                                                            * 1262.47
                                                                          230.77
1491. 04
                             0.02 * Cum SA (acres)
 C & E Loss (ft)
                                                               216. 78 *
                                                                           10.79
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
         1.4. This may indicate the need for additional cross sections.
        Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
* E.G. Elev (ft)
                       * 178.22 * Element
                                                               Left OB *
                                                                          Channel *
Right OB *
 Vel Head (ft)
                             0. 15
                                   * Wt. n-Val.
                                                                0.100 *
                                                                           0.045 *
```

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	սե	officate Effective			
0.100 * * W.S. Elev (ft)	* 178.08	* Reach Len. (ft)	* 1338.00	* 1338.00	*
1000.00 * * Crit W.S. (ft)	* 168.83	* Flow Area (sq ft)	* 6801.05	* 1062.90	*
288.11 * * E.G. Slope (ft/ft)	*0.000439	* Area (sq ft)	* 7722.58	* 1062.90	*
288. 11 * * * * * * * * * * * * * * * * * *	*17700.00	* Flow (cfs)	*12051. 30	* 5279.58	*
* Top Width (ft)	* 652. 91	* Top Width (ft)	* 570.00	* 55.00	*
27.91 * * Vel Total (ft/s)	* 2. 17	* Avg. Vel. (ft/s)	* 1.77	* 4.97	*
* Max Chl Dpth (ft)	* 20.58	* Hydr. Depth (ft)	* 13.60	* 19.33	*
* Conv. Total (cfs)	*845019.8	* Conv. (cfs)	*575344.1	*252053.8	*
* Length Wtd. (ft)	* 1331.74	* Wetted Per. (ft)	* 500.66	* 55.23	*
* Min Ch El (ft)	* 157.50	* Shear (Ib/sq ft)	* 0.37	* 0.53	*
* Al pha	* 2.02	* Stream Power (lb/ft s)	* 0.66	* 2.62	*
* Frctn Loss (ft)	* 0.48	* Cum Volume (acre-ft)	* 189.49	* 240.37	*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 12.66	* 10.79	*
0. 32	*****	******	*****	****	**
*****					

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth

with the lowest, valid, energy was used.

		*******	*****	*****	**
********* * E. G. El ev (ft)	* 173.51	* Element	* Left OB	8 * Channel	*
Right OB *  * Vel Head (ft)	* 0.10	* Wt. n-Val.	* 0.100	* 0.045	*
0.100 * * W.S. Elev (ft) 1000.00 *	* 173.41	* Reach Len. (ft)	* 1338.00	* 1338.00	*
* Crit W.S. (ft) 161.86 *	* 167.07	* Flow Area (sq ft)	* 4468.58	* 806.33	*
* E.G. Slope (ft/ft) 161.86 *	*0.000376	* Area (sq ft)	* 8664.80	* 806.33	*
* Q Total (cfs) 151.68 *	* 8780.00	* Flow (cfs)	* 5542.75	* 3085.56	*
* Top Width (ft) 24.14 *	* 1345.10	* Top Width (ft)	* 1265.96	* 55.00	*
* Vel Total (ft/s) 0.94 *	* 1.61	* Avg. Vel. (ft/s)	* 1. 24	* 3.83	*
* Max Chl Dpth (ft) 6.71 *	* 15. 91	* Hydr. Depth (ft)	* 8.94	* 14.66	*
* Conv. Total (cfs) 7818.7 *	*452569.7	* Conv. (cfs)	*285704. 1	*159046.9	*
* Length Wtd. (ft) 27.61 *	* 1333.66	* Wetted Per. (ft)	* 500.66	* 55. 23	*
* Min Ch El (ft) 0.14 *	* 157.50	* Shear (Ib/sq ft)	* 0. 21	* 0.34	*

```
Duplicate Effective
* Al pha
                                   * Stream Power (lb/ft s) *
                                                                  0. 26 *
                                                                            1. 31
  0. 13
 Frctn Loss (ft)
                              0.56 * Cum Volume (acre-ft)
                                                                408.75
                                                                            135. 33
 312. 38
 C & E Loss (ft)
                              0.03 * Cum SA (acres)
                                                                 69.39
                                                                             10.94
  69. 10
*************************
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
               This may indicate the need for additional cross sections.
         Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
CROSS SECTION OUTPUT Profile #2%
                                 ,
*************************
* E.G. Elev (ft)
                         * 173.13 * Element
                                                              * Left OB *
                                                                           Channel *
Right OB
                              0.33
                                    * Wt. n-Val.
                                                                 0.100
                                                                             0.045
 Vel Head (ft)
  0.100
* W.S. Elev (ft)
                            172.81
                                    * Reach Len. (ft)
                                                              * 1338.00
                                                                         * 1338.00
1000.00
* Crit W.S. (ft)
                            168.36
                                    * Flow Area (sq ft)
                                                              * 4166.11
                                                                            773.05
 147. 58
* E.G. Slope (ft/ft)
                         *0.001343
                                    * Area (sq ft)
                                                              * 7905.18
                                                                            773.05
 147. 58
* Q Total (cfs)
                         *15000.00
                                    * Flow (cfs)
                                                              * 9314.32
                                                                         * 5432.38
 253. 30
                                                              * 1245.39
 Top Width (ft)
                         * 1323.44
                                    * Top Width (ft)
                                                                             55.00
  23. 05
 Vel Total (ft/s)
                              2.95
                                    * Avg. Vel. (ft/s)
                                                                  2.24
                                                                              7.03
  1.72
                             15.31
 Max Chl Dpth (ft)
                                    * Hydr. Depth (ft)
                                                                  8.33
                                                                             14.06
   6.40
                                                             *254205.1
                                                                         *148259.9
 Conv. Total (cfs)
                         *409378.1
                                    * Conv. (cfs)
 6913. 1
 Length Wtd. (ft) 26.37 *
                                    * Wetted Per. (ft)
                                                                500.66
                         * 1333. 10
                                                                             55. 23
                                    * Shear (lb/sq ft)
 Min Ch El (ft)
                            157. 50
                                                                  0.70
                                                                              1. 17
  0.47
                                    * Stream Power (lb/ft s) *
 Al pha
                              2.42
                                                                  1.56
                                                                              8.24
  0.81
* Frctn Loss (ft)
                              1.55
                                    * Cum Volume (acre-ft)
                                                                 490.80
                                                                            152. 78
 541. 31
 C & E Loss (ft)
                              0.01 * Cum SA (acres)
                                                                 73. 10 *
                                                                             10.94
  78.96
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
               This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and
previous cross section.
                        This may indicate
         the need for additional cross sections.
Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
```

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CROSS SECTION OUTPUT Profile #0.2%

	Dur	olicate Effective			
* E.G. Elev (ft) Right OB *		* Element	* Left OB	3 * Channel *	:
* Vel Head (ft) 0.100 *	* 0. 26	* Wt. n-Val.	* 0.100	* 0.045 *	:
* W. S. Elev (ft) 1000.00 *	* 179. 22	* Reach Len. (ft)	* 1338.00	* 1338.00 *	
* Crit W.S. (ft) 332.38 *	* 170.02	* Flow Area (sq ft)	* 7372.05	* 1125.71 *	:
* E.G. Slope (ft/ft) 332.38 *	*0.000723	* Area (sq ft)	*21643.46	* 1125.71 *	:
* 0 Total (cfs) 548.71 *	*25700.00	* Flow (cfs)	*17693.83	* 7457.46 *	:
* Top Width (ft) 34.59 *	* 3828. 29	* Top Width (ft)	* 3738.70	* 55.00 *	:
* Vel Total (ft/s) 1.65 *	* 2. 91	* Avg. Vel. (ft/s)	* 2.40	* 6.62 *	:
* Max Chl Dpth (ft) 9.61 *	* 21.72	* Hydr. Depth (ft)	* 14.74	* 20.47 *	:
* Conv. Total (cfs) 20407.9 *	*955854.6	* Conv. (cfs)	*658082.9	*277363.7 *	;
* Length Wtd. (ft) 39.57 *	* 1328.59	* Wetted Per. (ft)	* 500.66	* 55. 23 *	:
* Min Ch El (ft) 0.38 *	* 157.50	* Shear (Ib/sq ft)	* 0.66	* 0.92 *	:
* Al pha	* 1. 98	* Stream Power (lb/ft s)	* 1.59	* 6.09 *	:
* Frctn Loss (ft)	* 0. 24	* Cum Volume (acre-ft)	* 1119.89	* 190.91 *	;
* C & E Loss (ft)	* 0.08	* Cum SA (acres)	* 186.69	* 11.31 *	:
70. 13	*****	*****	*****	*****	ç
****					

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RI VER: RI VER-1 REACH: Reach-1 RS: 250. 12

I NPUT

Description: XS 250.12
THIS SECTION IS FROM EFFECTIVE MODEL
THE X2 MIN HIGH
CORD WAS REVISED TO MATCH EXISTING CONDITIONS

	CORI	) WAS REV	ISED TO M	AICH EXI	STING C	CONDITIONS			
Station E	l evati o	n Data	num=	18					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
*****	****	*****	*****	*****	*****	*****	****	******	****
0	180	450	175	2850	174	3270	174	3450	172
3600	170	3650	160	3675	157	3695	160	3730	168
3920	168	3980	165. 3	4100	168	4225	170	4300	172
4430	168	4700	180	5050	194				
Manni ng' s	n Value	es	num=	3					
Sta		Sta	n Val	Sta	n Val				
*****									
0	. 07	3650	. 045	3695	. 07				
Ü	. 07	0000	. 0.10	0070	. 0 /				
Bank Sta:	Left	Ri ght	Lengths:	Left Ch	nannel	Ri ght	Coeff	Contr.	Expan
barne ota.	3650	3695	Long this.	482	482	482	00011	. 3	Expan. . 5
Ineffecti		num=	2	402	402	402		. 3	. 3
THETTECT	ve i i ow	maiii–	2	Pag	e 41				
				ray	C 41				

Sta L

0

Sta R

El ev

Permanent

F

```
3650
                   177.9
    3695
                                F
            5050
                   177.9
Blocked Obstructions
                          num=
                                     1
                    El ev
   Sta L
           Sta R
    3750
            5050
                      180
CROSS SECTION OUTPUT Profile #1%
* E.G. Elev (ft)
Right OB *
* Vel Head (ft)
                             176.85
                                     * Element
                                                                  Left OB *
                                                                              Channel *
                               0.11
                                     * Wt. n-Val.
                                                                               0.045
* W.S. Elev (ft)
                             176.73
                                     * Reach Len. (ft)
                                                                     0.50
                                                                                0.50
   0.50 *
* Crit W.S. (ft)
                             162. 72
                                     * Flow Area (sq ft)
                                                                              820.40
* E.G. Slope (ft/ft)
                                                                 8754.66
                          *0.000142
                                                                              820.40
                                     * Area (sq ft)
 620. 22
* Q Total (cfs)
                          * 2220.00
                                     * Flow (cfs)
                                                                             2220.00
* Top Width (ft)
                                     * Top Width (ft)
                          * 3455.81
                                                                 3355.81
                                                                               45.00
  55.00 *
* Vel Total (ft/s)
                               2.71
                                      * Avg. Vel. (ft/s)
                                                                                2.71
* Max Chl Dpth (ft)
                              19. 73
                                     * Hydr. Depth (ft)
                                                                               18. 23
                                     * Conv. (cfs)
                                                                           *186539.8
* Conv. Total (cfs)
                          *186539.8
* Length Wtd. (ft)
                                     * Wetted Per. (ft)
                                                                               45.40
                               0.50
                                     * Shear (lb/sq ft)
* Min Ch El (ft)
                             157.00
                                                                                0.16
                               1.00
                                     * Stream Power (lb/ft s) *
* Al pha
                                                                                0.43
                                     * Cum Volume (acre-ft)
* Frctn Loss (ft)
                                                                  904.01
                                                                              202.53
1480.84
 C & E Loss (ft)
                                     * Cum SA (acres)
                                                                   111.31
                                                                                9. 25
  93.05
                   *******************
*****
         Multiple critical depths were found at this location.
                                                                  The critical depth
with the lowest, valid, water surface was used.
CROSS SECTION OUTPUT Profile #Floodway
* E.G. Elev (ft)
                             177.73
                                     * Element
                                                                  Left OB *
                                                                              Channel *
Right OB *
* Vel Head (ft)
                               0.10
                                     * Wt. n-Val.
                                                                               0.045
* W.S. Elev (ft)
                             177.62
                                     * Reach Len. (ft)
                                                                     0.50
                                                                                0.50
   0.50
* Crit W.S. (ft)
                             162.72
                                     * Flow Area (sq ft)
                                                                              860.61
* E.G. Slope (ft/ft)
                          *0.000121
                                     * Area (sq ft)
                                                                 1064.72
                                                                              860.61
 669.36 *
* 0 Total (cfs)
                          * 2220.00
                                     * Flow (cfs)
                                                                             2220.00
                                     * Top Width (ft)
* Top Width (ft)
                             210.00
                                                                  110.00
                                                                               45.00
                                        Page 42
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55.00 *		Бар		cate Effective					
* Vel Total (ft/s)	*	2. 58	*	Avg. Vel. (ft/s)	*		*	2. 58	*
* Max Chl Dpth (ft)	* 2	20. 62	*	Hydr. Depth (ft)	*		*	19. 12	*
* Conv. Total (cfs)	*2020	024. 9	*	Conv. (cfs)	*		*20	2024. 9	*
* Length Wtd. (ft)	*	0.50	*	Wetted Per. (ft)	*		*	45. 40	*
* Min Ch El (ft)	* 1!	57. 00	*	Shear (Ib/sq ft)	*		*	0. 14	*
* Al pha *	*	1. 00	*	Stream Power (Ib/ft s)	*		*	0. 37	*
* Frctn Loss (ft) 456.27 *	*		*	Cum Volume (acre-ft)	*	54. 53	*	210. 83	*
* C & E Loss (ft) 7.57 *	*		*	Cum SA (acres)	*	2. 22	*	9. 25	*
******	****	****	**	*****	***	*****	***	*****	**
*****									

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT								
* E.G. Elev (ft)	* 172. 92	* Element	*	Left OB	*	Channel	*	
Right OB * * Vel Head (ft)	* 0.36	* Wt. n-Val.	*		*	0. 045	*	
* W.S. Elev (ft)	* 172.56	* Reach Len. (ft)	*	0. 50	*	0. 50	*	
0.50 * * Crit W.S. (ft)	* 163.70	* Flow Area (sq ft)	*		*	632. 68	*	
* E.G. Slope (ft/ft)	*0.000625	* Area (sq ft)	*	625. 99	*	632. 68	*	
390.77 * * Q Total (cfs)	* 3025.00	* Flow (cfs)	*		*	3025.00	*	
* Top Width (ft)	* 350.35	* Top Width (ft)	*	250. 35	*	45. 00	*	
55.00 * * Vel Total (ft/s) *	* 4.78	* Avg. Vel. (ft/s)	*		*	4. 78	*	
* Max Chl Dpth (ft)	* 15.56	* Hydr. Depth (ft)	*		*	14. 06	*	
* Conv. Total (cfs)	*120975. 2	* Conv. (cfs)	*		*1	20975. 2	*	
* Length Wtd. (ft)	* 0.50	* Wetted Per. (ft)	*		*	45. 40	*	
* Min Ch El (ft)	* 157.00	* Shear (Ib/sq ft)	*		*	0. 54	*	
* Al pha	* 1.00	* Stream Power (lb/ft s)	*		*	2. 60	*	
* Frctn Loss (ft) 306.03 *	*	* Cum Volume (acre-ft)	*	266. 06	*	113. 23	*	
* C & E Loss (ft) 68.19 *	*	* Cum SA (acres)	*	46. 11	*	9. 40	*	
<b>+++++++</b>								

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #2%

## 

*****	^^^^^		^ ^ ^		^ ^ ′		^ ^
* E.G. Elev (ft) Right OB *	* 171.57	* Element	*	Left OB	*	Channel	*
* Vel Head (ft)	* 0. 29	* Wt. n-Val.	*		*	0.045	*
* W.S. Elev (ft) 0.50 *	* 171. 28	* Reach Len. (ft)	*	0. 50	*	0. 50	*
* Crit W.S. (ft)	* 163.06	* Flow Area (sq ft)	*		*	575. 11	*
* E.G. Slope (ft/ft) 320.41 *	*0.000578	* Area (sq ft)	*	375. 46	*	575. 11	*
* 0 Total (cfs)	* 2480.00	* Flow (cfs)	*		*	2480.00	*
* Top Width (ft) 55.00 *	* 246.01	* Top Width (ft)	*	146. 01	*	45.00	*
* Vel Total (ft/s)	* 4.31	* Avg. Vel. (ft/s)	*		*	4. 31	*
* Max Chl Dpth (ft)	* 14. 28	* Hydr. Depth (ft)	*		*	12. 78	*
* Conv. Total (cfs)	*103190.4	* Conv. (cfs)	*		* ^	103190. 4	*
* Length Wtd. (ft)	* 0.50	* Wetted Per. (ft)	*		*	45. 40	*
* Min Ch El (ft)	* 157.00	* Shear (Ib/sq ft)	*		*	0. 46	*
* Al pha	* 1.00	* Stream Power (Ib/ft s)	*		*	1. 97	*
* Frctn Loss (ft) 535.94 *	*	* Cum Volume (acre-ft)	*	363. 62	*	132. 07	*
* C & E Loss (ft) 78.06 *	*	* Cum SA (acres)	*	51. 73	*	9. 40	*
*****			^ ^ ^		^ ^ /		^ ^

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

	rofile #0.2% **************	******
********* * E.G. Elev (ft) Right OB *	* 179.16 * Element	* Left OB * Channel *
* Vel Head (ft) 0.070 *	* 0.00 * Wt. n-Val.	* 0.070 * 0.045 *
* W. S. Elev (ft) 0.50 *	* 179.16 * Reach Len. (ft)	* 0.50 * 0.50 *
* Crit W.S. (ft) 753.66 *	* 166.00 * Flow Area (sq ft)	*17161.38 * 929.58 *
* E.G. Slope (ft/ft) 753.66 *	*0.000015 * Area (sq ft)	*17161.38 * 929.58 *
* Q Total (cfs) 312.94 *	* 5250.00 * Flow (cfs)	* 4041.44 * 895.62 *
* Top Width (ft)	* 3674.16 * Top Width (ft)	* 3574.16 * 45.00 *
55.00 * * Vel Total (ft/s)	* 0.28 * Avg. Vel. (ft/s)	* 0.24 * 0.96 *
0.42 * * Max Chl Dpth (ft)	* 22.16 * Hydr. Depth (ft)	* 4.80 * 20.66 *
13.70 * * Conv. Total (cfs)	*1346607.0 * Conv. (cfs)	*1036615.0 *229723.5
* 80268.2 * * Length Wtd. (ft) 67.06 *	* 0.50 * Wetted Per. (ft)	* 3575. 20 * 45. 40 *
07.00		

```
Duplicate Effective
* Min Ch El (ft)
                            157.00 * Shear (lb/sq ft)
                                                                 0.00 *
                                                                             0.02
  0.01
 Al pha
                              2.72 * Stream Power (lb/ft s) *
                                                                  0.00
                                                                             0.02
  0.00
* Frctn Loss (ft)
                                    * Cum Volume (acre-ft)
                                                                523.92
                                                                           159.34
 887. 96
 C & E Loss (ft)
                                    * Cum SA (acres)
                                                                 74.38
                                                                             9. 78
  97. 10 *
Multiple critical depths were found at this location. The critical depth
with the lowest, valid, water surface was used.
BRI DGE
RI VER: RI VER-1
REACH: Reach-1
                          RS: 250.06
I NPUT
Description: Bridge #2
Distance from Upstream XS =
                                 . 5
Deck/Roadway Width =
                                481
Weir Coefficient
                                2.7
Upstream Deck/Roadway Coordinates
    num=
    Sta Hi Cord Lo Cord
                            Sta Hi Cord Lo Cord
                                                    Sta Hi Cord Lo Cord
                            450
       0
             180
                      0
                                     180
                                                    2850
                                                           178.6
           177.9
                                   177. 9
                                           169.5
                                                           177.9
    3660
                      0
                            3660
                                                    3690
                                                                   169.5
    3690
           177.9
                      0
                            5050
                                   177.9
                                               0
Upstream Bridge Cross Section Data
Station Elevation Data
                                    18
                         num=
                    Sta
                           El ev
                                            El ev
                                                    Sta
    Sta
           El ev
                                    Sta
                                                           El ev
                                                                     Sta
                                                                            El ev
      0
                     450
                             175
                                    2850
                                                    3270
                                                             174
                                                                    3450
                                                                             172
             180
                                             174
    3600
                                                                    3730
             170
                    3650
                             160
                                    3675
                                             157
                                                    3695
                                                             160
                                                                             168
                    3980
                                                    4225
    3920
             168
                           165.3
                                    4100
                                             168
                                                             170
                                                                    4300
                                                                             172
    4430
             168
                    4700
                             180
                                    5050
                                             194
Manning's n Values
                          num=
                     Sta
                                           n Val
     Sta
          n Val
                          n Val
                                     Sta
            . 07
      0
                    3650
                           . 045
                                    3695
                                            . 07
                          Coeff Contr.
Bank Sta: Left
                 Ri ght
                                         Expan.
                  3695
          3650
                                   . 3
                                           . 5
Ineffective Flow
                                2
                    num=
           Sta R
                    El ev
                          Permanent
   Sta L
      0
            3650
                   177.9
                              F
                              F
    3695
            5050
                   177.9
Blocked Obstructions
                                   1
                         num=
                   El ev
  Sta L Sta R
    3750
           5050
                     180
Downstream
           Deck/Roadway Coordinates
    num=
              8
                            Sta Hi Cord Lo Cord
    Sta Hi Cord Lo Cord
                                                    Sta Hi Cord Lo Cord
```

```
Duplicate Effective
                                 450
                                                            2850
        0
              180
                          0
                                          180
                                                      0
                                                                    178.6
                                        177. 9
    3940
                                3940
                                                  169.5
                                                                    177.9
                                                                             169.5
            177.9
                          0
                                                            3970
             177.9
    3970
                          0
                                5050
                                        177.9
                                                      0
Downstream Bridge Cross Section Data
Station Elevation Data
                              num=
                                                   El ev
                                                                     El ev
                                                                                Sta
     Sta
             El ev
                        Sta
                                El ev
                                          Sta
                                                             Sta
                                                                                        El ev
        0
               180
                        550
                                 175
                                          1900
                                                    174
                                                            3100
                                                                      175
                                                                               3500
                                                                                         174
    3570
               172
                       3880
                                 170
                                          3930
                                                            3955
                                                                               3980
                                                    160
                                                                   156.84
                                                                                         160
    4035
               172
                       4350
                                 174
                                          5030
                                                  175.2
Manning's n Values
                              num=
Sta n Val
                        Sta
                              n Val
                                           Sta
                                                 n Val
        0
               . 07
                       3930
                                . 045
                                         3980
                                                   . 07
Bank Sta: Left
                   Ri ght
                              Coeff Contr.
                                               Expan.
                     3980
           3930
                                                  . 5
Ineffective Flow
                                     2
                        num=
            Sta R
                       El ev
                              Permanent
   Sta L
        0
              3930
                        177
                                   F
                                   F
    3980
              5030
                        177
Upstream Embankment side slope
                                                            0 horiz. to 1.0 vertical
Downstream Embankment side slope
                                                            0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =
                                                          98
Elevation at which weir flow begins
                                                       177.4
Energy head used in spillway design Spillway height used in design
Weir crést shape
                                                  = Broad Crested
Number of Bridge Coefficient Sets = 1
Low Flow Methods and Data
        Energy
Selected Low Flow Methods = Energy
High Flow Method
        Pressure and Weir flow
             Submerged Inlet Cd
             Submerged Inlet + Outlet Cd = .6608186
            Max Low Cord
                                                 169.5
Additional Bridge Parameters
        Add Friction component to Momentum
        Do not add Weigh't component to Momentum
        Class B flow critical depth computations use critical depth inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line
BRIDGE OUTPUT Profile #1%
* E.G. US. (ft)
*Inside BR DS *
                                    176.85 * Element
                                                                          *Inside BR US
* W.S. US. (ft)
                                    176.73 * E.G. Elev (ft)
                                                                                 176.85
175. 48
* Q Total (cfs)
                                  2220.00
                                            * W.S. Elev (ft)
                                                                                 169.50
169. 50
* Q Bridge (cfs)
                                  2220.00
                                            * Crit W.S. (ft)
                                                                                 163. 56
163.33
* Q Weir (cfs)
                                             * Max Chl Dpth (ft)
                                                                                  12.50
                                            Page 46
```

40 // #		Dupi i c	te Lilective		
12.66 * * Weir Sta Lft (ft)	*		* Vel Total (ft/s) *	6. 44	*
6.32 * * Weir Sta Rgt (ft)	*		* Flow Area (sq ft)	4. 63	*
351.36 * * Weir Submerg	*		* Froude # ChI *	0. 32	*
0.31 * * Weir Max Depth (ft)	*		* Specif Force (cu ft) * 242	9. 30	*
2498.02 * * Min El Weir Flow (ft)	*	177. 91	* Hydr Depth (ft) *		*
* Min El Prs (ft)	*	169. 50	* W.P. Total (ft) * 8	1. 23	*
81.77 * * Delta EG (ft)	*	1. 37	* Conv. Total (cfs)	24. 0	*
30665.7 * * Delta WS (ft)	*	1. 36	* Top Width (ft) *		*
* BR Open Area (sq ft)	*	344. 63	* Frctn Loss (ft) *		*
* BR Open Vel (ft/s)	*	6. 44	* C & E Loss (ft) *		*
* BR Sluice Coef	*		* Shear Total (lb/sq ft) *	1. 47	*
1.41 * * BR Sel Method 8.88 *		J	<b>,</b>	7. 43	*
**************************************	*****	*****	**********	****	*****

The downstream water surface is above the minimum elevation required for Note:

orifice flow. The orifice flow equation
was used for pressure flow.

Note: Multiple critical depths were found at this location.
with the lowest, valid, water surface was used.

Note: Multiple critical depths were found at this location. The critical depth The critical depth with the lowest, valid, water surface was used.

	FI 00	dway *****	************	***
******* * E.G. US. (ft) *Inside BR DS *	*	177. 73	* Element *Inside BR US	
* W. S. US. (ft) 176. 35 *	*	177. 62	* E.G. Elev (ft)	
* Q Total (cfs) 169.50 *	*	2220. 00	* W.S. Elev (ft)	
* Q Bridge (cfs) 163.33 *	*	2220. 00	* Crit W.S. (ft)	
* Q Weir (cfs) 12.66 *	*		* Max Chl Dpth (ft)	
* Weir Sta Lft (ft) 6.32 *	*		* Vel Total (ft/s)	
* Weir Sta Rgt (ft) 351.36 *	*		* Flow Area (sq ft)	
* Weir Submerg 0.31 *	*		* Froude # ChI	
* Weir Max Depth (ft) 2498.02 *	*		* Specif Force (cu ft) * 2429.30 *	
* Min El Weir Flow (ft)	*	177. 91	* Hydr Depth (ft) * *	
* Min El Prs (ft) 81.77 *	*	169. 50	* W. P. Total (ft)	
* Delta EG (ft) 30665.7 *	*	1. 38	* Conv. Total (cfs) * 29824.0 *	

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* Delta_WS (ft)	Dupl i 0 * 1. 37	cate Effective * Top Width (ft)	*	*
* BR Open Area (sq ft)	* 344.63	* Frctn Loss (ft)	*	*
* BR Open Vel (ft/s)	* 6.44	* C & E Loss (ft)	*	*
* BR SIuice Coef 1 41 *	*	* Shear Total (lb/sq ft)	* 1.47	*
* BR Sel Method 8.88 *	,	* Power Total (lb/ft s) ************************************	* 9.45 ******	*
****				

Note: The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation

was used for pressure flow.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

### BRIDGE OUTPUT Profile #10%

	~ ~ ~ ~ ~	*****	^ ^	*******	^ ^ ^ ^ /		~ ~ ~ ~ ~ ~ ~
******** * E.G. US. (ft)	*	172. 92	*	Element	*Inc	side BR US	
*Inside BR DS *		172.92		Erement	1113	side br us	
* W.S. US. (ft)	*	172. 56	*	E.G. Elev (ft)	*	172. 91	*
170.59 * * Q Total (cfs)	*	3025.00	*	W.S. Elev (ft)	*	169. 50	*
169.50 * * Q Bridge (cfs)	*	3025.00	*	Crit W.S. (ft)	*	164. 82	*
164.60 * * Q Weir (cfs)	*		*	Max Chl Dpth (ft)	*	12. 50	*
12.66 * * Weir Sta Lft (ft)	*		*	Vel Total (ft/s)	*	8. 78	*
8.61 * * Weir Sta Rgt (ft)	*		*	Flow Area (sq ft)	*	344.63	*
351.36 * * Weir Submerg	*		*	Froude # Chl	*	0.44	*
0.43 * * Weir Max Depth (ft) 2871.52 *	*		*	Specif Force (cu ft)	*	2810. 09	*
* Min El Weir Flow (ft)	*	177. 91	*	Hydr Depth (ft)	*		*
* Min El Prs (ft) 81.77 *	*	169. 50	*	W.P. Total (ft)	*	81. 23	*
* Del ta EG (ft) 30665.7 *	*	2. 33	*	Conv. Total (cfs)	*	29824. 0	*
* Del ta WS (ft)	*	2. 38	*	Top Width (ft)	*		*
* BR Open Area (sq ft)	*	344. 63	*	Frctn Loss (ft)	*		*
* BR Open Vel (ft/s)	*	8. 78	*	C & E Loss (ft)	*		*
* BR SIuice Coef 2.61 *	*		*	Shear Total (lb/sq ft)	*	2. 73	*
* BR Sel Method	* Pr	ess Only	*	Power Total (lb/ft s)	*	23. 92	*
<pre>22.41 ***************************** ********</pre>	****	*****	* *	*******	****	*****	*****

Note: The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation  $\frac{1}{2}$ 

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was used for pressure flow. Multiple critical depths were found at this location. Note: The critical depth with the lowest, valid, water surface was used.

Note: Multiple critical depths were found at this location. with the lowest, valid, water surface was used. The critical depth

BRIDGE OUTPUT Profile #2% ************************************							
******* * E. G. US. (ft)	*	171. 57	*	Element	*In	side BR US	
*Inside BR DS *  * W.S. US. (ft)	*	171. 28	*	E.G. Elev (ft)	*	171. 57	*
170. 03	*	2480. 00	*	W.S. Elev (ft)	*	169. 50	*
* Q Bridge (cfs) 163.76 *	*	2480. 00	*	Crit W.S. (ft)	*	163. 98	*
* Q Weir (cfs) 12.66 *	*		*	Max Chl Dpth (ft)	*	12. 50	*
* Weir Sta Lft (ft) 7.06 *	*		*	Vel Total (ft/s)	*	7. 20	*
* Weir Sta Rgt (ft) 351.36 *	*		*	Flow Area (sq ft)	*	344. 63	*
* Weir Submerg 0.35 *	*		*	Froude # Chl	*	0. 36	*
* Weir Max Depth (ft) 2606.12 *	*		*	Specif Force (cu ft)	*	2539. 51	*
* Min El Weir Flow (ft)	*	177. 91	*	Hydr Depth (ft)	*		*
* Min El Prs (ft) 81.77 *	*	169. 50	*	W.P. Total (ft)	*	81. 23	*
* Delta EG (ft) 30665.7 *	*	1. 54	*	Conv. Total (cfs)	*	29824. 0	*
* Delta WS (ft)	*	1. 55	*	Top Width (ft)	*		*
* BR Open Area (sq ft)	*	344. 63	*	Frctn Loss (ft)	*		*
* BR Open Vel (ft/s)	*	7. 20	*	C & E Loss (ft)	*		*
* BR SIuice Coef 1.75 *	*			Shear Total (Ib/sq ft)	*	1. 83	*
* BR Sel Method 12.38 *		,		Power Total (lb/ft s)	*	13. 18	*
**************************************							

The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation
was used for pressure flow.

Note: Multiple critical depths were found at this location.

The critical depth with the lowest, valid, water surface was used.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

#### BRIDGE OUTPUT Profile #0.2%

*****					
* E.G. US. (ft)	*	179. 16	* Element	*I nsi	de BR US
*Inside BR DS *					
* W.S. US. (ft)	*	179. 16	* E.G. Elev (ft)	*	179. 16 *
178. 62 * · · ·					
* Q Total (cfs) 178.41 *	*	5250.00	* W.S. Elev (ft)	*	179. 16 *
178. 41 * ` ·			• •		

* Q Bridge (cfs)	*		cate Effective * Crit W.S. (ft) * 167.85	*
167.63 * * Q Weir (cfs) 21.57 *	*	2629. 67	* Max Chl Dpth (ft)	*
* Weir Sta Lft (ft) 1.76 *	*	1888. 88	* Vel Total (ft/s) * 3.58	*
* Weir Sta Rgt (ft) 2987.53 *	*	3750.00	* Flow Area (sq ft)	*
* Weir Submerg 0.34 *	*	0.00	* Froude # ChI	*
<pre>* Weir Max Depth (ft)</pre>	*	1. 26	* Specif Force (cu ft) * 6769.30	*
* Min El Weir Flow (ft)	*	177. 91	* Hydr Depth (ft)	*
1.58 * * Min El Prs (ft) 1971.39 *	*	169. 50	* W. P. Total (ft) * 1937.98	*
* Del ta EG (ft)	*	2. 05	* Conv. Total (cfs) *	*
* Delta WS (ft)	*	2. 05	* Top Width (ft)	*
1889.11 * * BR Open Area (sq ft)	*	344. 63	* Frctn Loss (ft) *	*
* BR Open Vel (ft/s)	*	7. 60	* C & E Loss (ft) *	*
* BR SIuice Coef	*		* Shear Total (lb/sq ft) *	*
* BR Sel Method	*	Press/Wei r	* Power Total (lb/ft s) *	*
********* *******	***	*****	************	****

The downstream water surface is above the minimum elevation required for Note: orifice flow. The orifice flow equation was used for pressure flow.

Multiple critical depths were found at this location. The critical depth Note: with the lowest, valid, water surface was used.

For the cross section inside the bridge at the upstream end, the water surface and energy have been projected

from the upstream cross section. The selected bridge modeling method does

not compute answers inside the bridge. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

For the cross section inside the bridge at the downstream end, the water Note: surface and energy are based on critical depth over the weir.

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 250

I NPUT

Description: XS 250

THIS IS THE D/S FACE OF RUNWAY 34-R

Station Elevation Data 13 num= Sta El ev Sta El ev Sta El ev Sta El ev Sta El ev 1900 3100 3500 0 180 550 175 174 175 174 172 3570 3880 170 3930 160 3955 156.84 3980 160 4035 172 4350 174 5030 175.2

Manning's n Values num=

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```
Duplicate Effective
                      Sta
     Sta
           n Val
                            n Val
                                      Sta
                                      3980
       0
             . 07
                     3930
                                               . 07
                             . 045
                                                               Coeff Contr.
Bank Sta: Left
                 Ri ght
                           Lengths: Left Channel
                                                    Ri ght
                                                                               Expan.
                  3980
          3930
                                        5
                                               40
                                                                                 . 5
                                                       60
                                                                       . 3
Ineffective Flow
                                 2
                      num=
   Sta L
           Sta R
                           Permanent
                     Elev
            3930
                      177
                                F
    3980
            5030
                      177
CROSS SECTION OUTPUT Profile #1%
* E.G. Elev (ft)
                             175.48
                                      * Element
                                                                   Left OB *
                                                                               Channel *
Right OB *
 Vel Head (ft)
                               0.11
                                      * Wt. n-Val.
                                                                                0.045
* W.S. Elev (ft)
                             175. 37
                                      * Reach Len. (ft)
                                                                     5.00
                                                                                40.00
  60.00
* Crit W.S. (ft)
                             162.37
                                      * Flow Area (sq ft)
                                                                               847.42
* E.G. Slope (ft/ft)
                          *0.000146
                                      * Area (sq ft)
                                                                               847.42
                                                                  4607.89
1783.89
* Q Total (cfs)
                          * 2220.00
                                      * Flow (cfs)
                                                                              2220.00
* Top Width (ft)
                          * 4520.53
                                      * Top Width (ft)
                                                                  3420.53
                                                                                50.00
1050.00
 Vel Total (ft/s)
                               2.62
                                      * Avg. Vel. (ft/s)
                                                                                 2.62
                                      * Hydr. Depth (ft)
* Max Chl Dpth (ft)
                              18.53
                                                                                16.95
* Conv. Total (cfs)
                                      * Conv. (cfs)
                                                                            *183657.7
                          *183657.7
* Length Wtd. (ft)
                              39.05
                                      * Wetted Per. (ft)
                                                                                50.40
* Min Ch El (ft)
                                      * Shear (lb/sq ft)
                             156.84
                                                                                 0.15
                               1.00
                                      * Stream Power (lb/ft s)
* Al pha
                                                                                 0.40
* Frctn Loss (ft)
                                      * Cum Volume (acre-ft)
                               0.00
                                                                   903.93
                                                                               198.67
1480.83
 C & E Loss (ft)
                               0.04
                                      * Cum SA (acres)
                                                                   111.27
                                                                                 9.25
Warning: The cross-section end points had to be extended vertically for the computed
water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
         1.4. This may indicate the need for additional cross sections.
         Multiple critical depths were found at this location. The critical depth
with the lowest, valid, water surface was used.
CROSS SECTION OUTPUT Profile #Floodway
* E.G. Elev (ft)
                             176.35 * Element
                                                                               Channel *
                                                                   Left OB *
Right OB *
 Vel Head (ft)
                               0.10
                                      * Wt. n-Val.
                                                                                0.045
* W.S. Elev (ft)
                             176. 25
                                      * Reach Len. (ft)
                                                                     5.00 *
                                                                                40.00
```

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* Crit W.S. (ft)	* 162.37	* Flow Area (sq ft)	*		*	891. 58	*
* E.G. Slope (ft/ft)	*0.000123	* Area (sq ft)	*	562. 58	*	891. 58	*
539.85 * * Q Total (cfs)	* 2220.00	* Flow (cfs)	*		*	2220. 00	*
* Top Width (ft)	* 150.00	* Top Width (ft)	*	50.00	*	50.00	*
50.00 * * Vel Total (ft/s) *	* 2.49	* Avg. Vel. (ft/s)	*		*	2. 49	*
* Max Chl Dpth (ft)	* 19.41	* Hydr. Depth (ft)	*		*	17. 83	*
* Conv. Total (cfs)	*199881.8	* Conv. (cfs)	*		*1	99881.8	*
* Length Wtd. (ft)	* 39. 10	* Wetted Per. (ft)	*		*	50. 40	*
* Min Ch El (ft)	* 156.84	* Shear (Ib/sq ft)	*		*	0. 14	*
* Al pha	* 1.00	* Stream Power (lb/ft s)	*		*	0. 34	*
* Frctn Loss (ft)	* 0.00	* Cum Volume (acre-ft)	*	54. 52	*	206. 97	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	*	2. 21	*	9. 25	*
1.31	*****	*******	***	*****	***	*****	**
* * * * * * * * * * *							

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

60.00 \*

		******	***	*****	**:	*****	**
********* * E. G. El ev (ft)	* 170.59	* Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	* 0.41	* Wt. n-Val.	*		*	0.045	*
* W.S. Elev (ft)	* 170.18	* Reach Len. (ft)	*	5. 00	*	40.00	*
60.00 * * Crit W.S. (ft)	* 163. 27	* Flow Area (sq ft)	*		*	587. 91	*
* E.G. Slope (ft/ft)	*0.000918	* Area (sq ft)	*	261. 37	*	587. 91	*
237.40 * * Q Total (cfs)	* 3025.00	* Flow (cfs)	*		*	3025. 00	*
* Top Width (ft)	* 174. 26	* Top Width (ft)	*	77. 61	*	50.00	*
46.65 * * Vel Total (ft/s)	* 5. 15	* Avg. Vel. (ft/s)	*		*	5. 15	*
* Max Chl Dpth (ft)	* 13.34	* Hydr. Depth (ft)	*		*	11. 76	*
* Conv. Total (cfs)	* 99851.7	* Conv. (cfs)	*		*	99851.7	*
* Length Wtd. (ft)	* 39.34	* Wetted Per. (ft)	*		*	50. 40	*
* Min Ch El (ft)	* 156.84	* Shear (Ib/sq ft)	*		*	0. 67	*
* Al pha	* 1.00	* Stream Power (lb/ft s)	*		*	3. 44	*

```
Duplicate Effective
* Frctn Loss (ft)
                           0.03 * Cum Volume (acre-ft) * 266.06 * 109.38 *
306.03
 C & E Loss (ft)
                           0.12 * Cum SA (acres)
                                                           46. 10 *
                                                                       9.40 *
 68. 19
             ******************
        Multiple critical depths were found at this location. The critical depth
with the lowest, valid, water surface was used.
CROSS SECTION OUTPUT Profile #2%
****************
* E.G. Elev (ft)
Right OB *
                         170.03
                                 * Element
                                                          Left OB *
                                                                     Channel *
* Vel Head (ft)
                           0.30
                                 * Wt. n-Val.
                                                                      0.045
* W.S. Elev (ft)
                         169. 73
                                 * Reach Len. (ft)
                                                             5.00
                                                                      40.00
 60.00
                                 * Flow Area (sq ft)
* Crit W.S. (ft)
                         162.67
                                                                     565.50
* E.G. Slope (ft/ft)
                       *0.000702
                                 * Area (sq ft)
                                                           236.68
                                                                     565.50
 216. 96
* Q Total (cfs)
                       * 2480.00
                                                                  * 2480.00
                                 * Flow (cfs)
* Top Width (ft)
                         143. 25
                                 * Top Width (ft)
                                                                      50.00
                                                            48.65
 44. 60
 Vel Total (ft/s)
                           4.39
                                 * Avg. Vel. (ft/s)
                                                                       4.39
                                 * Hydr. Depth (ft)
* Max Chl Dpth (ft)
                          12.89
                                                                      11. 31
                                 * Conv. (cfs)
                                                                   93588. 9
                       * 93588.9
* Conv. Total (cfs)
                                 * Wetted Per. (ft)
* Length Wtd. (ft)
                          39.38
                                                                      50.40
                                 * Shear (lb/sq ft)
* Min Ch El (ft)
                         156.84
                                                                       0.49
* Al pha
                           1.00
                                 * Stream Power (lb/ft s) *
                                                                       2. 16
                                 * Cum Volume (acre-ft)
* Frctn Loss (ft)
                           0.02
                                                           363. 62
                                                                     128. 22
535. 94
 C & E Loss (ft)
                           0.09
                                 * Cum SA (acres)
                                                           51.73
                                                                       9.40
 78.06 *
*************************
*****
        Multiple critical depths were found at this location. The critical depth
with the lowest, valid, water surface was used.
CROSS SECTION OUTPUT Profile #0.2%
                                *************
*****
* E.G. Elev (ft)
                         177.11 * Element
                                                          Left OB *
                                                                     Channel *
Right OB *
                                 * Wt. n-Val.
 Vel Head (ft)
                           0.01
                                                           0.070
                                                                      0.045
 0.070
 W.S. Elev (ft)
                         177. 10
                                * Reach Len. (ft)
                                                            5.00
                                                                      40.00
 60.00
* Crit W.S. (ft)
                         165.42
                                 * Flow Area (sq ft)
                                                        *10710.28
                                                                     934.20
3606. 29
* E.G. Slope (ft/ft)
                                                        *10710.28
                       *0.000037
                                 * Area (sq ft)
                                                                     934.20
3606. 29
                       * 5250.00
                                 * Flow (cfs)
* Q Total (cfs)
                                                        * 2867.08
                                                                  * 1320.25
```

Page 53

		սեր	ו וע	cate Lilective					
1062. 67 *									
<pre>* Top Width (ft)</pre>	*	4711. 45	*	Top Width (ft)	*	3611. 45	*	50.00	*
1050.00 * ` ´									
* Vel Total (ft/s)	*	0. 34	*	Avg. Vel. (ft/s)	*	0. 27	*	1. 41	*
0. 29 *				(119)					
* Max Chl Dpth (ft)	*	20. 26	*	Hydr. Depth (ft)	*	2. 97	*	18. 68	*
3. 43 *		20.20		ngan boptii (11)		,,		10.00	
* Conv. Total (cfs)	* g	359174.8	*	Conv. (cfs)	*/	169203. 9	* 2	16061.8	
*173909.0 *		,5,1,4.0		00117. (613)		107200. 7	_	10001.0	
* Length Wtd. (ft)	*	31. 47	*	Wetted Per. (ft)	*	3612. 49	*	50. 40	*
1053. 21 *		31.47		welled Fel. (II)		3012.49		30. 40	
	*	15/ 04	*	Chaon (lh/on ft)	*	0 01	*	0.04	*
* Min Ch El (ft)		156. 84		Shear (Ib/sq ft)		0. 01		0. 04	
0.01	*	4 70	ىد.	01		0.00		0.01	*
* Al pha	^	4. 72	^	Stream Power (lb/ft s)	*	0. 00	*	0. 06	^
0.00 *									
<pre>* Frctn Loss (ft)</pre>	*	0. 00	*	Cum Volume (acre-ft)	*	517. 19	*	155. 03	*
884. 58 *									
* C & E Loss (ft)	*	0. 03	*	Cum SA (acres)	*	60. 28	*	9. 25	*
90. 98 *				, ,					
*******	***	*****	* *	******	* * *	*****	***	*****	* *
*****									

Warning: Multiple water surfaces were found that could balance the energy equation. The program selected the water

surface whose main channel velocity head was the closest to the previously computed cross section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 246

I NPUT

Description: XS 246

THIS IS THE CROSS SECTION BETWEEN THE RUNWAY AND TAXIWAY

Station El	evation	υατα	num=	14					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
******	*****	*****	*****	******	*****	*****	******	*****	****
0	180	550	175	1900	174	3100	175	3500	174
3570	172	3880	170	3930	160	3955	156. 8	3980	160
4040	170	4050	172	4970	174	5030	175. 2		

Manni ng' s	n Values		num=	3	
Sťa	n Val	Sta	n Val	Sta	n Val
******	******	*****	******	*****	****
0	. 07	3930	. 045	3980	. 07

Coeff Contr. Bank Sta: Left Ri ght Lengths: Left Channel Ri ght Expan. 3930 3980 5 50 140 . 3 . 5 2 Ineffective Flow num=

Sta L Sta R El ev Permanent
0 3880 180 F
4040 5030 180 F

CROSS SECTION OUTPUT Profile #1%

			^ ^	^^^^^	^ ^ ′		^ ^
********* * E.G. Elev (ft)	* 175.43	* Element	*	Left OB	*	Channel	*
Right OB *	175. 45	LICINCITE		LCT CD		orianner	
* Vel Head (ft)	* 0.03	* Wt. n-Val.	*	0.070	*	0.045	*
0. 070 *							
* W.S. Elev (ft) 140.00 *	* 175.40	* Reach Len. (ft)	*	5. 00	*	50.00	*
* Crit W.S. (ft)	* 162.38	* Flow Area (sq ft)	*	520. 22	*	850. 22	*
624. 26 *		(-4)					
* E.G. Slope (ft/ft)	*0.000055	* Area (sq ft)	*	4730.88	*	850. 22	*
2928. 62 *							
* Q Total (cfs)	* 2220.00	* Flow (cfs)	*	385. 46	*	1370. 15	*
404. 30	J. 4504 40	# <b>T</b> WILLIAM (C.)	.1.	0.40.4.40			
* Top Width (ft) 1050.00 *	* 4524.48	* Top Width (ft)	^	3424. 48	*	50.00	*
* Vel Total (ft/s)	* 1.11	* Avg. Vel. (ft/s)	*	0. 74	*	1. 61	*
0. 74 *		7.11g. 1011 (1175)		0.71			
* Max Chl Dpth (ft)	* 18.60	* Hydr. Depth (ft)	*	10. 40	*	17.00	*
10. 40 * '		<i>y</i> 1 ( <i>y</i>					
* Conv. Total (cfs)	*299171.5	* Conv. (cfs)	*	51946. 0	* *	184644. 3	*
62581.3 *							
* Length Wtd. (ft)	* 55. 51	<pre>* Wetted Per. (ft)</pre>	*	50. 99	*	50. 41	*
00.03	* 156 90	* Chaor (lb/cg ft)	*	0.04	*	0.04	*
* Min Ch El (ft) 0.04 *	* 156.80	* Shear (Ib/sq ft)		0. 04		0. 06	
* Al pha	* 1.46	* Stream Power (lb/ft s)	*	0. 03	*	0. 09	*
0. 03 *		0 tr 0 am r 0 m 0 r (1 b / 1 t 0 )		0.00		0.07	
* Frctn Loss (ft)	* 0.01	* Cum Volume (acre-ft)	*	903. 39	*	197. 89	*
1477. 58 *							
* C & E Loss (ft)	* 0.06	* Cum SA (acres)	*	110. 88	*	9. 21	*
91. 60 *	. + + + + + + + + + + +	*****	++	+++++++	++-		++
****					^ /		^

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# CROSS SECTION OUTPUT Profile #Floodway

******	*****	*******	****	*****	*****
*****					
* E.G. Elev (ft) Right OB *	* 176.31	* Element	*	Left OB *	Channel *
* Vel Head (ft) 0.070 *	* 0.03	* Wt. n-Val.	*	0. 070 *	0. 045 *
* W.S. Elev (ft) 140.00 *	* 176. 28	* Reach Len. (ft)	*	5.00 *	50.00 *
* Crit W.S. (ft) 677.04 *	* 162.38	* Flow Area (sq ft)	*	564. 20 *	894. 20 *
* E.G. Slope (ft/ft) 677.04 *	*0.000047	* Area (sq ft)	*	564. 20 *	894. 20 *
* Q Total (cfs) 461.22 *	* 2220.00	* Flow (cfs)	*	378. 30 *	1380. 48 *
* Top Width (ft) 60.00 *	* 160.00	* Top Width (ft)	*	50.00 *	50.00 *
* Vel Total (ft/s) 0.68 *	* 1.04	* Avg. Vel. (ft/s)	*	0. 67 *	1.54 *
* Max Chl Dpth (ft)	* 19.48	* Hydr. Depth (ft) Page 55	*	11. 28 *	17. 88 *

11 20 +		Dak	,, ,	cate Effective					
11.28 * * Conv. Total (cfs) 67100.3 *	*3	22972. 9	*	Conv. (cfs)	*	55036. 2	*2	00836. 4	*
* Length Wtd. (ft) 67 11 *	*	55. 52	*	Wetted Per. (ft)	*	57. 27	*	50. 41	*
* Min Ch El (ft) 0.03 *	*	156. 80	*	Shear (Ib/sq ft)	*	0. 03	*	0. 05	*
* Al pha 0.02 *	*	1. 53	*	Stream Power (lb/ft s)	*	0. 02	*	0. 08	*
* Frctn Loss (ft) 455,43 *	*	0. 01	*	Cum Volume (acre-ft)	*	54. 46	*	206. 15	*
* C & E Loss (ft)	*	0. 05	*	Cum SA (acres)	*	2. 21	*	9. 21	*
*****	***	*****	* *	*******	* *	*****	***	*****	* *
* C & E Loss (ft) 7.49 *				, ,		2.2.		7. 21	*

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT P			**	******	* * :	****	* * ;	*****	**
********* * E. G. El ev (ft)	*	170. 44	*	Element	*	Left OB	*	Channel	*
Right OB *  * Vel Head (ft)	*	0. 17	*	Wt. n-Val.	*	0. 070	*	0. 045	*
0.070 * * W.S. Elev (ft) 140.00 *	*	170. 28	*	Reach Len. (ft)	*	5. 00	*	50.00	*
* Crit W.S. (ft) 316.50 *	*	163. 23	*	Flow Area (sq ft)	*	263. 75	*	593. 75	*
* E.G. Slope (ft/ft) 316.69 *	*0	. 000478	*	Area (sq ft)	*	269. 61	*	593. 75	*
* Q Total (cfs) 440.88 *	*	3025.00	*	Flow (cfs)	*	365. 96	*	2218. 16	*
* Top Width (ft) 61.37 *	*	203. 99	*	Top Width (ft)	*	92. 62	*	50.00	*
* Vel Total (ft/s) 1.39 *	*	2. 58	*	Avg. Vel. (ft/s)	*	1. 39	*	3. 74	*
* Max Chl Dpth (ft) 5.27 *	*	13. 47	*	Hydr. Depth (ft)	*	5. 27	*	11. 87	*
* Conv. Total (cfs) 20173.5 *	*1	38415. 8	*	Conv. (cfs)	*	16745. 1	* *	101497. 2	*
* Length Wtd. (ft) 60.83 *	*	53.84	*	Wetted Per. (ft)	*	50. 99	*	50. 41	*
* Min Ch El (ft) 0.16 *	*	156. 80	*	Shear (Ib/sq ft)	*	0. 15	*	0. 35	*
* Al pha 0. 22 *	*	1. 62	*	Stream Power (lb/ft s)	*	0. 21	*	1. 31	*
* Frctn Loss (ft) 305.65 *	*	0. 05	*	Cum Volume (acre-ft)	*	266. 03	*	108. 83	*
* C & E Loss (ft) 68.12 *	*	0. 25		Cum SA (acres)	*	46. 10	*	9. 36	*
	^ X X X	^ ^ * * * * * * *	~ ~	^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	^ X	^ ^ X X X X X X X	^ * 7		^ ^

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

Duplicate Effective
1.4. This may indicate the need for additional cross sections.
Multiple critical depths were found at this location. The critical depth Note: with the lowest, valid, energy was used.

# CROSS SECTION OUTPUT Profile #2%

******	******	******	* * :	*****	* * :	*****	* *
*****							
* E.G. Elev (ft) Right OB *	* 169. 92	* Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.070 *	* 0.13	* Wt. n-Val.	*	0. 070	*	0.045	*
* W.S. Elev (ft)	* 169.80	* Reach Len. (ft)	*	5. 00	*	50.00	*
* Crit W.S. (ft)	* 162.68	* Flow Area (sq ft)	*	239. 86	*	569. 75	*
* E.G. Slope (ft/ft)	*0.000383	* Area (sq ft)	*	239. 86	*	569. 75	*
287.83 * * Q Total (cfs)	* 2480.00	* Flow (cfs)	*	283. 67	*	1854. 59	*
341.75 * * Top Width (ft)	* 157.75	* Top Width (ft)	*	48. 98	*	50.00	*
58.77 * * Vel_Total (ft/s)	* 2. 26	* Avg. Vel. (ft/s)	*	1. 18	*	3. 26	*
1.19 * * Max_Chl_Dpth (ft)	* 13.00	* Hydr. Depth (ft)	*	4. 90	*	11. 40	*
4.90 * * Conv. Total (cfs)	*126706. 9	* Conv. (cfs)	*	14493. 1	*	94753.6	*
17460.3 * * Length Wtd. (ft)	* 53.63	* Wetted Per. (ft)	*	49. 95	*	50. 41	*
59.58 * * Min Ch El (ft)	* 156.80	* Shear (lb/sq ft)	*	0. 11	*	0. 27	*
0. 12 * * Al pha	* 1.62	* Stream Power (lb/ft s)	*	0. 14	*	0. 88	*
0.14 * * Frctn Loss (ft)	* 0.04	* Cum Volume (acre-ft)	*	363. 59	*	127. 70	*
535.59 * * C & E Loss (ft)	* 0. 17	* Cum SA (acres)	*	51. 72	*	9. 36	*
77. 99 *		******	**:		**:		**
****							

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth

with the lowest, valid, energy was used.

CROSS SECTION OUTPUT P		) ************	***	*****	* * :	*****	**
* E.G. Elev (ft)	* 177.08	* Element	*	Left OB	*	Channel	*
Right OB *  * Vel Head (ft) 0.070 *	* 0.12	* Wt. n-Val.	*	0. 070	*	0. 045	*
* W.S. Elev (ft)	* 176. 95	* Reach Len. (ft)	*	5.00	*	50.00	*
140.00 * * Crit W.S. (ft) 717.27 *	* 165.16	* Flow Area (sq ft)	*	597. 72	*	927. 72	*
* E.G. Slope (ft/ft)	*0.000215	* Area (sq ft)	*1	0171. 20	*	927. 72	*
4556. 19 * * Q Total (cfs)	* 5250.00	* Flow (cfs) Page 57	*	960. 45	*	3132. 45	*

1157.10 *									
* Top Width (ft)	*	4694. 99	*	Top Width (ft)	*	3594. 99	*	50.00	*
1050.00 *	*	2 24	*	Avg Vol (ft/s)	*	1 / 1	*	2 20	*
* Vel Total (ft/s) 1.61 *		2. 34		Avg. Vel. (ft/s)		1. 61		3. 38	
* Max Chl Dpth (ft) 11.95 *	*	20. 15	*	Hydr. Depth (ft)	*	11. 95	*	18. 55	*
* Conv. Total (cfs) 78879.8 *	*3	57895. 4	*	Conv. (cfs)	*	65474. 7	*2	13540. 9	*
* Length Wtd. (ft) 60.83 *	*	55. 80	*	Wetted Per. (ft)	*	50. 99	*	50. 41	*
* Min Ch El (ft) 0.16 *	*	156. 80	*	Shear (Ib/sq ft)	*	0. 16	*	0. 25	*
* Al pha 0. 26 *	*	1. 43	*	Stream Power (lb/ft s)	*	0. 25	*	0. 83	*
* Frctn Loss (ft) 878.95 *	*	0. 03	*	Cum Volume (acre-ft)	*	515. 99	*	154. 18	*
* C & E Loss (ft) 89.54 *	*	0. 32	*	Cum SA (acres)	*	59. 86	*	9. 21	*
********	***	*****	* * :	*****	* * :	*****	***	****	**
*****									

Warning: The cross-section end points had to be extended vertically for the computed water šurface.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross

sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RI VER: RI VER-1

RS: 245 REACH: Reach-1

I NPUT

Description: XS 245
THIS IS THE U/S FACE OF THE TAXIWAY
Station Flevation Data \_\_num=

LION ELE	evation	Data	num=	10					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
*****	*****	****	*****	*****	******	*****	*****	*****	****
0	180	550	175	1900	174	3100	175	3500	174
3570	172	3890	170	3940	160	3960	156. 8	3975	160
4020	170	4090	174	4260	175	4890	175	5030	176. 2
	Sta ****** 0 3570	Sta Elev ************************************	0 180 550 3570 172 3890	Sta       El ev       Sta       El ev         ************************************	Sta       El ev       Sta       El ev       Sta         0       180       550       175       1900         3570       172       3890       170       3940	Sta       El ev       Sta       El ev         0       180       550       175       1900       174         3570       172       3890       170       3940       160	Sta       El ev       Sta       El ev       Sta         0       180       550       175       1900       174       3100         3570       172       3890       170       3940       160       3960	Sta       El ev       Sta       El ev       Sta       El ev         0       180       550       175       1900       174       3100       175         3570       172       3890       170       3940       160       3960       156.8	Sta       El ev       Sta       El ev       Sta       El ev       Sta         0       180       550       175       1900       174       3100       175       3500         3570       172       3890       170       3940       160       3960       156.8       3975

Manni ng' s	n Values		num=	3	
	n Val				
*****	*****	*****	*****	*****	*****
0	. 07	3940	. 045	3975	. 07

Lengths: Left Channel Ri ght 230 Coeff Contr. Bank Sta: Left Ri ght Expan. 3975 . 3 . 5 3940 230 230

2 Ineffective Flow num= Sta R Sta L El ev Permanent 3940 0 176.9 F 3975 5030 176.6

CROSS SECTION OUTPUT Profile #1%

****	սար	orreate Errective					
* E.G. Elev (ft)	* 175.37	* Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft) *	* 0. 22	* Wt. n-Val.	*		*	0. 045	*
* W.S. Elev (ft) 10.00 *	* 175. 15	* Reach Len. (ft)	*	10.00	*	10.00	*
* Crit W.S. (ft)	* 163.40	* Flow Area (sq ft)	*		*	586. 08	*
* E.G. Slope (ft/ft) 878.99 *	*0.000314	* Area (sq ft)	*	3888. 03	*	586. 08	*
* 0 Total (cfs)	* 2220.00	* Flow (cfs)	*		*	2220. 00	*
* Top Width (ft) 931.93 *	* 4372.89	* Top Width (ft)	*	3405. 96	*	35. 00	*
* Vel Total (ft/s)	* 3.79	* Avg. Vel. (ft/s)	*		*	3. 79	*
* Max Chl Dpth (ft)	* 18.35	* Hydr. Depth (ft)	*		*	16. 75	*
* Conv. Total (cfs)	*125258.8	* Conv. (cfs)	*		* *	125258. 8	*
* Length Wtd. (ft)	* 10.00	* Wetted Per. (ft)	*		*	35. 59	*
* Min Ch El (ft)	* 156.80	* Shear (Ib/sq ft)	*		*	0. 32	*
* Al pha	* 1.00	* Stream Power (lb/ft s)	*		*	1. 22	*
* Frctn Loss (ft) 1471.47 *	*	* Cum Volume (acre-ft)	*	902. 90	*	197. 07	*
* C & E Loss (ft) 88.41 *	*	* Cum SA (acres)	*	110. 48	*	9. 16	*
00	*****	********	**	*****	**:	*****	**

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

# CROSS SECTION OUTPUT Profile #Floodway

**************************************										
********* * E. G. El ev (ft)	* 176. 25	* Element	*	Left OB	*	Channel	*			
Right OB * * Vel Head (ft) *	* 0. 20	* Wt. n-Val.	*		*	0. 045	*			
* W.S. Elev (ft) 10.00 *	* 176.05	* Reach Len. (ft)	*	10. 00	*	10.00	*			
* Cri t W. S. (ft)	* 163.40	* Flow Area (sq ft)	*		*	617. 80	*			
* E.G. Slope (ft/ft) 653.14 *	*0.000264	* Area (sq ft)	*	552. 57	*	617. 80	*			
* Q Total (cfs)	* 2220.00	* Flow (cfs)	*		*	2220. 00	*			
* Top Width (ft) 75.00 *	* 160.00	* Top Width (ft)	*	50. 00	*	35.00	*			
* Vel Total (ft/s)	* 3.59	* Avg. Vel. (ft/s)	*		*	3. 59	*			
* Max Chl Dpth (ft)	* 19. 25	* Hydr. Depth (ft)	*		*	17. 65	*			
* Conv. Total (cfs)	*136760.8	* Conv. (cfs)	*		*1	36760. 8	*			
* Length Wtd. (ft)	* 10.00	* Wetted Per. (ft)	*		*	35. 59	*			
* Min Ch El (ft)	* 156.80	* Shear (Ib/sq ft) Page 59	*		*	0. 29	*			

*	DU	pricate Effective					
* Al pha	* 1.00	* Stream Power (lb/ft s)	*		*	1. 03	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	54. 40	*	205. 28	*
453.29 * * C & E Loss (ft)	*	* Cum SA (acres)	*	2. 20	*	9. 16	*
7. 28 * **********************************	*****	*******	***	****	* * *	:****	**
Note: Multiple criti with the lowest, valid,	cal depths water surfa	were found at this location ace was used.	on.	The cri	tic	al depth:	
	Profile #10%	******	***	****	* * *	*****	**
******* * E.G. Elev (ft)	* 170.14	* Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	* 1.01	* Wt. n-Val.	*		*	0. 045	*
* W.S. Elev (ft)	* 169.13	* Reach Len. (ft)	*	10. 00	*	10.00	*
10.00 * * Crit W.S. (ft) *	* 164.55	* Flow Area (sq ft)	*		*	375. 60	*
* E.G. Slope (ft/ft) 187.61 *	*0.002570	* Area (sq ft)	*	208. 46	*	375. 60	*
* 0 Total (cfs)	* 3025.00	* Flow (cfs)	*		*	3025.00	*
* Top Width (ft) 41.09 *	* 121.75	* Top Width (ft)	*	45. 66	*	35.00	*
* Vel Total (ft/s)	* 8.05	* Avg. Vel. (ft/s)	*		*	8. 05	*
* Max Chl Dpth (ft)	* 12.33	* Hydr. Depth (ft)	*		*	10. 73	*
* Conv. Total (cfs)	* 59670.8	* Conv. (cfs)	*		*	59670.8	*
* Length Wtd. (ft)	* 10.00	* Wetted Per. (ft)	*		*	35. 59	*
* Min Ch El (ft)	* 156.80	* Shear (Ib/sq ft)	*		*	1. 69	*
* Al pha *	* 1.00	* Stream Power (lb/ft s)	*		*	13. 64	*
* Frctn Loss (ft) 304.84 *	* 0.04	* Cum Volume (acre-ft)	*	266. 00	*	108. 28	*
* C & E Loss (ft) 67.95 *	* 0.15	* Cum SA (acres)	*	46. 09	*	9. 31	*
	*****	*******	***	****	* * *	:****	**
is less than 0.7 or gre 1.4. This may	eater than y indicate tl cal depths v	tream conveyance divided be ne need for additional cro were found at this location ace was used.	oss	sections.		-	
CROSS SECTION OUTPUT F		*******	***	****	* * *	********	**
* E.G. Elev (ft) Right OB *	* 169.72	* Element	*	Left OB	*	Channel	*
* Vel Head (ft)	* 0.69	* Wt. n-Val.	*		*	0. 045	*
* W.S. Elev (ft)	* 169.03	* Reach Len. (ft) Page 60	*	10. 00	*	10. 00	*

* Crit W.S. (ft)	*	163. 78	*	Flow Area (sq ft)	*		*	371. 89	*
* E.G. Slope (ft/ft)	*	0. 001785	*	Area (sq ft)	*	203. 65	*	371. 89	*
183.28 * * Q Total (cfs) *	*	2480. 00	*	Flow (cfs)	*		*	2480. 00	*
* Top Width (ft)	*	120. 74	*	Top Width (ft)	*	45. 13	*	35. 00	*
40.61 * * Vel Total (ft/s) *	*	6. 67	*	Avg. Vel. (ft/s)	*		*	6. 67	*
* Max Chl Dpth (ft)	*	12. 23	*	Hydr. Depth (ft)	*		*	10. 63	*
* Conv. Total (cfs)	*	58691.5	*	Conv. (cfs)	*		*	58691.5	*
* Length Wtd. (ft)	*	10.00	*	Wetted Per. (ft)	*		*	35. 59	*
* Min Ch El (ft)	*	156. 80	*	Shear (Ib/sq ft)	*		*	1. 16	*
* Al pha	*	1. 00	*	Stream Power (lb/ft s)	*		*	7. 77	*
* Frctn Loss (ft)	*	0. 02	*	Cum Volume (acre-ft)	*	363. 57	*	127. 16	*
* C & E Loss (ft)	*	0. 09	*	Cum SA (acres)	*	51. 71	*	9. 31	*
77. 83	**	*****	**	*******	***	*****	**;	*****	**

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

10 00 \*

CROSS SECTION OUTPUT PR		) ************	*****	*****
* E.G. Elev (ft)	* 176.73	* Element	* Left OB	3 * Channel *
Right OB * * Vel Head (ft) *	* 1.19	* Wt. n-Val.	*	* 0.045 *
* W.S. Elev (ft)	* 175.54	* Reach Len. (ft)	* 10.00	* 10.00 *
10.00 * * Crit W.S. (ft) *	* 167.27	* Flow Area (sq ft)	*	* 599.89 *
* E.G. Slope (ft/ft)	*0. 001625	* Area (sq ft)	* 5241.14	* 599.89 *
1255.97 * * Q Total (cfs)	* 5250.00	* Flow (cfs)	*	* 5250.00 *
* Top Width (ft)	* 4462.37	* Top Width (ft)	* 3449.38	* 35.00 *
977. 98 * * Vel Total (ft/s)	* 8.75	* Avg. Vel. (ft/s)	*	* 8.75 *
* Max Chl Dpth (ft)	* 18.74	* Hydr. Depth (ft)	*	* 17.14 *
* Conv. Total (cfs)	*130218.9	* Conv. (cfs)	*	*130218.9 *
* Length Wtd. (ft)	* 10.00	* Wetted Per. (ft)	*	* 35.59 *
* Min Ch El (ft)	* 156.80	* Shear (Ib/sq ft)	*	* 1.71 *
* Al pha	* 1.00	* Stream Power (Ib/ft s)	*	* 14.97 *

```
Duplicate Effective
* Frctn Loss (ft)
                                 * Cum Volume (acre-ft) * 515.11 * 153.30 *
869. 61
                                * Cum SA (acres)
 C & E Loss (ft)
                                                          59.46 * 9.16 *
 86. 28 *
           *****************
Note: Multiple critical depths were found at this location. The critical depth
with the lowest, valid, water surface was used.
BRI DGE
RI VER: RI VER-1
REACH: Reach-1
                RS: 244.19
I NPUT
Description: Bridge #1
THIS IS SMALL RUNWAY CROSSING
Distance from Upstream XS = Deck/Roadway Width =
                              10
                             200
                       =
Weir Coefficient
                             2.7
Upstream Deck/Roadway Coordinates
   num=
         10
    Sta Hi Cord Lo Cord
                          Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
        180 0 550 177.3 0 1900
176.9 0 3940 176.6 0 3944.99
176.6 170.9 3975 176.6 170.9 3975.01
    0
         176. 9
176. 6
   3100
                                                      176. 6
                                                                 0
   3945
                                                      176.6
   5030
          176.6
                     0
Upstream Bridge Cross Section Data
Station Elevation Data num=
   Sta Elev Sta Elev Sta Elev
                                                     El ev Sta
                                               Sta
                                                                      El ev
    0
           180
                550 175
                                 1900
                                                3100
                                                      175
                                                              3500
                                         174
                                                                     174
                                 3940
                                                3960
                                                              3975
                  3890
   3570
           172
                          170
                                         160
                                                      156.8
                                                                      160
   4020
           170
                  4090
                          174
                                 4260
                                         175
                                                4890
                                                        175
                                                              5030
                                                                     176. 2
Manning's n Values
                       num=
  Sťa n Val
                  Sta n Val
                                 Sta
                                       n Val
      0
          . 07
                                 3975 . 07
                  3940 . 045
Bank Sta: Left Right
3940 3975
                       Coeff Contr.
                                   Expan.
                        . 3
                                     . 5
Ineffective Flow
                num=
                             2
        Sta R
                  Elev Permanent
  Sta L
          3940
      0
                 176.9
                        F
   3975
          5030
                 176.6
Downstream Deck/Roadway Coordinates
           9
   num=
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord L
                                              Sta Hi Cord Lo Cord
          180 0 550
176. 9 0 3894. 99
                               177. 3
                                                1900
                                                      177.3
                                          0
   3100
          176. 9
                                                3895
                                                      176.6
                                                              170.9
                                176. 6
                                      0
                                           0
                170. 9 3925. 01
                                                5030
   3925
          176. 6
                                176. 6
                                                      176.6
Downstream Bridge Cross Section Data
Station Elevation Data num= 14
                                Sta El ev
        Elev Sta Elev
                                                Sta El ev
    Sta
                                                               Sta
                                                                      El ev
                                  Page 62
```

```
Duplicate Effective
*************************
                                               172
                                                                           3845
      0
              180 400 175
                                       1550
                                                         3800
                                                               172
                                                                                     170
    3845
              160
                      3885 157.969
                                        3910
                                                         3940
                                                                   160
                                                                           3980
                                                                                     170
                                               156. 7
    4040
              170
                                        4470
                                                 170
                                                         4790
                                                                   176
                      4100
                                168
Manning's n Values
                                         3
                            num=
Sta n Val
                    Sta n Val
                                         Sta
                                               n Val
           . 07
       0
                      3885
                            . 045
                                        3940
                                                . 07
Bank Sta: Left
                  Ri ght
                             Coeff Contr.
                                             Expan.
                    3940
                                                . 5
           3885
                                    . 3
                                   2
Ineffective Flow
                      num=
            Sta R
                      Elev Permanent
   Sta L
             3885
       0
                       176
                                 F
    3940
             4790
                       176
                                  F
Upstream Embankment side slope
                                                       0 horiz. to 1.0 vertical
Downstream Embankment side slope
                                                        0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
                                                       . 98
                                                     176.6
Weir crest shape
                                                = Broad Crested
Number of Bridge Coefficient Sets = 1
Low Flow Methods and Data
        Energy
Selected Low Flow Methods = Energy
High Flow Method
        Pressure and Weir flow
            Submerged Inlet Cd
            Submerged Inlet + Outlet Cd = .7905694
            Max Low Cord
Additional Bridge Parameters
       Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
        Criteria to check for pressure flow = Upstream energy grade line
BRIDGE OUTPUT Profile #1%
                            * E.G. US. (ft)
*Inside BR DS *
                                  175.37 * Element
                                                                       *Inside BR US
* W.S. US. (ft)
                                  175.15 * E.G. Elev (ft)
                                                                             175. 37
174.62
* Q Total (cfs)
                                 2220.00 * W.S. Elev (ft)
                                                                             170.90
170. 90
* Q Bridge (cfs)
                                 2220.00 * Crit W.S. (ft)
                                                                             163.74
162.85
* Q Weir (cfs)
14.20 *
                                           * Max Chl Dpth (ft)
                                                                              14. 10
 Weir Sta Lft (ft)
5.44 *
                                           * Vel Total (ft/s)
                                                                               5.83
* Weir Sta Rgt (ft)
407.93 *
                                           * Flow Area (sq ft)
                                                                             381. 01
* Weir Submerg
                                                                               0.27 *
                                           * Froude # Chl
 0. 25
```

Page 63

* Weir Max Depth (ft) 3151.68 *	*	Duplic		te Effective Specif Force (cu ft)	*	2832. 04	*
* Min El Weir Flow (ft)	*	176. 61	*	Hydr Depth (ft)	*		*
* Min El Prs (ft) 73.55 *	*	170. 90	*	W.P. Total (ft)	*	72. 23	*
* Del ta EG (ft) 42206.5 *	*	0. 75	*	Conv. Total (cfs)	*	38123. 9	*
* Del ta WS (ft)	*	0. 62	*	Top Width (ft)	*		*
* BR Open Area (sq ft)	*	381. 01	*	Frctn Loss (ft)	*		*
* BR Open Vel (ft/s)	*	5. 83	*	C & E Loss (ft)	*		*
* BR SIuice Coef 0.96 *	*		*	Shear Total (Ib/sq ft)	*	1. 12	*
* BR Sel Method 5.21 *	* Pr	ress Only	*	Power Total (lb/ft s)	*	6. 51	*
J. Z I ***********************************	****	*****	* *	*******	***	*****	*****

Note: The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation

was used for pressure flow.

ote: Multiple critical depths were found at this location. The critical depth

with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

# BRIDGE OUTPUT Profile #Floodway

^^^^^	^ ^ ^ ^	^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^		^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	^ ^ ^ ^ ^ ^ ^ ^
*****						
* E.G. US. (ft) *Inside BR DS *	*	176. 25	* Element	*Ins	ide BR US	
* W.S. US. (ft)	*	176. 05	* E.G. Elev (ft)	*	176. 25	*
175.49 * * Q Total (cfs) 170.90 *	*	2220. 00	* W.S. Elev (ft)	*	170. 90	*
* Q Bridge (cfs) 162.85 *	*	2220. 00	* Crit W.S. (ft)	*	163. 74	*
* Q Weir (cfs) 14.20 *	*		* Max Chl Dpth (ft)	*	14. 10	*
* Weir Sta Lft (ft) 5.44 *	*		* Vel Total (ft/s)	*	5. 83	*
* Weir Sta Rgt (ft) 407.93 *	*		* Flow Area (sq ft)	*	381. 01	*
* Weir Submerg	*		* Froude # Chl	*	0. 27	*
0.25 * * Weir Max Depth (ft) 3151.68 *	*		* Specif Force (cu ft)	*	2832. 04	*
* Min El Weir Flow (ft)	*	176. 61	* Hydr Depth (ft)	*		*
* Min El Prs (ft) 73.55 *	*	170. 90	* W.P. Total (ft)	*	72. 23	*
* Del ta EG (ft) 42206.5 *	*	0. 76	* Conv. Total (cfs)	*	38123. 9	*
* Del ta WS (ft)	*	0. 64	* Top Width (ft)	*		*
* BR Open Area (sq ft)	*	381. 01	* Frctn Loss (ft)	*		*
* BR Open Vel (ft/s)	*	5. 83	* C & E Loss (ft)	*		*
* BR Sluice Coef	*		* Shear Total (lb/sq ft) Page 64	*	1. 12	*

0.96 *	Бартте	ate Effective				
* BR Sel Method	* Press Only	* Power Total	(lb/ft s)	*	6. 51	*
5. 21 *			(. 5, . 1 5)		0.0.	
******	*****	* * * * * * * * * * * * * * * *	******	*****	*****	*****
*****						

The downstream water surface is above the minimum elevation required for Note: orifice flow. The orifice flow equation

was used for pressure flow.

Multiple critical depths were found at this location. The critical depth Note: with the lowes't, valid, water surface was used. Multiple critical depths were found at this location. Note: The critical depth with the lowest, valid, water surface was used.

### BRIDGE OUTPUT Profile #10%

\*\*\*\*\*

*****							
* E.G. US. (ft)	*	170. 14	*	Element	*In	side BR US	
*Inside BR DS * * W.S. US. (ft)	*	169. 13	*	E.G. Elev (ft)	*	169. 95	*
168. 22 *	*	3025. 00		W.S. Elev (ft)	*	168. 45	*
166. 25 *		3023.00		` ,		100. 40	
* Q Bridge (cfs) 164.11 *	*	3025. 00	*	Crit W.S. (ft)	*	165. 01	*
* Q Weir (cfs) 9.55 *	*		*	Max Chl Dpth (ft)	*	11. 65	*
* Weir Sta Lft (ft)	*		*	Vel Total (ft/s)	*	9. 84	*
11.27 * * Weir Sta Rgt (ft) 268.37 *	*		*	Flow Area (sq ft)	*	307. 43	*
* Weir Submerg	*		*	Froude # Chl	*	0. 51	*
0.64 * * Weir Max Depth (ft)	*		*	Specif Force (cu ft)	*	2510. 90	*
2262.91 * * Min El Weir Flow (ft) 8.95 *	*	176. 61	*	Hydr Depth (ft)	*	10. 25	*
* Min El Prs (ft)	*	170. 90	*	W.P. Total (ft)	*	39. 30	*
48.09 * * Delta EG (ft)	*	2. 69	*	Conv. Total (cfs)	*	40000. 2	*
27881.3 * * Delta WS (ft)	*	2. 26	*	Top Width (ft)	*	30.00	*
* BR Open Area (sq ft)	*	381.01	*	Frctn Loss (ft)	*	1. 59	*
0.08 * * BR Open Vel (ft/s) 0.70 *	*	11. 27	*	C & E Loss (ft)	*	0. 14	*
* BR SI ui ce Coef 4.10 *	*		*	Shear Total (1b/sq ft)	*	2. 79	*
* BR Sel Method 46.23 *	*Ene	ergy only	*	Power Total (lb/ft s)	*	27. 48	*
40. 23	****	*****	* *	******	***	****	*****

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowes't, valid, water surface was used. Warning: The velocity head has changed by more than 0.5 ft (0.15 m). Page 65

indicate the need for additional cross

sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth

with the lowest, valid, water surface was used.

### BRIDGE OUTPUT Profile #2%

***********************	****	*****	**	* * * * * * * * * * * * * * * * * * * *	***	****	*****
* E.G. US. (ft)	*	169. 72	*	Element	*Ir	nside BR US	
*Inside BR DS *  * W.S. US. (ft)	*	169. 03	*	E.G. Elev (ft)	*	169. 61	*
168.77 * * Q Total (cfs)	*	2480. 00	*	W.S. Elev (ft)	*	168. 63	*
167.80 * * 0 Bridge (cfs)	*	2480. 00	*	Crit W.S. (ft)	*	164. 17	*
163.27 * * Q Weir (cfs)	*		*	Max Chl Dpth (ft)	*	11. 83	*
11.10 * * Weir Sta Lft (ft)	*		*	Vel Total (ft/s)	*	7. 93	*
7.87 * * Weir Sta Rgt (ft)	*		*	Flow Area (sq ft)	*	312. 90	*
315.04 * * Weir Submerg	*		*	Froude # Chl	*	0. 41	*
0.42 * * Weir Max Depth (ft)	*		*	Specif Force (cu ft)	*	2253. 31	*
2263.74 * * Min El Weir Flow (ft)	*	176. 61	*	Hydr Depth (ft)	*	10. 43	*
10.50 * * Min El Prs (ft)	*	170. 90	*	W.P. Total (ft)	*	39. 30	*
49.60 * * Delta EG (ft)	*	1. 31	*	Conv. Total (cfs)	*	41194. 7	*
35677.7 * ` ´ * Del ta WS (ft)	*	0. 92		Top Width (ft)	*	30. 00	*
30.00 *	*	381. 01		Frctn Loss (ft)	*	0. 83	*
0.03 * * BR Open Vel (ft/s)	*	7. 93		C & E Loss (ft)	*	0. 01	*
0.33 * * BR Sluice Coef	*	,,,,		Shear Total (Ib/sq ft)	*	1. 80	*
1.92 * * BR Sel Method	*Ena	erav only		Power Total (lb/ft s)		14, 28	*
15. 08 * *********************************							*****

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross

sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #0.2% \*\*\*\*\*

\*\*\*\*\*

#1 I I BB BO #		Dupi i d	ite Effective	
*Inside BR DS * * W.S. US. (ft) 176.73 *	*	175. 54	* E.G. Elev (ft)	*
* Q Total (cfs)	*	5250.00	* W.S. Elev (ft)	*
* Q Bridge (cfs)	*	5129. 04	* Crit W.S. (ft)	*
167.14 * * Q Weir (cfs)	*	131. 17	* Max Chl Dpth (ft)	*
18.84 * * Weir Sta Lft (ft)	*	3940. 00	* Vel Total (ft/s)	*
9.60 * * Weir Sta Rgt (ft)	*	5030.00	* Flow Area (sq ft) *	*
546.77 * * Weir Submerg	*	0.00	* Froude # ChI	*
0.52 * * Weir Max Depth (ft)	*	0. 13	* Specif Force (cu ft) * 6446.25	*
6768.94 * * Min El Weir Flow (ft)	*	176. 61	* Hydr Depth (ft) *	*
* Min El Prs (ft) 86.10 *	*	170. 90	* W.P. Total (ft)	*
* Del ta EG (ft)	*	5. 46	* Conv. Total (cfs) *	*
* Delta WS (ft)	*	5. 18	* Top Width (ft) *	*
* BR Open Area (sq ft)	*	381. 01	* Frctn Loss (ft) *	*
* BR Open Vel (ft/s)	*	13. 46	* C & E Loss (ft) *	*
* BR SIuice Coef	*	0. 48	* Shear Total (Ib/sq ft) *	*
* BR Sel Method	*	Press/Weir	* Power Total (lb/ft s) *	*
*********	***	******	*********	******

\*\*\*\*\*

Momentum answer is not valid if the water surface is above the low chord or Note: if there is weir flow. The momentum answer has been disregarded.

The downstream water surface is below the minimum elevation for pressure Note: The sluice gate equations were flow. used for pressure flow.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

For the cross section inside the bridge at the upstream end, the water Note: surface and energy have been projected

from the upstream cross section. The selected bridge modeling method does

not compute answers inside the bridge.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: For the cross section inside the bridge at the downstream end, the energy

is based on critical depth over the weir.

The water surface has been projected.

### CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 243.38

I NPUT

Description: XS 243.38

MANASSAS MUNICIPAL AIRPORT - TAXIWAY AND RUNWAY Page 67

THI S	
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THE DOWNSTI	REAM FACE OF THE TAXIWAY FROM EFFECTIV	VE MODEL	
Station Elevation Data Sta Elev Sta	num= 14	Elev St	
0 180 400	0 175 1550 172 3800 5 157. 969 3910 156. 7 3940	172 384 160 398 176	5 170
Manni ng's n Values Sta n Val Sta ************************************	******		
Bank Sta: Left Right 3885 3940 Ineffective Flow nur Sta L Sta R Elev 0 3885 176 3940 4790 176	Lengths: Left Channel Right ( 600 600 300 m= 2 v Permanent 6 F	Coeff Contr .3	. Expan. . 5
	rofile #1% *************	*****	*****
********* * E. G. El ev (ft)	* 174.62 * Element	* Left OB	* Channel *
Right OB * * Vel Head (ft)	* 0.09 * Wt. n-Val.	*	* 0.045 *
* W.S. Elev (ft)	* 174.53 * Reach Len. (ft)	* 600.00	* 600.00 *
300.00 * * Crit W.S. (ft) *	* 161.59 * Flow Area (sq ft)	*	* 915.03 *
* E.G. Slope (ft/ft) 3574.56 *	*0.000128 * Area (sq ft)	* 7684.73	* 915.03 *
* Q Total (cfs)	* 2220.00 * Flow (cfs)	*	* 2220.00 *
* Top Width (ft) 771.35 *	* 4129.41 * Top Width (ft)	* 3303.06	* 55.00 *
* Vel Total (ft/s)	* 2.43 * Avg. Vel. (ft/s)	*	* 2.43 *
* Max Chl Dpth (ft)	* 17.83 * Hydr. Depth (ft)	*	* 16.64 *
* Conv. Total (cfs)	*196403.6 * Conv. (cfs)	*	*196403.6 *
* Length Wtd. (ft)	* 521.11 * Wetted Per. (ft)	*	* 55.21 *
* Min Ch El (ft) *	* 156.70 * Shear (Ib/sq ft)	*	* 0.13 *
* Al pha *	* 1.00 * Stream Power (Ib/ft s)	*	* 0.32 *
* Frctn Loss (ft) 1470.54 *	* 0.01 * Cum Volume (acre-ft)	* 900.69	* 194.84 *
* C & E Loss (ft) 88.13 *	* 0.04 * Cum SA (acres)	* 109.34 *****	* 9.14 * *******

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT	Profile #Floo	olicate Effective dway *******		
*****	* * * * * * * * * * * * * * * * * * * *	******	^ ^ ^ ^	******
* E.G. Elev (ft) Right OB *	* 175.49	* Element	*	Left OB * Channel *
* Vel Head (ft)	* 0.08	* Wt. n-Val.	*	* 0.045 *
* W.S. Elev (ft) 300.00 *	* 175.41	* Reach Len. (ft)	*	600.00 * 600.00 *
* Crit W.S. (ft)	* 161.59	* Flow Area (sq ft)	*	* 963.63 *
* E.G. Slope (ft/ft)	*0.000108	* Area (sq ft)	*	708.85 * 963.63 *
470.45 * * Q Total (cfs)	* 2220.00	* Flow (cfs)	*	* 2220.00 *
* Top Width (ft)	* 155.00	* Top Width (ft)	*	50.00 * 55.00 *
50.00 * * Vel Total (ft/s)	* 2.30	* Avg. Vel. (ft/s)	*	* 2.30 *
* Max Chl Dpth (ft)	* 18.71	* Hydr. Depth (ft)	*	* 17.52 *
* Conv. Total (cfs)	*214094.9	* Conv. (cfs)	*	*214094.9 *
* Length Wtd. (ft)	* 600.00	* Wetted Per. (ft)	*	* 55. 21 *
* Min Ch El (ft)	* 156.70	* Shear (Ib/sq ft)	*	* 0.12 *
* Al pha	* 1.00	* Stream Power (lb/ft s	) *	* 0.27 *
* Frctn Loss (ft)	* 0.06	* Cum Volume (acre-ft)	*	54. 17 * 203. 04 *
453.11 * * C & E Loss (ft)	* 0.02	* Cum SA (acres)	*	2. 19 * 9. 14 *
	*****	******	***	******
********** Note: Multiple crit	ical denths w	ere found at this locati	on	The critical depth
with the lowest, valid	, water surfa	ce was used.		The Given and Goptin
****	Profile #10% ******	******	***	*****
********* * E.G. Elev (ft)	* 167.45	* Element	*	Left OB * Channel *
Right OB * * Vel Head (ft)	* 0.58	* Wt. n-Val.	*	* 0.045 *
* W.S. Elev (ft)	* 166.87	* Reach Len. (ft)	*	600.00 * 600.00 *
300.00 * * Crit W.S. (ft)	* 162.43	* Flow Area (sq ft)	*	* 493.80 *
* * E.G. Slope (ft/ft)	*0. 001854	* Area (sq ft)	*	315. 28 * 493. 80 *
94.30 * * 0 Total (cfs)	* 3025.00	* Flow (cfs)	*	* 3025.00 *
* Top Width (ft)	* 122.47	* Top Width (ft)	*	40.00 * 55.00 *
27'. 47 * * Vel Total (ft/s)	* 6. 13	* Avg. Vel. (ft/s)	*	* 6.13 *
* ` ´ * Max Chl Dpth (ft)	* 10.17	* Hydr. Depth (ft)	*	* 8.98 *
* Conv. Total (cfs)	* 70254.4	* Conv. (cfs)	*	* 70254.4 *
* Length Wtd. (ft)	* 593.89	* Wetted Per. (ft) Page 69	*	* 55.21 *

Duplicate Effective											
* Min Ch El (ft)	* 156.70	* Shear (Ib/sq ft)	*	* 1.04 *							
* Al pha	* 1.00	* Stream Power (lb/ft s)	*	* 6.34 *							
* Frctn Loss (ft)	* 0.75	* Cum Volume (acre-ft)	*	265. 90 * 106. 70 *							
304.79 * * C & E Loss (ft)	* 0.17	* Cum SA (acres)	*	46. 07 * 9. 14 *							
67. 94 * **********************************											
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.											
CROSS SECTION OUTPUT F	Profile #2% ******	******	***	*****							
* E.G. Elev (ft)	* 168.40	* Element	*	Left OB * Channel *							
Right OB * * Vel Head (ft)	* 0.30	* Wt. n-Val.	*	* 0.045 *							
* W.S. Elev (ft)	* 168.10	* Reach Len. (ft)	*	600.00 * 600.00 *							
300.00 * * Crit W.S. (ft)	* 161.87	* Flow Area (sq ft)	*	* 561.71 *							
* E.G. Slope (ft/ft)	*0. 000811	* Area (sq ft)	*	364.67 * 561.71 *							
132.36 * * 0 Total (cfs)	* 2480.00	* Flow (cfs)	*	* 2480.00 *							
* Top Width (ft)	* 149.18	* Top Width (ft)	*	40.00 * 55.00 *							
54.18 * * Vel Total (ft/s) *	* 4.42	* Avg. Vel. (ft/s)	*	* 4.42 *							
* Max Chl Dpth (ft)	* 11.40	* Hydr. Depth (ft)	*	* 10. 21 *							
* Conv. Total (cfs)	* 87083.8	* Conv. (cfs)	*	* 87083.8 *							
* Length Wtd. (ft)	* 584.09	* Wetted Per. (ft)	*	* 55. 21 *							
* Min Ch El (ft)	* 156.70	* Shear (Ib/sq ft)	*	* 0.52 *							
* Al pha *	* 1.00	* Stream Power (Ib/ft s)	*	* 2.27 *							
* Frctn Loss (ft) 534.78 *	* 0. 26	* Cum Volume (acre-ft)	*	363. 46 * 125. 43 *							
* C & E Loss (ft) 77.81 *	* 0.11	* Cum SA (acres)	*	51.70 * 9.14 *							
	******	*******	***	******							
Warning: The conveyance is less than 0.7 or great 1.4. This may Note: Multiple criti	Warning: Divided flow computed for this cross-section. Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.										
CROSS SECTION OUTPUT F		% ***********	***	*****							

Dur	olicate Effective								
* 0.91	* Wt. n-Val.	*		*	0. 045	*			
* 170. 36	* Reach Len. (ft)	*	600.00	*	600.00	*			
* 164.45	* Flow Area (sq ft)	*		*	686. 19	*			
*0. 001865	* Area (sq ft)	*	456. 70	*	686. 19	*			
* 5250.00	* Flow (cfs)	*		*	5250. 00	*			
* 652.65	* Top Width (ft)	*	48. 21	*	55.00	*			
* 7.65	* Avg. Vel. (ft/s)	*		*	7. 65	*			
* 13.66	* Hydr. Depth (ft)	*		*	12. 48	*			
*121571.9	* Conv. (cfs)	*		*1	21571. 9	*			
* 551.00	* Wetted Per. (ft)	*		*	55. 21	*			
* 156. 70	* Shear (lb/sq ft)	*		*	1. 45	*			
* 1.00	* Stream Power (Ib/ft s)	*		*	11. 07	*			
* 0.36	* Cum Volume (acre-ft)	*	514. 40	*	151. 12	*			
* 0.40	* Cum SA (acres)	*	59. 05	*	9. 14	*			
86.04 * ***********************************									
	* 0.91  * 170.36  * 164.45  *0.001865  * 5250.00  * 652.65  * 7.65  * 13.66  *121571.9  * 551.00  * 156.70  * 1.00  * 0.36  * 0.40	* 170.36 * Reach Len. (ft)  * 164.45 * Flow Area (sq ft)  *0.001865 * Area (sq ft)  * 5250.00 * Flow (cfs)  * 652.65 * Top Width (ft)  * 7.65 * Avg. Vel. (ft/s)  * 13.66 * Hydr. Depth (ft)  *121571.9 * Conv. (cfs)  * 551.00 * Wetted Per. (ft)  * 156.70 * Shear (lb/sq ft)  * 1.00 * Stream Power (lb/ft s)  * 0.36 * Cum Volume (acre-ft)  * 0.40 * Cum SA (acres)	* 0.91 * Wt. n-Val. *  * 170.36 * Reach Len. (ft) *  * 164.45 * Flow Area (sq ft) *  *0.001865 * Area (sq ft) *  * 5250.00 * Flow (cfs) *  * 652.65 * Top Width (ft) *  * 7.65 * Avg. Vel. (ft/s) *  * 13.66 * Hydr. Depth (ft) *  *121571.9 * Conv. (cfs) *  * 551.00 * Wetted Per. (ft) *  * 156.70 * Shear (lb/sq ft) *  * 0.36 * Cum Volume (acre-ft) *  * 0.40 * Cum SA (acres) *	* 0.91 * Wt. n-Val.	* 0.91 * Wt. n-Val.	* 0.91 * Wt. n-Val.			

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

### CROSS SECTION

RIVER: RIVER-1 REACH: Reach-1

RS: 243.2

I NPUT

Description: XS 243.2 INSERTED XS TO EVALUATE IMPACT OF PROPOSED SITE(5/21/01)

Stat	ion El	evation	Data	num=	20					
	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
***	****	******	*****	****	*****	*****	*****	*****	*****	****
	0	184	220	180	1780	178	1990	176	2650	174
	2840	172	3045	170	3105	166	3450	166	3485	160
	3520	155. 1	3560	160	3580	164	3600	166	3700	168
	3900	168	4100	166	4450	165	4750	168	4900	176

Manni ng' s	n Values		num=	3	
Sťa	n Val	Sta	n Val	Sta	n Val
******	******	*****	*****	*****	****
0	. 07	3485	. 045	3560	. 07

Bank Sta: Left Coeff Contr. Ri ght Lengths: Left Channel Ri ght Expan. Page 71

### Duplicate Effective 3485 3560 730 730 200 . 1 . 3 Ineffective Flow 2 num= Sta R Elev Permanent Sta L 3445 180 0 F 4145 4900 180 CROSS SECTION OUTPUT Profile #1% ~~ \* \*\*\*\*\* \* E.G. Elev (ft) 174. 56 \* Element Left OB \* Channel \* Right OB \* \* Wt. n-Val. 0.045 Vel Head (ft) 0.00 0.070 0.070 174.56 \* W.S. Elev (ft) \* Reach Len. (ft) 730.00 730.00 200.00 \* Crit W.S. (ft) 160.58 \* Flow Area (sq ft) 447.24 \* 1275.45 4408. 12 \* E.G. Slope (ft/ft) \* Area (sq ft) \*0.000011 \* 4825.21 \* 1275.45 \*10009.51 \* Q Total (cfs) \* 2220.00 \* Flow (cfs) 152.90 899.57 1167. 54 Top Width (ft) \* 2406.38 \* Top Width (ft) 1018.46 75.00 1312. 92 Vel Total (ft/s) 0.36 \* Avg. Vel. (ft/s) 0.34 0.71 0. 26 Max Chl Dpth (ft) 19.46 \* Hydr. Depth (ft) 11.18 17.01 7.54 \* \* Conv. Total (cfs) \*683445.4 \* Conv. (cfs) \* 47070.5 \*276938.7 \*359436. 2 Length Wtd. (ft) 443.36 \* Wetted Per. (ft) 40.51 75.64 585. 53 \* Shear (lb/sq ft) \* Min Ch El (ft) 155. 10 0.01 0.01 0.00 Al pha 1.88 \* Stream Power (lb/ft s) \* 0.00 0.01 0.00 \* Frctn Loss (ft) 0.00 \* Cum Volume (acre-ft) 814. 53 179.76 1423. 77 C & E Loss (ft) 0.00 \* Cum SA (acres) 79.57 8.25 80. 95 \* Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections. Multiple critical depths were found at this location. The critical depth Note: with the lowest, valid, energy was used. CROSS SECTION OUTPUT Profile #Floodway \*\*\*\*\*\* \* E.G. Elev (ft) 175.41 \* Element Left OB \* Channel \* Right OB \* Vel Head (ft) 0.04 \* Wt. n-Val. 0.045 \* W.S. Elev (ft) 175.37 730.00 \* \* Reach Len. (ft) 730.00 200.00 \* Crit W.S. (ft) \* Flow Area (sq ft) \* 1336.58 160. 56 \* E.G. Slope (ft/ft) \*0.000087 \* Area (sq ft) \* 1336.58 \* Q Total (cfs) \* 2220.00 \* Flow (cfs) \* 2220.00

```
Duplicate Effective
                           75.00 * Top Width (ft)
* Top Width (ft)
                                                                       75.00 *
* Vel Total (ft/s)
                           1.66 * Avg. Vel. (ft/s)
                                                                        1.66
                                 * Hydr. Depth (ft)
                           20. 27
* Max Chl Dpth (ft)
                                                                       17.82
* Conv. Total (cfs)
                       *238520.9
                                 * Conv. (cfs)
                                                                    *238520.9
                                 * Wetted Per. (ft)
* Length Wtd. (ft)
                          730.00
                                                                      106.38
* Min Ch El (ft)
                          155. 10
                                 * Shear (lb/sq ft)
                                                                        0.07
* Al pha
                            1.00
                                 * Stream Power (lb/ft s) *
                                                                        0.11
* Frctn Loss (ft)
                            0.04
                                 * Cum Volume (acre-ft)
                                                             49. 29
                                                                      187.20
451. 49
* C & E Loss (ft)
                            0.01 * Cum SA (acres)
                                                              1.84
                                                                        8.25
************************************
*****
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

### CROSS SECTION OUTPUT Profile #10%

****							
* E.G. Elev (ft)	* 166.54	* Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	* 0. 25	* Wt. n-Val.	*	0. 070	*	0. 045	*
0.070 * * W.S. Elev (ft)	* 166. 29	* Reach Len. (ft)	*	730. 00	*	730. 00	*
200.00 * * Crit W.S. (ft)	* 161.30	* Flow Area (sq ft)	*	116. 43	*	655. 18	*
133.30 * * E.G. Slope (ft/ft)	*0. 000909	* Area (sq ft)	*	214. 17	*	655. 18	*
475.18 * * 0 Total (cfs) 123.29 *	* 3025.00	* Flow (cfs)	*	150. 63	*	2751. 08	*
123.29 *` * Top Width (ft)	* 1020.70	* Top Width (ft)	*	384. 29	*	75. 00	*
561.42 * ` ´ * Vel Total (ft/s)	* 3.34	* Avg. Vel. (ft/s)	*	1. 29	*	4. 20	*
0.92 * * Max Chl Dpth (ft)	* 11.19	* Hydr. Depth (ft)	*	2. 91	*	8. 74	*
1. 04 *		,	*		+		*
* Conv. Total (cfs) 4089.3 *	*100330.3	* Conv. (cfs)	^	4995. 8	^	91245. 2	^
* Length Wtd. (ft) 128.35 *	* 694.59	* Wetted Per. (ft)	*	40. 51	*	75. 64	*
* Min Ch El (ft) 0.06 *	* 155. 10	* Shear (Ib/sq ft)	*	0. 16	*	0. 49	*
* Al pha	* 1.45	* Stream Power (lb/ft s)	*	0. 21	*	2. 06	*
* Frctn Loss (ft)	* 0. 22	* Cum Volume (acre-ft)	*	262. 26	*	98. 79	*
302.83 * * C & E Loss (ft)	* 0.06	* Cum SA (acres)	*	43. 15	*	8. 25	*
65. 91 * ******************	*****	******	***	*****	**:	*****	**
*****							

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Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

### CROSS SECTION OUTPUT Profile #2%

```
* E.G. Elev (ft)
                           168. 04
                                   * Element
                                                                Left OB *
                                                                           Channel *
Right OB *
  Vel Head (ft)
                              0.09
                                    * Wt. n-Val.
                                                                 0.070
                                                                            0.045
  0.070
 W.S. Elev (ft)
                            167.95
                                    * Reach Len. (ft)
                                                                730.00
                                                                           730.00
 200.00
* Crit W.S. (ft)
                            160.81
                                    * Flow Area (sq ft)
                                                                182.96
                                                                           779.93
 553.49
* E.G. Slope (ft/ft)
                                    * Area (sq ft)
                                                                874.15
                         *0.000279
                                                                           779. 93
1754. 93
 Q Total (cfs)
                         * 2480.00
                                    * Flow (cfs)
                                                                177.39
                                                                          2039.48
 263. 12
 Top Width (ft)
                                    * Top Width (ft)
                                                                409.24
                                                                            75.00
                         * 1461.51
 977. 27
* Vel Total (ft/s)
                              1.64
                                    * Avg. Vel. (ft/s)
                                                                  0.97
                                                                             2.61
  0.48
* Max Chl Dpth (ft)
                             12.85
                                    * Hydr. Depth (ft)
                                                                  4.57
                                                                            10.40
   1.47
                                    * Conv. (cfs)
* Conv. Total (cfs)
                         *148356.5
                                                             * 10611.9
                                                                        *122004.3
15740.3
 Length Wtd. (ft)
                            636.83
                                    * Wetted Per. (ft)
                                                                 40.51
                                                                            75.64
 377.89
* Min Ch El (ft)
                            155. 10
                                    * Shear (lb/sq ft)
                                                                  0.08
                                                                             0.18
  0.03
                              2.14
                                    * Stream Power (lb/ft s) *
                                                                  0.08
 Al pha
                                                                             0.47
  0.01
 Frctn Loss (ft)
                                    * Cum Volume (acre-ft)
                              0.05
                                                                354.93
                                                                           116. 19
 528. 28
                              0.02
                                   * Cum SA (acres)
 C & E Loss (ft)
                                                                 48. 61
                                                                             8. 25
  74. 26
```

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# CROSS SECTION OUTPUT Profile #0.2%

*****	× × ×	*****	× ×	******	× × 7	*****	× × ×	*****	: ×
*****									
* E.G. Elev (ft)	*	170. 51	*	Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft) 0.070 *	*	0. 10	*	Wt. n-Val.	*	0. 070	*	0. 045	*
* W. S. Elev (ft) 200.00 *	*	170. 41	*	Reach Len. (ft)	*	730. 00	*	730. 00	*
* Crit W.S. (ft) 1982.13 *	*	162. 97	*	Flow Area (sq ft)	*	281. 36	*	964. 42	*
* E.G. Slope (ft/ft) 4726.06 *	*0	. 000327	*	Area (sq ft)	*	1933. 51	*	964. 42	*

Duplicate Effective											
* 0 Total (cfs) 1714.91 *	*			Flow (cfs)	*	393. 04	*	3142. 05	*		
* Top Width (ft) 1235.17 *	*	1792. 09	*	Top Width (ft)	*	481. 92	*	75. 00	*		
* Vel Total (ft/s) 0.87 *	*	1. 63	*	Avg. Vel. (ft/s)	*	1. 40	*	3. 26	*		
* Max Chl Dpth (ft) 3.39 *	*	15. 31	*	Hydr. Depth (ft)	*	7. 03	*	12. 86	*		
* Conv. Total (cfs)	*2	290405. 4	*	Conv. (cfs)	*	21741. 2	*1	73803. 5	*		
* Length Wtd. (ft)	*	535. 37	*	Wetted Per. (ft)	*	40. 51	*	75. 64	*		
* Min Ch El (ft)	*	155. 10	*	Shear (Ib/sq ft)	*	0. 14	*	0. 26	*		
* Al pha	*	2. 55	*	Stream Power (lb/ft s)	*	0. 20	*	0. 85	*		
* Frctn Loss (ft)	*	0.06	*	Cum Volume (acre-ft)	*	497. 94	*	139. 76	*		
850.16 * * C & E Loss (ft)	*	0. 03	*	Cum SA (acres)	*	55. 40	*	8. 25	*		
79.90 *	***	******	**	*****	**:	*****	***	*****	**		
******											

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

### CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1 RS: 243

I NPUT

Description: XS 243

JUST UPSTREAM OF CANNON BRANCH

Stat	ion Ele	evation	Data	num=	18					
	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	Elev
***	****	*****	*****	*****	*****	*****	*****	*****	*****	*****
	0	180	20	178	100	176	330	172	520	170
	570	168	660	166	680	160	1250	160	1300	153. 2
	1350	160	1360	164	2070	166	2120	168	2340	168
	2490	166	3170	166	3280	176				

Manni ng' s	n Values		num=	3	
	n Val		n Val	Sta	n Val
*****	******	*****	*****	*****	*****
0	. 07	1250	. 045	1350	. 07

Bank Sta: Left	Ri ght	Lengths:	Left	Channel	Ri ght	Coeff Contr.	Expan.
1250	1350	Ü	4920	3938	1480	. 1	. 3
Ineffective Flow	w num=	2					

Sta R Elev Permanent Sta L 1080 180 0 F 2510 3280 180

\* E.G. Elev (ft) Right OB \* \* 174.56 \* Element \* Left OB \* Channel \*

* Vel Head (ft)		olicate Effective * Wt. n-Val.	*	0. 070	*	0. 045	*
0.070 * * W.S. Elev (ft) 1480.00 *	* 174.56	* Reach Len. (ft)	*	4920. 00	*	3938. 00	*
* Cri t W.S. (ft) *10035.60 *	* 158.84	* Flow Area (sq ft)	*	2474. 61	*	1795. 66	
* E. G. Slope (ft/ft) *16085.60 *	*0.000002	* Area (sq ft)	*	10349. 93	*	1795. 66	
* Q Total (cfs) 1233, 79 *	* 2220.00	* Flow (cfs)	*	430. 59	*	555. 63	*
* Top Width (ft) 1914.12 *	* 3081.12	* Top Width (ft)	*	1067. 00	*	100.00	*
* Vel Total (ft/s) 0.12 *	* 0.16	* Avg. Vel. (ft/s)	*	0. 17	*	0. 31	*
* Max Chl Dpth (ft) 8.65 *	* 21.36	* Hydr. Depth (ft)	*	14. 56	*	17. 96	*
* Conv. Total (cfs) *897341.7 *	*1614621.0	* Conv. (cfs)		*313167.8	7	*404111. 6	
* Length Wtd. (ft) 1160.83 *	* 2256.30	* Wetted Per. (ft)	*	170. 00	*	100. 92	*
* Min Ch El (ft) 0.00 *	* 153. 20	* Shear (Ib/sq ft)	*	0.00	*	0.00	*
* Al pha 0.00 *	* 1.59	* Stream Power (Ib/ft s)	*	0.00	*	0.00	*
* Frctn Loss (ft) 1363.86 *	* 0.00	* Cum Volume (acre-ft)	*	687. 38	*	154. 02	*
* C & E Loss (ft) 73.54 *	* 0.00	* Cum SA (acres)	*	62. 10	*	6. 78	*
73.34	*****	*******	**	*****	**;	* * * * * * * * *	**

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

### CROSS SECTION OUTPUT Profile #Floodway

**************************************	*****	********	*****	*****
* E.G. Elev (ft)	* 175.37	* Element	* Left OB	* Channel *
Right OB * * Vel Head (ft) *	* 0.02	* Wt. n-Val.	*	* 0.045 *
* W.S. Elev (ft) 1480.00 *	* 175.35	* Reach Len. (ft)	* 4920.00	* 3938.00 *
* Crit W.S. (ft)	* 158.83	* Flow Area (sq ft)	*	* 1874.61 *
* E.G. Slope (ft/ft)	*0.000037	* Area (sq ft)	*	* 1874.61 *
* Q Total (cfs)	* 2220.00	* Flow (cfs)	*	* 2220.00 *
* Top Width (ft)	* 100.00	* Top Width (ft)	*	* 100.00 *
* Vel Total (ft/s)	* 1.18	* Avg. Vel. (ft/s)	*	* 1.18 *
* Max Chl Dpth (ft)	* 22. 15	* Hydr. Depth (ft)	*	* 18.75 *
* Conv. Total (cfs)	*363722.1	* Conv. (cfs)	*	*363722.1 *
* Length Wtd. (ft)	* 3159.68	* Wetted Per. (ft)	*	* 131.61 *
* Min Ch El (ft)	* 153. 20	* Shear (Ib/sq ft) Page 76	*	* 0.03 *

* Al pha *	*	1.00	* Stream Power (lb/ft s)	*		*	0. 04	*
* Frctn Loss (ft) 451 49 *	*	0.05	* Cum Volume (acre-ft)	*	49. 29	*	160. 29	*
* C & E Loss (ft)	*	0. 01	* Cum SA (acres)	*	1. 84	*	6. 78	*
7.00	****	*****	******	***	*****	***	*****	**
*****								

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

### CROSS SECTION OUTPUT Profile #10% \*

* E.G. Elev (ft)	*****										
* Vel Head (ft)		* 166. 25	* Element	*	Left OB	*	Channel	*			
* W. S. Elev (ft)	* Vel Head (ft)	* 0.04	* Wt. n-Val.	*	0. 070	*	0. 045	*			
1480.00 *     * Crit W.S. (ft)	0.070	* 166 22	* Reach Len (ft)	*	4920 00	*	3938 00	*			
* Crit W. S. (ft)		100. 22	Redell Len. (11)		4720.00		3730.00				
* E.G. Slope (ft/ft)  1057.52 *  * 0 Total (cfs)	* Crit W.S. (ft)	* 159.58	* Flow Area (sq ft)	*	1057. 02	*	961. 78	*			
* Q Total (cfs)	* E.G. Slope (ft/ft)	*0.000158	* Area (sq ft)	*	3609. 55	*	961. 78	*			
280.96 *     * Top Width (ft)		* 3025.00	* Flow (cfs)	*	952. 28	*	1791. 76	*			
* Vel Total (ft/s)	280. 96 *										
* Vel Total (ft/s)	* Top Width (ft)	* 2123.97	* Top Width (ft)	*	599. 80	*	100. 00	*			
* Max Chl Dpth (ft)											
* Max Chl Dpth (ft)		* 1.03	* Avg. Vel. (ft/s)	*	0. 90	*	1. 86	*			
1. 20 *     * Conv. Total (cfs)											
* Conv. Total (cfs)		* 13.02	* Hydr. Depth (ft)	*	6. 22	*	9. 62	*			
22384.5 * * Length Wtd. (ft)	1. 20	*2/1008 /	* Conv (cfs)	*	75870 2	* -	1/2753 7	*			
* Length Wtd. (ft)		241000.4	conv. (crs)		73070. 2		142/33.7				
762.56 *  * Min Ch El (ft)		* 3068.73	* Wetted Per. (ft)	*	170. 00	*	100. 92	*			
0.01 *  * Alpha			` '								
* Alpha	* Min Ch El (ft)	* 153. 20	* Shear (Ib/sq ft)	*	0.06	*	0.09	*			
0.00 *  * Frctn Loss (ft)	0.01										
* Frctn Loss (ft)		* 2.18	* Stream Power (Ib/ft s)	*	0. 06	*	0. 17	*			
299. 32 * * * * * * * * * * * * * * * * * *	0.00	4 0 00	* O V I ( CI)		000 00		05.04				
		^ 0. 28	^ cum volume (acre-rt)	^	230. 22	^	85. 24	^			
		* 0.01	* Cum SA (00ros)	*	24.00	*	4 70	*			
61.36 *	* C & E Loss (ft)	0.01	cuiii sa (acres)		34. 90		0.78				
OI. JO  ***********************************	- · · · · ·										

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

\*\*\*\*\*

CROSS SECTION OUTPUT Profile #2% \*\*\*\*\*

\* E.G. Elev (ft) \* 167.96 \* Element Page 77 \* Left OB \* Channel \*

		սաբ	'	cate Effective					
Right OB *  * Vel Head (ft) 0.070 *	*	0. 01	*	Wt. n-Val.	*	0. 070	*	0. 045	*
* W. S. Elev (ft) 1480.00 *	*	167. 95	*	Reach Len. (ft)	*	4920.00	*	3938. 00	*
* Crit W.S. (ft) 2385.82 *	*	159. 08	*	Flow Area (sq ft)	*	1351. 99	*	1135. 29	*
* E.G. Slope (ft/ft) 3695.70 *	*0	. 000038	*	Area (sq ft)	*	4718. 01	*	1135. 29	*
* Q Total (cfs) 608.77 *	*	2480. 00	*	Flow (cfs)	*	707. 20	*	1164. 03	*
* Top Width (ft) 1616.77 *	*	2394. 65	*	Top Width (ft)	*	677. 88	*	100.00	*
* Vel Total (ft/s) 0.26 *	*	0. 51	*	Avg. Vel. (ft/s)	*	0. 52	*	1. 03	*
* Max Chl Dpth (ft) 2.55 *	*	14. 75	*	Hydr. Depth (ft)	*	7. 95	*	11. 35	*
* Conv. Total (cfs) 98431.3 *	*4	00986. 1	*	Conv. (cfs)	* *	114345. 9	**	188208.8	*
* Length Wtd. (ft) 936.11 *	*	2783. 49	*	Wetted Per. (ft)	*	170. 00	*	100. 92	*
* Min Ch El (ft) 0.01 *	*	153. 20	*	Shear (Ib/sq ft)	*	0. 02	*	0. 03	*
* Al pha 0.00 *	*	2. 27	*	Stream Power (Ib/ft s)	*	0. 01	*	0. 03	*
* Frctn Loss (ft) 515.77 *	*	0. 06	*	Cum Volume (acre-ft)	*	308. 07	*	100. 15	*
* C & E Loss (ft) 68.31 *	*	0. 00	*	Cum SA (acres)	*	39. 50	*	6. 78	*
******	***	****	* * :	*****	* * :	*****	**	*****	**
*****									

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.

### CROSS SECTION OUTPUT Profile #0.2%

************************											
*****											
* E.G. Elev (ft) Right OB *	* 170.43	* Element	* Left OB	* Channel *							
* Vel Head (ft) 0.070 *	* 0.01	* Wt. n-Val.	* 0.070	* 0.045 *							
* W.S. Elev (ft) 1480.00 *	* 170.42	* Reach Len. (ft)	* 4920.00	* 3938.00 *							
* Crit W.S. (ft) 5234.95 *	* 161. 29	* Flow Area (sq ft)	* 1771.07	* 1381.81 *							
* E.G. Slope (ft/ft) 8258.23 *	*0.000050	* Area (sq ft)	* 6473.49	* 1381.81 *							
* Q Total (cfs) 2140.98 *	* 5250.00	* Flow (cfs)	* 1265. 79	* 1843. 23 *							
* Top Width (ft) 1868.60 *	* 2738.31	* Top Width (ft)	* 769.72	* 100.00 *							
* Vel Total (ft/s) 0.41 *	* 0.63	* Avg. Vel. (ft/s)	* 0.71	* 1.33 *							
* Max Chl Dpth (ft) 4.51 *	* 17. 22	* Hydr. Depth (ft)	* 10.42	* 13.82 *							
* Conv. Total (cfs) *303324.0 *	*743796. 9	* Conv. (cfs)	*179332.0	*261141.0							
* Length Wtd. (ft)	* 2503.56	* Wetted Per. (ft) Page 78	* 170.00	* 100.92 *							

44/0 00 #		Day	<i>-</i>	outo Errooti vo					
1160.83 * * Min Ch El (ft)	*	153. 20	*	Shear (Ib/sq ft)	*	0. 03	*	0. 04	*
0. 01 * * Al pha 0. 01 *	*	2. 08	*	Stream Power (lb/ft s)	*	0. 02	*	0. 06	*
* Frctn Loss (ft) 820.35 *	*	0. 07	*	Cum Volume (acre-ft)	*	427. 50	*	120. 10	*
* C & E Loss (ft) 72 77 *	*	0.00	*	Cum SA (acres)	*	44. 91	*	6. 78	*
, = , , ,	****	*****	**:	******	***	*****	***	*****	**

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1 RS: 190

I NPUT

Description: XS 190 (LETTERED CROSS SECTION T) MODIFIED LOCATION OF ROB AND

ADJUSTED GR ACCORDINGLY

ROB IS BLOCKED BECAUSE OF DIVIDED

FLOW

THE DIVIDED FLOW SECTION STARTS AS A TRIBUTARY WITH COMMON XS\_180

		75-10	JU							
St	ation El	evati on	Data	num=	28					
	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
* *	*****	*****	*****	*****	*******	******	*****	*****	****	****
	1920	185	1970	155	2000	153.8	2020	155	2030	160
	2250	161	2455	162. 5	2750	163	3000	162. 5	3150	160
	3350	162. 5	3625	162. 5	3730	160	3915	163	4100	165
	4435	168	4625	164	4645	160	4665	160	4675	164
	4955	166	5060	168	5335	170	5665	172	5815	174
	5925	176	6135	178	6255	180				

Manni ng' s	n Values		num=	3	
Sťa	n Val	Sta	n Val	Sta	n Val
******	*****	****	*****	*****	*****
1920	. 1	1970	. 045	2020	. 1

Bank Sta: Left Ri ght Lengths: Left Channel Ri ght Coeff Contr. Expan. 2Ŏ2O 1970 1000 1000 1000 . 3 Blocked Obstructions 1 num=

Sta L Sta R El ev

4435 6255

### CROSS SECTION OUTPUT Profile #1%

*****									
* E.G. Elev (ft)	*	174. 55	*	Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	*	0.00	*	Wt. n-Val.	*	0 100	*	0. 045	*
0. 100 *		0.00		wt. 11-vai.		0. 100		0.043	
* W.S. Elev (ft) 1000.00 *	*	174. 55	*	Reach Len. (ft)	*	1000.00	*	1000.00	*

```
Duplicate Effective
* Crit W.S. (ft)
                                                              318.64
                                   * Flow Area (sq ft)
                                                                      * 1007.71
*28754.71
* E.G. Slope (ft/ft)
*28754.71 *
                                                              318.64
                        *0.000001 * Area (sq ft)
                                                                      * 1007.71
* Q Total (cfs)
                                   * Flow (cfs)
                        * 2220.00
                                                               17.43
                                                                         219.63
1982. 94
* Top Width (ft)
                        * 2497.59
                                   * Top Width (ft)
                                                               32.59
                                                                          50.00
2415.00 *
 Vel Total (ft/s)
                             0.07
                                   * Avg. Vel. (ft/s)
                                                                0.05
                                                                           0.22
  0.07
 Max Chl Dpth (ft)
                            20.75
                                   * Hydr. Depth (ft)
                                                                9. 78
                                                                          20. 15
11.91 *
* Conv. Total (cfs)
                        *2488873.0
                                   * Conv. (cfs)
                                                            * 19540.0
                                                                       *246234.9
*2223098.0
* Length Wtd. (ft)
                        * 1000.00
                                   * Wetted Per. (ft)
                                                               38.01
                                                                          50.06
2422. 86
 Min Ch El (ft)
                           153.80
                                   * Shear (lb/sq ft)
                                                                0.00
                                                                           0.00
  0.00
                             1.65
                                   * Stream Power (lb/ft s) *
                                                                0.00
                                                                           0.00
 Al pha
  0.00
                                   * Cum Volume (acre-ft)
* Frctn Loss (ft)
                             0.02
                                                               84.88
                                                                          27. 30
 602. 11
                             0.00 * Cum SA (acres)
* C & E Loss (ft)
******************
*****
CROSS SECTION OUTPUT Profile #Floodway
* E.G. Elev (ft)
                           175.32
                                   * Element
                                                              Left OB *
                                                                         Channel *
Right OB *
 Vel Head (ft)
                             0.00
                                   * Wt. n-Val.
                                                               0.100
                                                                          0.045
 0. 100
* W.S. Elev (ft)
                           175.31
                                   * Reach Len. (ft)
                                                             1000.00
                                                                      * 1000.00
1000.00
* Crit W.S. (ft)
                                   * Flow Area (sq ft)
                                                                      * 1045.65
                                                              343.38
5985. 59
* E.G. Slope (ft/ft)
                        *0.00008
                                   * Area (sq ft)
                                                              343.38
                                                                      * 1045.65
5985. 59
* Q Total (cfs)
                        * 2220.00
                                   * Flow (cfs)
                                                               60.80
                                                                         729.00
1430. 20
* Top Width (ft)
                           499.61
                                   * Top Width (ft)
                                                               32.61
                                                                          50.00
 417.00 *
* Vel Total (ft/s)
                             0.30
                                   * Avg. Vel. (ft/s)
                                                                0. 18
                                                                           0.70
  0. 24
* Max Chl Dpth (ft)
                            21.51
                                   * Hydr. Depth (ft)
                                                               10.53
                                                                          20.91
14. 35 *
* Conv. Total (cfs)
*513768.1 *
                        *797486.9
                                   * Conv. (cfs)
                                                             21839. 9
                                                                      *261878.9
* Length Wtd. (ft)
                        * 1000.00
                                   * Wetted Per. (ft)
                                                               38.78
                                                                          50.06
 431. Ĭ3
* Min Ch El (ft)
                           153.80
                                   * Shear (lb/sq ft)
                                                                0.00
                                                                           0.01
  0.01
 Al pha
                                   * Stream Power (lb/ft s) *
                             2.18
                                                                0.00
                                                                           0.01
  0.00
* Frctn Loss (ft)
                             0.04
                                   * Cum Volume (acre-ft)
                                                               29.89
                                                                          28.29
 349.80
* C & E Loss (ft)
                             0.00
                                  * Cum SA (acres)
******************
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CROSS SECTION OUTPUT Profile #10% ************************************								
******** * E.G. Elev (ft)	* 165.97	* Element	*	Left OB	*	Channel	*	
Right OB * * Vel Head (ft)	* 0.01	* Wt. n-Val.	*	0. 100	*	0. 045	*	
0.100 * * W.S. Elev (ft)	* 165. 96	* Reach Len. (ft)	*	1000.00	*	1000.00	*	
1000.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	*	100. 15	*	578. 14	*	
8238.23 * * E.G. Slope (ft/ft)	*0.000058	* Area (sq ft)	*	100. 15	*	578. 14	*	
8238.23 * * Q Total (cfs) 2251.74 *	* 3025.00	* Flow (cfs)	*	31. 75	*	741. 51	*	
* Top Width (ft) 2187.52 *	* 2255.79	* Top Width (ft)	*	18. 27	*	50.00	*	
* Vel Total (ft/s) 0.27 *	* 0.34	* Avg. Vel. (ft/s)	*	0. 32	*	1. 28	*	
* Max Chl Dpth (ft) 3.77 *	* 12.16	* Hydr. Depth (ft)	*	5. 48	*	11. 56	*	
* Conv. Total (cfs) *296196.2 *	*397911.5	* Conv. (cfs)	*	4175. 8	*	97539. 5		
* Length Wtd. (ft) 2188.81 *	* 1000.00	* Wetted Per. (ft)	*	21. 31	*	50. 06	*	
* Min Ch El (ft) 0.01 *	* 153.80	* Shear (Ib/sq ft)	*	0. 02	*	0. 04	*	
* Al pha 0.00 *	* 4.00	* Stream Power (Ib/ft s)	*	0. 01	*	0. 05	*	
* Frctn Loss (ft) 141.40 *	* 0. 29	* Cum Volume (acre-ft)	*	20. 72	*	15. 63	*	
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	*		*		*	
********** *****	*****	*********	**	*****	***	*****	**	
CROSS SECTION OUTPUT								
******** * E.G. Elev (ft)	* 167. 90	* Element	*	Left OB	*	Channel	*	
Right OB * * Vel Head (ft)	* 0.00	* Wt. n-Val.	*	0. 100	*	0. 045	*	
0.100 * * W.S. Elev (ft)	* 167. 90	* Reach Len. (ft)	*	1000.00	*	1000.00	*	
1000.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	*	138. 72	*	675. 11		
*12690.50 * * E.G. Slope (ft/ft)	*0. 000012	* Area (sq ft)	*	138. 72	*	675. 11		
*12690.50 * * Q Total (cfs)	* 2480.00	* Flow (cfs)	*	22. 70	*	444. 78	*	
2012.52 * * Top Width (ft)	* 2475.58	* Top Width (ft)	*	21. 50	*	50.00	*	
2404.08 * * Vel Total (ft/s)	* 0.18	* Avg. Vel. (ft/s)	*	0. 16	*	0. 66	*	
0.16 * * Max Chl Dpth (ft)	* 14.10	* Hydr. Depth (ft)	*	6. 45	*	13. 50	*	
5.28 * * * * * * * * * * * * * * * * * * *	*704234.3	* Conv. (cfs)	*	6447. 4	*1	26302. 3		
*571484.6 * * Length Wtd. (ft) 2405.38 *	* 1000.00	* Wetted Per. (ft)	*	25. 08	*	50.06	*	
* Min Ch El (ft) 0.00 *	* 153.80	* Shear (Ib/sq ft)	*	0.00	*	0. 01	*	
0.00		Dago 91						

```
Duplicate Effective
* Al pha
                              2.92 * Stream Power (lb/ft s) *
                                                                 0.00 *
                                                                             0.01
  0.00
* Frctn Loss (ft)
                              0.18 * Cum Volume (acre-ft)
                                                                 33.79 *
                                                                            18. 31
 237.40
                              0.01 * Cum SA (acres)
* C & E Loss (ft)
************************
CROSS SECTION OUTPUT Profile #0.2%
                                    ***********
* E.G. Elev (ft)
                         * 170.36
                                    * Element
                                                                Left OB *
                                                                           Channel *
Right OB *
* Vel Head (ft)
                                    * Wt. n-Val.
                                                                 0.100
                              0.00
                                                                            0.045
 0.100 *
* W.S. Elev (ft)
                            170. 36
                                    * Reach Len. (ft)
                                                               1000.00
                                                                        * 1000.00
1000.00 *
* Crit W.S. (ft)
                                    * Flow Area (sq ft)
                                                                196.51
                                                                           797.81
*18616.55
* E.G. Slope (ft/ft)
*18616.55 *
                                                                196.51
                         *0.000017 * Area (sq ft)
                                                                           797.81
* 0 Total (cfs)
                         * 5250.00
                                    * Flow (cfs)
                                                                 42.89
                                                                           697.65
4509.46
* Top Width (ft)
                         * 2490.59
                                    * Top Width (ft)
                                                                 25.59
                                                                            50.00
2415.00 *
* Vel Total (ft/s)
                            0. 27
                                    * Avg. Vel. (ft/s)
                                                                  0.22
                                                                             0.87
  0. 24
* Max Chl Dpth (ft)
                             16. 56
                                    * Hydr. Depth (ft)
                                                                  7.68
                                                                            15.96
7.71 *
* Conv. Total (cfs)
                         *1255488.0
                                                              * 10257.5
                                                                         *166836.0
                                    * Conv. (cfs)
*1078394.0
* Length Wtd. (ft)
                         * 1000.00
                                    * Wetted Per. (ft)
                                                                 29.85
                                                                            50.06
2418. 66
 Min Ch El (ft)
                            153.80
                                    * Shear (lb/sq ft)
                                                                  0.01
                                                                             0.02
  0.01
                                    * Stream Power (lb/ft s) *
 Al pha
                              2. 13
                                                                  0.00
                                                                             0.02
  0.00
* Frctn Loss (ft)
                              0.18
                                    * Cum Volume (acre-ft)
                                                                 50.81
                                                                            21.57
 363.80
* C & E Loss (ft)
                              0.01
                                    * Cum SA (acres)
*****
CROSS SECTION
RIVER: RIVER-1
                          RS: 180
REACH: Reach-2
I NPUT
Description: XS 180 (LETTERED CROSS-SECTION S)
Station Elevation Data
                          num=
                                    28
                                                     Sta
                           El ev
                                     Sta
                                            El ev
                                                            El ev
                                                                     Sta
                                                                            El ev
    Sta
           El ev
                    Sta
                    1205
1710
                                                    1370
    1140
             185
                             180
                                    1285
                                             175
                                                             170
                                                                     1480
                                                                             165
    1570
                           162.5
                                                                     1970
                                                    1945
                                                             160
                                                                             155
             163
                                    1860
                                             161
    1975
                           153.3
                                                                             157
           153.3
                    2000
                                    2030
                                           153.3
                                                    2035
                                                             155
                                                                    2075
    2270
             162
                    3000
                             164
                                    3285
                                             165
                                                    3330
                                                             166
                                                                     3380
                                                                             165
    3680
                    3800
                                    4000
                                                    4200
                                                             170
                                                                             173
             164
                             165
                                             168
                                                                    4500
```

185

5000

4630

175

4790

180

Manning's n Values Sta n Val Sta	Du <sub>l</sub> num= n Val	officate Effective 3 Sta n Val		
**************************************				
Bank Sta: Left Right 1970 2035	Lengths:	Left Channel Right 1000 1000 1000	Co	eff Contr. Expan. .1 .3
CROSS SECTION OUTPUT Pro		******	***	******
********* * E.G. Elev (ft)	* 174.54	* Element	*	Left OB * Channel *
Right OB * * Vel Head (ft)	* 0.01	* Wt. n-Val.	*	
0.100 * * W.S. Elev (ft)	* 174.52	* Reach Len. (ft)	*	1000.00 * 1000.00 *
1000.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	*	7076. 26 * 1371. 10
*23701.13	*0. 000057	* Area (sq ft)	*	7076. 26 * 1371. 10
*23701.13 * * 0 Total (cfs)	*18100.00	* Flow (cfs)	*	3792. 98 * 2594. 96
*11712.06 * * Top Width (ft)	* 3306.02	* Top Width (ft)	*	676. 92 * 65. 00 *
2564.10 * * Vel Total (ft/s)	* 0.56	* Avg. Vel. (ft/s)	*	0.54 * 1.89 *
0.49 * * Max Chl Dpth (ft)	* 21. 22	* Hydr. Depth (ft)	*	10. 45 * 21. 09 *
9.24 * * Conv. Total (cfs) *1551040.0 *	*2397046. C	* Conv. (cfs)		*502317.6 *343659.2
*1551069.0 *  * Length Wtd. (ft) 2564 30 *	* 1000.00	* Wetted Per. (ft)	*	677.70 * 65.56 *
* Min Ch El (ft)	* 153. 30	* Shear (Ib/sq ft)	*	0.04 * 0.07 *
0. 03 * * Al pha 0. 02 *	* 2. 31	* Stream Power (lb/ft s)	*	0.02 * 0.14 *
* Frctn Loss (ft) 445.48 *	* 0.05	* Cum Volume (acre-ft)	*	255. 67 * 34. 28 *
* C & E Loss (ft) 49.40 *	* 0.00	* Cum SA (acres)	*	22. 68 * 1. 61 *
	*****	*******	***	*******
CROSS SECTION OUTPUT Pro				
****		**********		
* E.G. Elev (ft) Right OB *		* Element	*	Ecr C OB Gridinier
* Vel Head (ft) 0.100_ *	* 0.01	* Wt. n-Val.	*	0. 100
* W.S. Elev (ft) 1000.00 *	* 175. 26	* Reach Len. (ft)		1000.00 * 1000.00 *
* Crit W.S. (ft) *24489.10 *	*	* Flow Area (sq ft)		2261. 05 * 1418. 92
* E.G. Slope (ft/ft) *24489.10 *	*0.000058	* Area (sq ft)		2261. 05 * 1418. 92
* Q Total (cfs) *13844.55 *	*18100.00	* Flow (cfs)		1474. 31 * 2781. 15
2200. 00 * ` ´	* 2415.00	* Top Width (ft)		150.00 * 65.00 *
* Vel Total (ft/s) 0.57 *	* 0.64	* Avg. Vel. (ft/s)	*	0.65 * 1.96 *

```
* Max Chl Dpth (ft)
                           21.96 * Hydr. Depth (ft)
                                                              15. 07 *
                                                                        21.83 *
11. 13 *
* Conv._Total_(cfs)
                       *2368096.0 * Conv. (cfs)
                                                           *192889.7
                                                                     *363868.5
*1811337.0
* Length Wtd. (ft)
                        * 1000.00 * Wetted Per. (ft)
                                                             164.36
                                                                        65.56
2205. Ŏ9
 Min Ch El (ft)
                          153.30
                                  * Shear (lb/sq ft)
                                                               0.05
                                                                         0.08
  0.04
 Al pha
                            2. 11
                                  * Stream Power (lb/ft s) *
                                                               0.03
                                                                         0.15
  0.02
* Frctn Loss (ft)
                            0.05
                                  * Cum Volume (acre-ft)
                                                             189. 56
                                                                        35. 47
438. 17
* C & E Loss (ft)
                            0.00 * Cum SA (acres)
                                                              13.66
                                                                         1. 61
  38.85
*****
CROSS SECTION OUTPUT Profile #10%
* E.G. Elev (ft)
Right OB *
* Vel Head (ft)
                                                          * Left OB *
                          165.67 * Element
                                                                       Channel *
                                  * Wt. n-Val.
                            0. 18
                                                              0.100
                                                                        0.045
 0.100
                          165. 49
* W.S. Elev (ft)
                                  * Reach Len. (ft)
                                                          * 1000.00
                                                                     * 1000.00
1000.00 *
* Crit W.S. (ft)
                                  * Flow Area (sq ft)
                                                          * 1704.59
                                                                       783.76
4080. 42
* E.G. Slope (ft/ft)
                        *0.000840
                                  * Area (sq ft)
                                                          * 1704.59
                                                                       783.76
4080.42
                        * 8930.00
                                  * Flow (cfs)
                                                                      3921.76
* Q Total (cfs)
                                                          * 1660.06
3348. 18
* Top Width (ft)
                        * 2314.76
                                  * Top Width (ft)
                                                             500.75
                                                                        65.00
1749. 01
 Vel Total (ft/s)
                            1.36
                                  * Avg. Vel. (ft/s)
                                                               0.97
                                                                         5.00
  0.82
 Max Chl Dpth (ft)
                           12. 19
                                  * Hydr. Depth (ft)
                                                               3.40
                                                                        12.06
2. 33 *
* Conv. Total (cfs)
*115518.5 *
                        *308101.6
                                  * Conv. (cfs)
                                                          * 57275.1
                                                                     *135308.0
* Length Wtd. (ft)
                        * 1000.00
                                  * Wetted Per. (ft)
                                                             501.29
                                                                        65.56
1749. Ĭ4 *
* Min Ch El (ft)
                          153.30
                                  * Shear (lb/sq ft)
                                                               0.18
                                                                         0.63
  0. 12
                            6.18
                                  * Stream Power (lb/ft s) *
 Al pha
                                                               0. 17
                                                                         3. 14
  0. 10
                            0.71
                                  * Cum Volume (acre-ft)
 Frctn Loss (ft)
                                                              59.25
                                                                        19.23
  75. 79
 C & E Loss (ft)
                            0.02
                                  * Cum SA (acres)
                                                                         1.61 *
                                                              18. 13 *
 26. 67 *
*****
Warning: Divided flow computed for this cross-section.
CROSS SECTION OUTPUT Profile #2%
                               .
**********************
* E.G. Elev (ft)
                          167.71 * Element
                                                             Left OB *
                                                                       Channel *
Right OB *
 Vel Head (ft)
                            0.12
                                  * Wt. n-Val.
                                                              0.100
                                                                        0.045
 0.100
* W.S. Elev (ft)
                       * 167.59
                                  * Reach Len. (ft)
                                                          * 1000.00 * 1000.00 *
                                    Page 84
```

1000.00 \*

```
* Crit W.S. (ft)
                                  * Flow Area (sq ft)
                                                          * 2805. 25
                                                                    * 920.33
7991. 94
* E.G. Slope (ft/ft)
                        *0.000637
                                 * Area (sq ft)
                                                          * 2805.25
                                                                        920.33
7991. 94
* 0 Total (cfs)
                        *15300.00
                                  * Flow (cfs)
                                                          * 3126.94
                                                                     * 4463.94
7709. 12
* Top Width (ft)
                        * 2549.62
                                  * Top Width (ft)
                                                             546.97
                                                                         65.00
1937. 65
* Vel Total (ft/s)
                            1. 31
                                  * Avg. Vel. (ft/s)
                                                               1.11
                                                                          4.85
  0.96
* Max Chl Dpth (ft)
                                  * Hydr. Depth (ft)
                           14. 29
                                                               5. 13
                                                                         14.16
  4. 12
* Conv. Total (cfs)
*305404.0 *
                                  * Conv. (cfs)
                        *606124.1
                                                          *123876.8
                                                                     *176843.3
* Length Wtd. (ft)
                        * 1000.00
                                  * Wetted Per. (ft)
                                                             547.56
                                                                         65.56
1937. 81
 Min Ch El (ft)
                                  * Shear (lb/sq ft)
                          153. 30
                                                               0.20
                                                                          0.56
  0.16
 Al pha
                            4.45
                                  * Stream Power (lb/ft s) *
                                                               0.23
                                                                          2.71
  0. 16
 Frctn Loss (ft)
                            0.62
                                  * Cum Volume (acre-ft)
                                                              99.58
                                                                         22.65
138. 56
 C & E Loss (ft)
                            0.00
                                  * Cum SA (acres)
                                                              19. 56
                                                                          1. 61
  32.56 *
*****
CROSS SECTION OUTPUT Profile #0.2%
                                 ***********
* E.G. Elev (ft)
Right OB *
                          170.17 * Element
                                                             Left OB *
                                                                        Channel *
 Vel Head (ft)
                                  * Wt. n-Val.
                            0.10
                                                              0.100
                                                                        0.045
 0.100 *
* W.S. Elev (ft)
                          170. 07
                                  * Reach Len. (ft)
                                                          * 1000.00
                                                                     * 1000.00
1000.00
* Crit W.S. (ft)
                                  * Flow Area (sq ft)
                                                          * 4230.49
                                                                     * 1081.65
*13077.72 *
* E.G. Slope (ft/ft)
*13077.72 *
                                  * Area (sq ft)
                                                          * 4230.49
                        *0.000558
                                                                     * 1081.65
* Q Total (cfs)
                        *26100.00
                                  * Flow (cfs)
                                                          * 5447.23
                                                                     * 5466.23
*15186.54
* Top Width (ft)
                        * 2838.38
                                  * Top Width (ft)
                                                             601.22
                                                                         65.00
2172. 16
 Vel Total (ft/s)
                            1.42
                                  * Avg. Vel. (ft/s)
                                                               1.29
                                                                          5.05
  1. 16
 Max Chl Dpth (ft)
                           16. 77
                                  * Hydr. Depth (ft)
                                                               7.04
                                                                         16.64
  6. 02
* Conv. Total (cfs)
                        *1105213.0
                                  * Conv. (cfs)
                                                           *230664.7
                                                                      *231469.4
643079.0
* Length Wtd. (ft)
                        * 1000.00
                                  * Wetted Per. (ft)
                                                             601.86
                                                                         65.56
2172. 34
 Min Ch El (ft)
                          153. 30
                                  * Shear (lb/sq ft)
                                                               0.24
                                                                          0. 57
  0. 21
                                  * Stream Power (lb/ft s) *
 Al pha
                            3.22
                                                               0.32
                                                                          2.90
  0. 24
 Frctn Loss (ft)
                            0.58
                                  * Cum Volume (acre-ft)
                                                             150. 19 *
                                                                         26.65
 232. 07
                            0.00 * Cum SA (acres)
 C & E Loss (ft)
                                                              21.01 *
                                                                          1. 61
  41. 33
```

# CROSS SECTION

RIVER: RIVER-1 REACH: Reach-2	RS: 170						
INPUT Description: XS 170 (LETStation Elevation Data Sta Elev Sta	num= 25	El ev Sta ******	EI ev *****				
610 185 635 1165 162.5 1665 2000 152.7 2030 2140 160 2275 3325 168 3520	180     660     175     720       161     1865     160     1965       152. 7     2040     155     2045       159     2460     160     2620       170     3810     175     4050	170 865 155 1970 160 2090 165 3025 180 4270	165 152. 7 161 167. 5 185				
Manning's n Values Sta n Val Sta							
610 .1 1965  Bank Sta: Left Right 1965 2040	. 045 2040 . 1  Lengths: Left Channel Right 0 0 0	Coeff Contr. .1	Expan. . 3				
CROSS SECTION OUTPUT Pro	ofile #1% *****************	****	*****				
********* * E.G. Elev (ft)	* 174.48 * Element	* Left OB *	Channel *				
Right OB * ` ´		* 0.100 *	0. 045 *				
* Vel Head (ft) 0.100 *	o. or we. H-var.		0.043				
* W.S. Elev (ft)	* 174.47 * Reach Len. (ft)	* *	*				
* Crit W.S. (ft) *15108.80 *	* 163.32 * Flow Area (sq ft)	*15197.54 *	1615. 50				
* E.G. Slope (ft/ft) *15108.80 *	*0.000052 * Area (sq ft)	*15197.54 *	1615. 50				
* Q Total (cfs)	*18100.00 * Flow (cfs)	* 8352.65 *	2944. 02 *				
* Top Width (ft)	* 3112.90 * Top Width (ft)	* 1298.64 *	75.00 *				
1739.26 * * Vel Total (ft/s)	* 0.57 * Avg. Vel. (ft/s)	* 0.55 *	1. 82 *				
0.45 * * Max Chl Dpth (ft)	* 21.77 * Hydr. Depth (ft)	* 11.70 *	21. 54 *				
8.69 * * * Conv. Total (cfs)	*2521860.0 * Conv. (cfs)	*1163768.0	*410188. 3				
*947903.3 * ` ` ` ` ` ` * Length Wtd. (ft)	* * Wetted Per. (ft)	* 1299.05 *	75. 76 *				
1741. 49 * * Min Ch El (ft)	* 152.70 * Shear (lb/sq ft)	* 0.04 *	0. 07 *				
0. 03 * * Al pha	* 2.35 * Stream Power (Ib/ft s)		0. 12 *				
0. 01 *	,	* *	V. 12 *				
* Frctn Loss (ft)	cuiii voi uiile (aci e-i t)						
* C & E Loss (ft)	* * Cum SA (acres)	* *	*				
**************************************							

CROSS SECTION OUTPUT Profile #Floodway
Page 86

^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	*****	******	*****
**********	* 175 22	* Flower+	* Left OR * Channel *
* E.G. Elev (ft) Right OB *	* 175. 22	* Element	* Left OB * Channel *
* Vel Head (ft)	* 0.01	* Wt. n-Val.	* 0.100 * 0.045 *
0.100 * * W.S. Elev (ft) *	* 175. 21	* Reach Len. (ft)	* * *
* Crit W.S. (ft) *13684.28 *	* 163.32	* Flow Area (sq ft)	*14253. 41 * 1671. 00
* E.G. Slope (ft/ft) *13684.28 *	*0.000046	* Area (sq ft)	*14253. 41 * 1671. 00
* Q Total (cfs)	*18100.00	* Flow (cfs)	* 8160. 29 * 2939. 71 *
7000.00 * * Top Width (ft) 1185.00 *	* 2300.00	* Top Width (ft)	* 1040.00 * 75.00 *
* Vel Total (ft/s) 0.51 *	* 0.61	* Avg. Vel. (ft/s)	* 0.57 * 1.76 *
* Max Chl Dpth (ft) 11.55 *	* 22.51	* Hydr. Depth (ft)	* 13.71 * 22.28 *
* Conv. Total (cfs) *1033299.0 *	*2671816.0	* Conv. (cfs)	*1204574.0 *433942.9
* Length Wtd. (ft) 1194.56 *	*	* Wetted Per. (ft)	* 1050.85 * 75.76 *
* Min Ch El (ft)	* 152.70	* Shear (Ib/sq ft)	* 0.04 * 0.06 *
* Al pha	* 2.01	* Stream Power (lb/ft s)	* 0.02 * 0.11 *
0.02 * * Frctn Loss (ft)	*	* Cum Volume (acre-ft)	* * *
* C & E Loss (ft)	*	* Cum SA (acres)	* * *
^			
*******	*****	******	******
**************************************	*****	********	******
****		***********	*******
*********  CROSS SECTION OUTPUT P	rofile #10%	****************************	
********  CROSS SECTION OUTPUT P *********  * E.G. Elev (ft)	rofile #10%		
********  CROSS SECTION OUTPUT P  *********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	rofile #10% ******	*******	*******
********  CROSS SECTION OUTPUT P *********  * E.G. Elev (ft) Right OB *	rofile #10% ******* * 164.94	**************************************	**************************************
********  CROSS SECTION OUTPUT P  **********  * E. G. Elev (ft) Right OB *  * Vel Head (ft) 0.100 *  * W. S. Elev (ft)  * Crit W. S. (ft)	rofile #10% ******* * 164.94 * 0.12	************ * Element * Wt. n-Val.	*******************  * Left OB * Channel *  * 0.100 * 0.045 *
********  CROSS SECTION OUTPUT P  **********  * E. G. Elev (ft) Right OB *  * Vel Head (ft) 0.100 *  * W. S. Elev (ft)  * Crit W. S. (ft) 2522.74 *  * E. G. Slope (ft/ft)	rofile #10% *****  * 164.94  * 0.12  * 164.82	**************************************	**************  * Left OB * Channel *  * 0.100 * 0.045 *  * *
*********  CROSS SECTION OUTPUT P  **********  * E. G. Elev (ft) Right OB *  * Vel Head (ft) 0.100 *  * W. S. Elev (ft)  * Crit W. S. (ft) 2522.74 *  * E. G. Slope (ft/ft) 2522.74 *  * O Total (cfs)	rofile #10% *****  * 164.94  * 0.12  * 164.82  * 161.36	***********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)	***************  * Left OB * Channel *  * 0.100 * 0.045 *  * * *  * 3457.00 * 891.96 *
*********  CROSS SECTION OUTPUT P  **********  * E.G. Elev (ft) Right OB *  * Vel Head (ft) 0.100 *  * W.S. Elev (ft)  * Crit W.S. (ft) 2522.74 *  * E.G. Slope (ft/ft) 2522.74 *  * O Total (cfs) 2457.95 *  * Top Width (ft)	rofile #10% ******  * 164.94  * 0.12  * 164.82  * 161.36  *0.000601	**********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)	***************  * Left OB * Channel *  * 0.100 * 0.045 *  * * *  * 3457.00 * 891.96 *  * 3457.00 * 891.96 *
*********  CROSS SECTION OUTPUT P  **********  * E.G. Elev (ft) Right OB *  * Vel Head (ft) 0.100 *  * W.S. Elev (ft)  * Crit W.S. (ft) 2522.74 *  * E.G. Slope (ft/ft) 2522.74 *  * O Total (cfs) 2457.95 *  * Top Width (ft) 574.33 *  * Vel Total (ft/s)	rofile #10% ******  * 164.94  * 0.12  * 164.82  * 161.36  *0.000601  * 8930.00	<pre>*********** * Element * Wt. n-Val. * Reach Len. (ft) * Flow Area (sq ft) * Area (sq ft) * Flow (cfs)</pre>	****************  * Left OB * Channel *  * 0.100 * 0.045 *  * * *  * 3457.00 * 891.96 *  * 3457.00 * 891.96 *  * 2736.34 * 3735.71 *
*********  CROSS SECTION OUTPUT P  **********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	rofile #10% ******  * 164.94  * 0.12  * 164.82  * 161.36  *0.000601  * 8930.00  * 1728.07	<pre>*********** * Element * Wt. n-Val. * Reach Len. (ft) * Flow Area (sq ft) * Area (sq ft) * Flow (cfs) * Top Width (ft)</pre>	******************  * Left OB * Channel *  * 0.100 * 0.045 *  * * *  * 3457.00 * 891.96 *  * 3457.00 * 891.96 *  * 2736.34 * 3735.71 *  * 1078.74 * 75.00 *
*********  CROSS SECTION OUTPUT P  **********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	rofile #10% ******  * 164.94  * 0.12  * 164.82  * 161.36  *0.000601  * 8930.00  * 1728.07  * 1.30	<pre>*********** * Element * Wt. n-Val. * Reach Len. (ft) * Flow Area (sq ft) * Area (sq ft) * Flow (cfs) * Top Width (ft) * Avg. Vel. (ft/s)</pre>	******************  * Left OB * Channel *  * 0.100 * 0.045 *  * * *  * 3457.00 * 891.96 *  * 3457.00 * 891.96 *  * 2736.34 * 3735.71 *  * 1078.74 * 75.00 *  * 0.79 * 4.19 *
*********  CROSS SECTION OUTPUT P  **********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	rofile #10% ******  * 164.94  * 0.12  * 164.82  * 161.36  *0.000601  * 8930.00  * 1728.07  * 1.30  * 12.12	*********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)	*******************  * Left OB * Channel *  * 0.100 * 0.045 *  * * * *  * 3457.00 * 891.96 *  * 3457.00 * 891.96 *  * 2736.34 * 3735.71 *  * 1078.74 * 75.00 *  * 0.79 * 4.19 *  * 3.20 * 11.89 *
*********  CROSS SECTION OUTPUT P  **********  * E.G. Elev (ft)  Right OB *  * Vel Head (ft)	rofile #10% ******  * 164. 94  * 0. 12  * 164. 82  * 161. 36  *0. 000601  * 8930. 00  * 1728. 07  * 1. 30  * 12. 12  *364357. 0	********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)	*******************  * Left OB * Channel *  * 0.100 * 0.045 *  * * * * *  * 3457.00 * 891.96 *  * 3457.00 * 891.96 *  * 2736.34 * 3735.71 *  * 1078.74 * 75.00 *  * 0.79 * 4.19 *  * 3.20 * 11.89 *  *111646.5 *152422.5
*********  CROSS SECTION OUTPUT P  **********  * E.G. Elev (ft)  Right OB *  * Vel Head (ft)	rofile #10% ******  * 164.94  * 0.12  * 164.82  * 161.36  *0.000601  * 8930.00  * 1728.07  * 1.30  * 12.12  *364357.0  *	********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)  * Conv. (cfs)  * Wetted Per. (ft)	******************  * Left OB * Channel *  * 0.100 * 0.045 *  * * *  * 3457.00 * 891.96 *  * 3457.00 * 891.96 *  * 2736.34 * 3735.71 *  * 1078.74 * 75.00 *  * 0.79 * 4.19 *  * 3.20 * 11.89 *  *111646.5 *152422.5  * 1078.88 * 75.76 *  * 0.12 * 0.44 *

	Dup	olicate Effective	
0.16 * * Frctn Loss (ft)	*	* Cum Volume (acre-ft)	* * *
* C & E Loss (ft)	*	* Cum SA (acres)	* * *
********** ******	*****	*******	*******
CROSS SECTION OUTPUT Pr	ofile #2%		
		********	*******
* E.G. Elev (ft) Right OB *	* 167.09	* Element	* Left OB * Channel *
* Vel Head (ft) 0.100 *	* 0.12	* Wt. n-Val.	* 0.100 * 0.045 *
* W.S. Elev (ft)	* 166. 97	* Reach Len. (ft)	* * *
* Crit W.S. (ft) 4079.72 *	* 162.94	* Flow Area (sq ft)	* 5870.40 * 1052.81 *
* E.G. Slope (ft/ft) 4079.72 *	*0.000600	* Area (sq ft)	* 5870.40 * 1052.81 *
* Q Total (cfs) 4065, 88 *	*15300.00	* Flow (cfs)	* 6310.45 * 4923.68 *
* Top Width (ft) 898.74 *	* 2130.80	* Top Width (ft)	* 1157.06 * 75.00 *
* Vel Total (ft/s) 1.00 *	* 1.39	* Avg. Vel. (ft/s)	* 1.07 * 4.68 *
* Max Chl Dpth (ft) 4.54 *	* 14. 27	* Hydr. Depth (ft)	* 5.07 * 14.04 *
* Conv. Total (cfs) *165928.7 *	*624394.4	* Conv. (cfs)	*257529.8 *200935.9
* Length Wtd. (ft) 900.92 *	*	* Wetted Per. (ft)	* 1157. 23 * 75. 76 *
* Min Ch El (ft) 0.17 *	* 152.70	* Shear (Ib/sq ft)	* 0.19 * 0.52 *
* Al pha 0. 17 *	* 4.02	* Stream Power (Ib/ft s)	* 0.20 * 2.44 *
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	* * *
* C & E Loss (ft)	*	* Cum SA (acres)	* * *
**********************	*****	********	*******
CROSS SECTION OUTPUT Pr	ofile #0.2%		
		*********	*******
* E.G. Elev (ft) Right OB *	* 169.59	* Element	* Left OB * Channel *
* Vel Head (ft)	* 0.12	* Wt. n-Val.	* 0.100 * 0.045 *
0.100 * * W.S. Elev (ft) *	* 169.47	* Reach Len. (ft)	* * *
* Crit W.S. (ft) 7139.91 *	* 164.19	* Flow Area (sq ft)	* 8854.02 * 1240.34 *
* E.G. Slope (ft/ft)	*0. 000601	* Area (sq ft)	* 8854.02 * 1240.34 *
7139.91 * * Q Total (cfs)	*26100.00	* Flow (cfs)	*12027.56 * 6474.46 *
7597.98 * * Top Width (ft)	* 2732.68	* Top Width (ft)	* 1229.57 * 75.00 *
1428.11 * * Vel Total (ft/s) 1.06 *	* 1.51	* Avg. Vel. (ft/s)	* 1.36 * 5.22 *
1.06 *		Page 88	

```
Duplicate Effective
 Max Chl Dpth (ft)
                           16.77 * Hydr. Depth (ft)
                                                                 7. 20 * 16. 54 *
5.00 *
* Conv. Total (cfs)
*309882.9 *
                        *1064487.0 * Conv. (cfs)
                                                             *490543.3 *264060.6
* Length Wtd. (ft) 1430.30 *
                                   * Wetted Per. (ft)
                                                            * 1229.78
                                                                           75.76
* Min Ch El (ft)
                           152.70 * Shear (lb/sq ft)
                                                                 0.27
                                                                            0.61
  0.19
 Al pha
                             3.46 * Stream Power (lb/ft s) *
                                                                 0.37
                                                                            3. 21
  0. 20
 Frctn Loss (ft)
                                   * Cum Volume (acre-ft)
                                   * Cum SA (acres)
* C & E Loss (ft)
*******************
*******
CROSS SECTION
RI VER: RI VER-2
REACH: Reach-1
                         RS: 250.12
I NPUT
Description: SIDE CHANNEL XS 250.12
Station Elevation Data num=
                                           Elev
                                                    Sta
                                                           Elev
                                                                           El ev
    Sta
          El ev
                    Sta
                          El ev
                                   Sta
                                                                    Sta
     0
            180
                    450
                            175
                                   2850
                                            174
                                                   3270
                                                            174
                                                                   3450
                                                                            172
   3600
            170
                                                   3695
                                                                   3730
                   3650
                            160
                                   3675
                                            157
                                                            160
                                                                            168
    3920
            168
                   3980
                          165.3
                                   4100
                                            168
                                                   4225
                                                            170
                                                                   4300
                                                                            172
            168
                                   5050
                                            194
   4430
                   4700
                            180
                         num=
Manning's n Values
              al Sta n Val
                                       n Val
Sta n Val
                                    Sta
                                   3695
                                           . 07
      0
           . 07
                   3650
                         . 045
               Ri ght
                         Lengths: Left Channel
                                                           Coeff Contr.
Bank Sta: Left
                                                 Ri ght
                                                                          Expan.
         3650
                 3695
                                   490
                                           490
                                                   260
                                                                            . 3
Ineffective Flow
                    num=
  Sta L
          Sta R
                   Elev Permanent
   5050
           5050
                   180
                             F
Blocked Obstructions
                     num=
                   El ev
  Sta L
          Sta R
           3750
                    180
CROSS SECTION OUTPUT Profile #1%
* E.G. Elev (ft)
                           176.70 * Element
                                                               Left OB *
                                                                          Channel *
Right OB *
 Vel Head (ft)
                             0.10 * Wt. n-Val.
 0.070
* W.S. Elev (ft)
                           176.60 * Reach Len. (ft)
                                                               490.00
                                                                          490.00
260.00
* Crit W.S. (ft)
                           170. 89
                                   * Flow Area (sq ft)
6316.63
* E.G. Slope (ft/ft)
                        *0.001017
                                   * Area (sq ft)
6316.63
* 0 Total (cfs)
                        *15880.00
                                   * Flow (cfs)
*15880.00
```

		Dup	l l	cate Effective					
* Top Width (ft) 873.59 *	*	873. 59	*	Top Width (ft)	*		*		*
* Vel Total (ft/s) 2.51 *	*	2. 51	*	Avg. Vel. (ft/s)	*		*		*
* Max Chl Dpth (ft) 7.23 *	*	11. 30	*	Hydr. Depth (ft)	*		*		*
* Conv. Total (cfs) *497969.3 *	*4	97969. 3	*	Conv. (cfs)	*		*		
* Length Wtd. (ft) 882.58 *	*	280. 71	*	Wetted Per. (ft)	*		*		*
* Min Ch El (ft) 0.45 *	*	180. 00	*	Shear (Ib/sq ft)	*		*		*
* Al pha 1.14 *	*	1. 00	*	Stream Power (lb/ft s)	*		*		*
* Frctn Loss (ft) 561.24 *	*	0. 43	*	Cum Volume (acre-ft)	*	91. 37	*	50. 93	*
* C & E Loss (ft) 30.02 *	*	0. 01	*	Cum SA (acres)	*	3. 21	*	3. 52	*
******	***	*****	* *	******	***	*****	***	*****	* *
*****									

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel,

a levee or ineffective flow may have to be added or the Manning's n of the

overbank could be increased.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# CROSS SECTION OUTPUT Profile #Floodway

*******	************************										
*****											
* E.G. Elev (ft)	* 177.33	* Element	*	Left OB	*	Channel	*				
Ri ght OB *  * Vel Head (ft)  0.070 *	* 0.19	* Wt. n-Val.	*		*		*				
* W.S. Elev (ft) 260.00 *	* 177.14	* Reach Len. (ft)	*	490.00	*	490.00	*				
* Crit W.S. (ft) 4490.05 *	* 171.65	* Flow Area (sq ft)	*		*		*				
* E.G. Slope (ft/ft)	*0.001679	* Area (sq ft)	*		*		*				
4490.05 * * Q Total (cfs) *15880.00 *	*15880.00	* Flow (cfs)	*		*						
<pre>* Top Width (ft)</pre>	* 530.00	* Top Width (ft)	*		*		*				
530.00 * * Vel Total (ft/s) 3.54 *	* 3.54	* Avg. Vel. (ft/s)	*		*		*				
* Max Chl Dpth (ft) 8.47 *	* 11.84	* Hydr. Depth (ft)	*		*		*				
* Conv. Total (cfs) *387592.4 *	*387592.4	* Conv. (cfs)	*		*						
* Length Wtd. (ft) 547.53 *	* 279. 21	* Wetted Per. (ft)	*		*		*				
* Min Ch El (ft) 0.86 *	*	* Shear (lb/sq ft)	*		*		*				
* Al pha 3.04 *	* 1.00	* Stream Power (Ib/ft s)	*		*		*				
* Frctn Loss (ft) 564.23 *	* 0.52	* Cum Volume (acre-ft)	*	29. 19	*	53. 48	*				
* C & E Loss (ft)	* 0.00	* Cum SA (acres) Page 90	*	0. 44	*	3. 52	*				

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# CROSS SECTION OUTPUT Profile #2%

		սաբ	'	cate Effective					
0.070 * * W.S. Elev (ft)	*	175. 07	*	Reach Len. (ft)	*	490.00	*	490.00	*
260.00 * * Crit W.S. (ft)	*	170. 49	*	Flow Area (sq ft)	*		*		*
5003.38 * * E.G. Slope (ft/ft)	*0	. 001363	*	Area (sq ft)	*		*		*
5003.38 * * Q Total (cfs)	*1	2820. 00	*	Flow (cfs)	*		*		
*12820.00 *  * Top Width (ft)	*	839. 09	*	Top Width (ft)	*		*		*
839.09 * * Vel_Total (ft/s)	*	2. 56	*	Avg. Vel. (ft/s)	*		*		*
2.56 * * Max Chl Dpth (ft)	*	9. 77	*	Hydr. Depth (ft)	*		*		*
* Conv. Total (cfs)	*3	47202. 0	*	Conv. (cfs)	*		*		
* Length Wtd. (ft)	*	280. 95	*	Wetted Per. (ft)	*		*		*
* Min Ch El (ft)	*	180. 00	*	Shear (Ib/sq ft)	*		*		*
* Al pha	*	1. 00	*	Stream Power (Ib/ft s)	*		*		*
* Frctn Loss (ft)	*	0. 61	*	Cum Volume (acre-ft)	*	37. 47	*	38. 06	*
* C & E Loss (ft)	*	0. 02	*	Cum SA (acres)	*	1. 83	*	3. 52	*
20.55 *	***	*****	* *	******	***	*****	***	*****	* *
****					,				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel,

a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT PI		) **********	****	*****	*****
* E.G. Elev (ft)	* 177. 26	* Element	*	Left OB *	Channel *
Right OB * * Vel Head (ft) 0.070 *	* 0. 15	* Wt. n-Val.	*	*	*
* W.S. Elev (ft)	* 177.11	* Reach Len. (ft)	*	490.00 *	490.00 *
260.00 * * Crit W.S. (ft)	* 171.47	* Flow Area (sq ft)	*	*	*
6762.74 * * E.G. Slope (ft/ft)	*0. 001422	* Area (sq ft)	*	*	*
6762.74 * * Q Total (cfs)	*20850.00	* Flow (cfs)	*	*	
* Top Width (ft)	* 885.01	* Top Width (ft)	*	*	*
885.01 * * Vel Total (ft/s)	* 3.08	* Avg. Vel. (ft/s)	*	*	*
* Max Chl Dpth (ft)	* 11.81	* Hydr. Depth (ft)	*	*	*
7.64 * * Conv. Total (cfs) *552980.6 *	*552980. 6	* Conv. (cfs)	*	*	

* Length Wtd. (ft)		plicate Effective * Wetted Per. (ft)	*	*	*
894.52 * * Min Ch El (ft)	* 180.00	* Shear (Ib/sq ft)	*	*	*
0. 67 * * Al pha	* 1.00	* Stream Power (Ib/ft	s) *	*	*
2.07 * * Frctn Loss (ft)	* 0.62	* Cum Volume (acre-ft	·	43 *	46. 41 *
340.54 * * C & E Loss (ft)	* 0.02	* Cum SA (acres)		12 *	3. 52 *
26.33 *	******	*******	*****	****	*****
*****					
Warning: The conveyance is less than 0.7 or gre	ater than	-	-		nveyance)
Warning: There is no fl	ow in the ch		cross secti channel st	ons. ations	are
	ffective flo	o the channel, ow may have to be added	or the Man	ıni ng' s	n of the
overbank could be incre Note: Multiple criti	cal depths w	were found at this loca	tion. The	cri ti ca	I depth
with the lowest, valid,	energy was	usea.			
CROSS SECTION					
RIVER: RIVER-2 REACH: Reach-1	RS: 225				
INPUT Description: SIDE CHANN	EI VS 225				
Station Elevation Data Sta Elev St	num=	13 Sta Elev Sta	El ev	Sta	El ev
******			**************************************		
205 170 24 710 170 73	0 168	260 166 280 810 177	168	475	168
Manning's n Values	num=	3			
*****					
0 . 07 24		280 . 07			
Bank Sta: Left Right 240 280	Lengths:	Left Channel Right 460 460 460	Coeff Co	ntr. .1	Expan. . 3
CROSS SECTION OUTPUT P		*******	****	. + + + + + + +	*****
*****					
* E.G. Elev (ft) Right OB *	* 176. 26	* Element			Channel *
* Vel Head (ft) 0.070 *	* 0.22	* Wt. n-Val.	* 0.0		0.070 *
* W.S. Elev (ft) 460.00 *	* 176.04	* Reach Len. (ft)	* 460.		460.00 *
* Crit W.S. (ft) 3455.21 *	*	* Flow Area (sq ft)	* 501.		361.73 *
* E.G. Slope (ft/ft) 3455.21 *	*0.002490	* Area (sq ft)	* 501.		361.73 *
* 0 Total (cfs) *13019.68 *	*15880.00	* Flow (cfs)	* 1202.		657. 53
* Top Width (ft) 514.69 *	* 701.46	* Top Width (ft)	* 146.	77 *	40. 00 *
		Page 93			

```
Duplicate Effective
                            3. 68
                                                                         4.58 *
* Vel Total (ft/s)
                                 * Avg. Vel. (ft/s)
                                                              2.40
  3.77
 Max Chl Dpth (ft)
                           10.04 * Hydr. Depth (ft)
                                                               3.42
                                                                         9.04
6.71 *
* Conv. Total (cfs)
*260930.8 *
                                  * Conv. (cfs)
                       *318255.1
                                                          * 24105.4
                                                                    * 33218.9
* Length Wtd. (ft)
                          460.00
                                  * Wetted Per. (ft)
                                                             147.03
                                                                        40. 20
514. 93 *
* Min Ch El (ft)
                          166.00
                                  * Shear (lb/sq ft)
                                                              0.53
                                                                         1.40
  1.04
 Al pha
                            1.06
                                  * Stream Power (lb/ft s) *
                                                              1.27
                                                                         6.41
  3. 93
* Frctn Loss (ft)
                            0.79
                                  * Cum Volume (acre-ft)
                                                              88.55
                                                                        48.89
532.07
 C & E Loss (ft)
                            0.03 * Cum SA (acres)
                                                              2.38
                                                                         3.30 *
 25.88 *
*****
CROSS SECTION OUTPUT Profile #Floodway
* E.G. Elev (ft)
                          176.81 * Element
                                                            Left OB *
                                                                       Channel *
Right OB *
 Vel Head (ft)
                            0.23
                                  * Wt. n-Val.
                                                              0.070
                                                                        0.070
 0.070
* W.S. Elev (ft)
                       * 176.58
                                  * Reach Len. (ft)
                                                             460.00
                                                                       460.00
460.00 *
* Crit W.S. (ft)
                                  * Flow Area (sq ft)
                                                             297.17
                                                                       383. 17
3454.07
                                  * Area (sq ft)
                                                             297.17
* E.G. Slope (ft/ft)
                       *0.002065
                                                                       383. 17
3454.07
* Q Total (cfs)
                       *15880.00
                                  * Flow (cfs)
                                                             990.62
                                                                    * 1661.47
*13227.92
* Top Width (ft)
                          510.00
                                  * Top Width (ft)
                                                              40.00
                                                                        40.00
 430.00
* Vel Total (ft/s)
                                  * Avg. Vel. (ft/s)
                            3.84
                                                              3.33
                                                                         4.34
  3.83
 Max Chl Dpth (ft)
                           10.58
                                  * Hydr. Depth (ft)
                                                                         9. 58
                                                              7.43
  8.03
* Conv. Total (cfs)
                                  * Conv. (cfs)
                                                          * 21801.2
                       *349483.3
                                                                    * 36565.2
*291116.9
* Length Wtd. (ft)
                          460.00
                                  * Wetted Per. (ft)
                                                              46.25
                                                                        40.20
436. 59 *
* Min Ch El (ft)
                          166.00
                                  * Shear (lb/sq ft)
                                                              0.83
                                                                         1. 23
  1.02
                            1.01
                                  * Stream Power (Ib/ft s) *
 Al pha
                                                              2.76
                                                                         5.33
  3. 91
* Frctn Loss (ft)
                            0.72
                                  * Cum Volume (acre-ft)
                                                              27. 52
                                                                        51.32
540. 52
 C & E Loss (ft)
                            0.02 * Cum SA (acres)
                                                              0. 21 *
                                                                         3.30 *
 19.66 *
····
CROSS SECTION OUTPUT Profile #10%
* E.G. Elev (ft)
                          172.01 * Element
                                                                       Channel *
                                                            Left OB *
Right OB *
 Vel Head (ft)
                            0.19
                                  * Wt. n-Val.
                                                              0.070
                                                                        0.070
 0.070
* W.S. Elev (ft)
                       * 171.82
                                  * Reach Len. (ft)
                                                                       460.00 *
                                                             460.00 *
                                    Page 94
```

460 00 *		Dup		cate Lifective					
* Crit W.S. (ft)	*		*	Flow Area (sq ft)	*	119. 40	*	192. 80	*
1424.16 * * E.G. Slope (ft/ft)	*0.	005304	*	Area (sq ft)	*	119. 40	*	192. 80	*
1424.16 * * 0 Total (cfs)	* 5	5905.00	*	Flow (cfs)	*	299. 15	*	847. 71	*
4758.14 * * Top Width (ft)	*	545. 95	*	Top Width (ft)	*	57. 75	*	40.00	*
448.20 * * Vel_Total (ft/s)	*	3. 40	*	Avg. Vel. (ft/s)	*	2. 51	*	4. 40	*
3.34 * * Max Chl Dpth (ft)	*	5. 82	*	Hydr. Depth (ft)	*	2. 07	*	4. 82	*
3.18 * * Conv. Total (cfs)	* 8	31077. 2	*	Conv. (cfs)	*	4107. 4	*	11639. 3	*
65330.5 * * Length Wtd. (ft)	*	460.00	*	Wetted Per. (ft)	*	57. 88	*	40. 20	*
448.30 * * Min Ch El (ft)	*	166. 00	*	Shear (Ib/sq ft)	*	0. 68	*	1. 59	*
1. 05 * * Al pha	*	1. 05	*	Stream Power (lb/ft s)	*	1. 71	*	6. 98	*
3.51 * * Frctn Loss (ft)	*	1. 18	*	Cum Volume (acre-ft)	*	20. 75	*	27. 06	*
100.69 * * C & E Loss (ft)	*	0. 03	*	Cum SA (acres)	*	0. 73	*	3. 30	*
12. 94 * *********************************	***	*****	* * :	******	***	*****	**	*****	**
*****									

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

### CROSS SECTION OUTPUT Profile #2%

*****	****	*****	~ ~ .	* * * * * * * * * *	^ ^	* * * * * * * * *	~ ~
* E.G. Elev (ft) Right OB *	* 174.55	* Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.070 *	* 0. 27	* Wt. n-Val.	*	0. 070	*	0.070	*
* W. S. Elev (ft) 460.00 *	* 174. 28	* Reach Len. (ft)	*	460.00	*	460.00	*
* Cri t W.S. (ft) 2572.45 *	*	* Flow Area (sq ft)	*	293. 65	*	291. 19	*
* E.G. Slope (ft/ft) 2572.45 *	*0.004003	* Area (sq ft)	*	293. 65	*	291. 19	*
* 0 Total (cfs) *10483.98 *	*12820. 00	* Flow (cfs)	*	871. 91	*	1464. 11	
* Top Width (ft) 486.48 *	* 615.57	* Top Width (ft)	*	89. 09	*	40. 00	*
* Vel Total (ft/s) 4.08 *	* 4.06	* Avg. Vel. (ft/s)	*	2. 97	*	5. 03	*
* Max Chl Dpth (ft) 5.29 *	* 8. 28	* Hydr. Depth (ft)	*	3. 30	*	7. 28	*
* Conv. Total (cfs) *165701.8 *	*202623.1	* Conv. (cfs)	*	13780. 8	*	23140. 6	
* Length Wtd. (ft) 486.65 *	* 460.00	* Wetted Per. (ft)	*	89. 33	*	40. 20	*
* Min Ch El (ft) 1.32 *	* 166.00	* Shear (Ib/sq ft)	*	0. 82	*	1. 81	*
* Al pha	* 1.04	* Stream Power (lb/ft s) Page 95	*	2. 44	*	9. 10	*

5.38 *		امر	priodto Errootivo					
* Frctn Loss (ft) 188 79 *	*	1. 27	* Cum Volume (acre-ft)	*	35. 81	*	36. 42	*
* C & E Loss (ft)	*	0. 03	* Cum SA (acres)	*	1. 33	*	3. 30	*
10.07	*****	*****	*******	***	*****	***	****	* *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

#### CROSS SECTION OUTPUT Profile #0.2%

^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	^ ^ ^	^ ^ ^ ^ ^ ^ ^ ^ ^ ^	^ ^	^^^^^	^ ^ .	^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	^ ^ .		^ ^
*****									
* E.G. Elev (ft) Right OB *	*	176. 62	*	Element	*	Left OB	*	Channel	*
* Vel Head (ft)	*	0. 36	*	Wt. n-Val.	*	0. 070	*	0.070	*
0.070 * * W.S. Elev (ft)	*	176. 26	*	Reach Len. (ft)	*	460. 00	*	460. 00	*
460.00 * * Crit W.S. (ft)	*		*	Flow Area (sq ft)	*	534. 15	*	370. 42	*
3567.42 * * E.G. Slope (ft/ft)	*0	. 003890	*	Area (sq ft)	*	534. 15	*	370. 42	*
3567.42 * * * * * * * * * * * * * * * * * * *	* 2	0850. 00		Flow (cfs)	*	1607. 07	*	2155. 47	
*17087.46 *	2	0030.00		TTOW (CTS)		1007.07		2133.47	
* Top Width (ft) 518.17 *	*	713. 82	*	Top Width (ft)	*	155. 65	*	40. 00	*
* Vel Total (ft/s) 4.79 *	*	4. 66	*	Avg. Vel. (ft/s)	*	3. 01	*	5. 82	*
* Max Chl Dpth (ft)	*	10. 26	*	Hydr. Depth (ft)	*	3. 43	*	9. 26	*
* Conv. Total (cfs)	*3	34298. 2	*	Conv. (cfs)	*	25766. 9	*	34559.8	
*273971.5 * *_Length Wtd. (ft)	*	460.00	*	Wetted Per. (ft)	*	155. 93	*	40. 20	*
518.41 * * Min Ch El (ft)	*	166. 00	*	Shear (Ib/sq ft)	*	0. 83	*	2. 24	*
1. 67 * * Al pha	*	1. 06	*	Stream Power (lb/ft s)	*	2. 50	*	13. 02	*
8.00 * * Frctn Loss (ft)	*	1. 43	*	Cum Volume (acre-ft)	*	55. 42	*	44. 33	*
309. 71 *									
* C & E Loss (ft) 22.14 *	*	0. 03	*	Cum SA (acres)	*	2. 25	*	3. 30	*
*******	***	*****	* *	******	* * :	****	* * :	****	* *
*****									

Warning: The energy loss was greater than 1.0 ft  $(0.3\ \text{m})$ . between the current and previous cross section. This may indicate the need for additional cross sections.

#### CROSS SECTION

RI VER: RI VER-2 RS: 200 REACH: Reach-1

I NPUT

Description: SIDE CHANNEL XS 200

Sta Elev Sta Elev Sta Elev

0 200 1 220 168 260 910 174 1035	177. 6 164	olicate Effective 90 176 150 430 166 750 1200 178 1320	17 16 18	7 760	
Manni ng' s n Val ues Sta n Val Sta ************************************	*****	3 Sta n Val ********** 430 .07			
Bank Sta: Left Right 220 430	Lengths:	Left Channel Right 820 820 890	Coe	ff Contr. .1	Expan. . 3
		*******	***	****	*****
********* * E.G. Elev (ft)	* 175.45	* Element	*	Left OB	* Channel *
Right OB *  * Vel Head (ft) 0.070 *	* 0.14	* Wt. n-Val.	*	0. 070	* 0.070 *
* W.S. Elev (ft)	* 175.32	* Reach Len. (ft)	*	820.00	* 820.00 *
890.00 * * Cri t W.S. (ft)	*	* Flow Area (sq ft)	*	318. 29	* 2126.73 *
3281.79 * * E.G. Slope (ft/ft)	*0. 001243	* Area (sq ft)	*	318. 29	* 2126.73 *
3281.79 * * 0 Total (cfs)	*15880.00	* Flow (cfs)	*	484. 27	* 7445.62 *
7950.11 *` * Top Width (ft)	* 881.89	* Top Width (ft)	*	109. 53	* 210.00 *
562.36 * * Vel Total (ft/s)	* 2.77	* Avg. Vel. (ft/s)	*	1. 52	* 3.50 *
2.42 * * Max Chl Dpth (ft)	* 11.32	* Hydr. Depth (ft)	*	2. 91	* 10.13 *
5.84 * * * Conv. Total (cfs)	*450398.4	* Conv. (cfs)	*	13735. 1	*211177. 4
*225485.9 * * Length Wtd. (ft)	* 872.52	* Wetted Per. (ft)	*	109. 81	* 210. 21 *
563.57 * * Min Ch El (ft)	* 164.00	* Shear (lb/sq ft)	*	0. 22	* 0.79 *
0. 45 * * Al pha	* 1.14	* Stream Power (lb/ft s)	*	0. 34	* 2.75 *
1.09 * * Frctn Loss (ft)	* 0.75	* Cum Volume (acre-ft)	*	84. 22	* 35.76 *
496.50 * * C & E Loss (ft)	* 0.03	* Cum SA (acres)	*	1. 03	* 1.98 *
	*****	*******	***	*****	*****
*********** CDOSS SECTION OUTDUT Dr	ofilo #Floo	dway			
CROSS SECTION OUTPUT Pr	*****	way *************	***	*****	*****
* E.G. Elev (ft)	* 176.07	* Element	*	Left OB	* Channel *
Right OB * * Vel Head (ft)	* 0.18	* Wt. n-Val.	*		* 0.070 *
0.070 * * W.S. Elev (ft)	* 175.89	* Reach Len. (ft)	*	820.00	* 820.00 *
890.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	*		* 2246.85 *
2420.29 * * E.G. Slope (ft/ft)	*0. 001241	* Area (sq ft)	*		* 2246.85 *
2420. 29  * *	*15880.00	* Flow (cfs)	*		* 7954.43 *
7925. 57 *		Page 07			

* Top Width (ft)	* 465.00	olicate Effective * Top Width (ft)	*	*	210.00	*
255. 00 *	* 3.40		*	*	3. 54	*
* Vel Total (ft/s) 3.27 *	* 3.40	* Avg. Vel. (ft/s)			3. 34	
* Max Chl Dpth (ft) 9.49 *	* 11.89	* Hydr. Depth (ft)	*	*	10. 70	*
* Conv. Total (cfs) *224993.8 *	*450807. 2	* Conv. (cfs)	*	*2	25813. 3	
* Length Wtd. (ft) 264.09 *	* 872.47	* Wetted Per. (ft)	*	*	218. 10	*
* Min Ch El (ft) 0.71 *	* 164.00	* Shear (Ib/sq ft)	*	*	0.80	*
* Al pha 2. 32 *	* 1.00	* Stream Power (Ib/ft s)	*	*	2. 83	*
* Frctn Loss (ft) 509.50 *	* 0.63	* Cum Volume (acre-ft)	* 25.95	*	37. 44	*
* C & E Loss (ft) 16.04 *	* 0.04	* Cum SA (acres)	*	*	1. 98	*
10.04	*****	********	*****	***	*****	**

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Pr		*****	***	*****	**:	*****	**
********* * E.G. Elev (ft)	* 170.80	* Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	* 0.09	* Wt. n-Val.	*	0. 070	*	0. 070	*
0. 070 *	0.07	wt. II vai.		0.070		0.070	
* W.S. Elev (ft) 890.00 *	* 170.72	* Reach Len. (ft)	*	820. 00	*	820. 00	*
* Crit W.S. (ft) 1362.61 *	*	* Flow Area (sq ft)	*	37. 50	*	1160. 15	*
* E.G. Slope (ft/ft)	*0. 001498	* Area (sq ft)	*	37. 50	*	1160. 15	*
1362.61 * * 0 Total (cfs) 2891.48 *	* 5905.00	* Flow (cfs)	*	36. 51	*	2977. 01	*
2891.48 * * Top Width (ft)	* 566.37	* Top Width (ft)	*	28. 94	*	210. 00	*
327. 43 *	± 0.01	. ,		0.07		0 57	*
* Vel Total (ft/s) 2.12 *	* 2.31	* Avg. Vel. (ft/s)	*	0. 97	*	2. 57	^
* Max Chl Dpth (ft) 4.16 *	* 6.72	* Hydr. Depth (ft)	*	1. 30	*	5. 52	*
* Conv. Total (cfs)	*152554.5	* Conv. (cfs)	*	943. 2	*	76910. 4	*
* Length Wtd. (ft)	* 872.14	* Wetted Per. (ft)	*	29. 07	*	210. 21	*
* Min Ch El (ft)	* 164.00	* Shear (Ib/sq ft)	*	0. 12	*	0. 52	*
0. 39 * * Al pha	* 1.04	* Stream Power (lb/ft s)	*	0. 12	*	1. 32	*
0.82 * * Frctn Loss (ft)	* 3. 24	* Cum Volume (acre-ft)	*	19. 92	*	19. 92	*
85.98 * * C & E Loss (ft) 8.85 *	* 0.03	* Cum SA (acres)	*	0. 27	*	1. 98	*
0.00	*****	******	***	*****	**:	*****	**
*****							

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

#### CROSS SECTION OUTPUT Profile #2%

****	****	*****	* *	******	* * *	*****	* * *	*****	* *
*****									
* E.G. Elev (ft) Right OB *	* 17	3. 25	*	Element	*	Left OB	*	Channel	*
* Vel Head (ft)	*	0. 17	*	Wt. n-Val.	*	0. 070	*	0. 070	*
0.070 * * W.S. Elev (ft)	* 17	3. 07	*	Reach Len. (ft)	*	820.00	*	820.00	*
890.00 * * Crit W.S. (ft)	*		*	Flow Area (sq ft)	*	140. 50	*	1655. 39	*
2182.38 * * E.G. Slope (ft/ft)	*0.00	2020	*	Area (sq ft)	*	140. 50	*	1655. 39	*
2182. 38 *	0.00	2020		711 04 (34 11)		110.00		1000.07	
* Q Total (cfs) 6329, 44 *	*1282	0.00	*	Flow (cfs)	*	239. 98	*	6250. 58	*
* Top Width (ft)	* 67	8. 91	*	Top Width (ft)	*	58. 42	*	210. 00	*
410.50 * * Vel Total (ft/s)	*	3. 22	*	Avg. Vel. (ft/s)	*	1. 71	*	3. 78	*
2.90 * * Max Chl Dpth (ft)	*	9. 07	*	Hydr. Depth (ft)	*	2. 41	*	7. 88	*
5.32 * * Conv. Total (cfs)	*2852	73. 7	*	Conv. (cfs)	*	5340. 2	*1	39089. 4	
*140844.1 * * Length Wtd. (ft)	* 87	2. 28	*	Wetted Per. (ft)	*	58. 64	*	210. 21	*
411.69 * * Min Ch El (ft)	* 16	4. 00	*	Shear (lb/sq ft)	*	0. 30	*	0. 99	*
0. 67 *				·					
* Al pha 1. 94 *	*	1. 07	*	Stream Power (Ib/ft s)	*	0. 52	*	3. 75	*
* Frctn Loss (ft) 163.69 *	*	3. 82	*	Cum Volume (acre-ft)	*	33. 52	*	26. 15	*
* C & E Loss (ft)	*	0. 03	*	Cum SA (acres)	*	0. 55	*	1. 98	*
11.85 *	*****	*****	* *	********	***	******	· * *	*****	* *
++++++++									

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

#### CROSS SECTION OUTPUT Profile #0 2%

***************************************											
*****											
* E.G. Elev (ft) Right OB *	* 175.16	* Element	*	Left OB	*	Channel	*				
* Vel Head (ft) 0.070 *	* 0. 26	* Wt. n-Val.	*	0. 070	*	0. 070	*				
* W.S. Elev (ft) 890.00 *	* 174. 90	* Reach Len. (ft)	*	820. 00	*	820. 00	*				
* Crit W.S. (ft) 3052.00 *	*	* Flow Area (sq ft)	*	275. 09	*	2038. 88	*				
* E.G. Slope (ft/ft) 3052.00 *	*0. 002527	* Area (sq ft)	*	275. 09	*	2038. 88	*				
* Q Total (cfs) *10367.22 *	*20850.00	* Flow (cfs)	*	587. 15	*	9895. 63					

```
Duplicate Effective
* Top Width (ft)
                                                                           210.00
                            843. 20 * Top Width (ft)
                                                                 96. 98
 536. 21
 Vel Total (ft/s)
                              3.89 * Avg. Vel. (ft/s)
                                                                             4.85
                                                                  2.13
   3.40
 Max Chl Dpth (ft)
                                    * Hydr. Depth (ft)
                             10.90
                                                                  2.84
                                                                             9.71
   5. 69
* Conv. Total (cfs)
                         *414738.7
                                    * Conv. (cfs)
                                                             * 11679.3
                                                                        *196839.3
*206220.1
* Length Wtd. (ft)
                            872.40
                                    * Wetted Per. (ft)
                                                                 97.26
                                                                           210.21
 537. 42
                                    * Shear (Ib/sq ft)
* Min Ch El (ft)
                            164.00
                                                                  0.45
                                                                             1.53
   0.90
  Al pha
                              1.13
                                    * Stream Power (lb/ft s) *
                                                                  0.95
                                                                             7.43
   3.04
 Frctn Loss (ft)
                              3.67
                                    * Cum Volume (acre-ft)
                                                                 51.15
                                                                            31.61
 274. 76
 C & E Loss (ft)
                              0.01
                                    * Cum SA (acres)
                                                                  0.91
                                                                             1.98
            ************************
*****
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and
previous cross section. This may indicate
         the need for additional cross sections.
CROSS SECTION
RIVER: RIVER-2
REACH: Reach-1
                          RS: 190
I NPUT
Description: SIDE CHANNEL XS 190 (LETTERED CROSS SECTION T)
MODIFIED LOCATION
             OF ROB AND ADJUSTED GR ACCORDINGLY
THE CHANNEL ROUGHNESS IS
          ESSENTIALLY THE SAME AS OB SINCE IT IS NOT NATURAL
CHANNEL
```

CHANNEL -									
	LEFT	IS BLOC	KED BECAU	SE OF DI	VIDED F	LOW			
Station El	evati on	Data	num=	28					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
******	*****	*****	*****	*****	*****	******	*****	*****	*****
1920	185	1970	155	2000	153. 8	2020	155	2030	160
2250	161	2455	162. 5	2750	163	3000	162. 5	3150	160
3350	162. 5	3625	162. 5	3730	160	3915	163	4100	165
4435	168	4625	164	4645	160	4665	160	4675	164
4955	166	5060	168	5335	170	5665	172	5815	174
5925	176	6135	178	6255	180				
Manni ng' s			num=	3					
	n Val	Sta	n Val	Sta	n Val				
******	*****	****	*****	*****	*****				
1920	. 1	1970	. 045	2020	. 07				
Bank Sta:	Left R	i ght	Lengths:	Left Ch	nannel	Ri ght	Coeff	Contr.	Expan.
	1970	2020	· ·	1100	1100	550		. 1	. 3
Ineffectiv	∕e Flow	num=	1						
Sta L	Sta R	El ev	Permanen	t					
6255	6255	180	F						
0200	0233	100	•						
Blocked 0b			num=	1					

Sta L	Sta R	El ev
*****	*****	*****
1920	4435	180

	ofile #1% *****	******	****	* * * * * * * * * * * *	**
*****					
* E.G. Elev (ft) Right OB *	* 174.67	* Element	* Left OB	* Channel	*
* Vel Head (ft) 0.070 *	* 0.05	* Wt. n-Val.	*	*	*
* W.S. Elev (ft)	* 174.62	* Reach Len. (ft)	* 1000.00	* 1000.00	*
1000.00 * * Crit W.S. (ft)	* 168.07	* Flow Area (sq ft)	*	*	*
8800.63 * * E.G. Slope (ft/ft)	*0.000636	* Area (sq ft)	*	*	*
8800.63 * * Q Total (cfs)	*15880.00	* Flow (cfs)	*	*	
*15880.00 *  * Top Width (ft)	* 1414.27	* Top Width (ft)	*	*	*
1414.27 * * Vel Total (ft/s)	* 1.80	* Avg. Vel. (ft/s)	*	*	*
1.80 * * Max Chl Dpth (ft) 6.22 *	* 14.62	* Hydr. Depth (ft)	*	*	*
* Conv. Total (cfs) *629681.2 *	*629681. 2	* Conv. (cfs)	*	*	
* Length Wtd. (ft) 1422.16 *	* 1000.00	* Wetted Per. (ft)	*	*	*
* Min Ch El (ft) 0.25 *	* 180.00	* Shear (Ib/sq ft)	*	*	*
* Al pha 0. 44 *	* 1.00	* Stream Power (Ib/ft s)	*	*	*
* Frctn Loss (ft) 373.07 *	* 0.13	* Cum Volume (acre-ft)	* 81. 22	* 15.74	*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	*	*	*
******	*****	*****	****	*****	* *
****					

Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a level or ineffective flow may have to be added or the Manning's n of the

a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# 

*****					
* E.G. Elev (ft)	* 175.40	* Element	* Left OE	3 * Channel	*
Right OB *					
* Vel_Head (ft)	* 0.04	* Wt. n-Val.	*	*	*
0. 070 *					
* W.S. Elev (ft)	* 175. 36	* Reach Len. (ft)	* 1000.00	* 1000.00	*
1000.00 *					
* Crit W.S. (ft)	* 168.04	<pre>* Flow Area (sq ft)</pre>	*	*	*
9388. 74 *					
* E.G. Slope (ft/ft)	*0. 000467	* Area (sq ft)	*	*	*
9388. 74 *					
* Q Total (cfs)	*15880.00	* Flow (cfs)	*	*	
*15880. 00 *					
* Top Width (ft)	* 1315.00	<pre>* Top Width (ft)</pre>	*	*	*
		Page 101			

1315 00 *	Dup	officate LifeCtive					
1315.00 * * Vel Total (ft/s) 1.69 *	* 1.69	* Avg. Vel. (ft/s)	*		*		*
* Max Chl Dpth (ft) 7.14 *	* 15.36	* Hydr. Depth (ft)	*		*		*
* Conv. Total (cfs) *734794.7 *	*734794.7	* Conv. (cfs)	*		*		
* Length Wtd. (ft) 1326.22 *	* 1000.00	* Wetted Per. (ft)	*		*		*
* Min Ch El (ft) 0.21 *	*	* Shear (Ib/sq ft)	*		*		*
* Al pha 0. 35 *	* 1.00	* Stream Power (Ib/ft s)	*		*		*
* Frctn Loss (ft) 388.86 *	* 0.12	* Cum Volume (acre-ft)	*	25. 95	*	16. 29	*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	*		*		*
*****	******	*****	****	*****	***	*****	* *
****							

Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the

overbank could be increased.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

### CROSS SECTION OUTPUT Profile #10%

*****	× × ×	****	* *	*******	× × 7	*****	× × :	*****	* *
*****									
* E.G. Elev (ft) Right OB *	*	167. 54	*	Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.070 *	*	0. 40	*	Wt. n-Val.	*		*		*
* W. S. Elev (ft) 1000.00 *	*	167. 14	*	Reach Len. (ft)	*	1000.00	*	1000.00	*
* Crit W.S. (ft) 1162.58 *	*	166. 41	*	Flow Area (sq ft)	*		*		*
* E.G. Slope (ft/ft) 1162.58 *	*0	. 020588	*	Area (sq ft)	*		*		*
* Q Total (cfs) 5905.00 *	*	5905. 00	*	Flow (cfs)	*		*		*
* Top Width (ft) 538.65 *	*	538. 65	*	Top Width (ft)	*		*		*
* Vel Total (ft/s) 5.08 *	*	5. 08	*	Avg. Vel. (ft/s)	*		*		*
* Max Chl Dpth (ft) 2.16 *	*	7. 14	*	Hydr. Depth (ft)	*		*		*
* Conv. Total (cfs) 41154.0 *	*	41154. 0	*	Conv. (cfs)	*		*		*
* Length Wtd. (ft) 539.86 *	*	1000. 00	*	Wetted Per. (ft)	*		*		*
* Min Ch El (ft) 2.77 *	*	180. 00	*	Shear (Ib/sq ft)	*		*		*
* Al pha 14.06 *	*	1. 00	*	Stream Power (Ib/ft s)	*		*		*
* Frctn Loss (ft) 60.18 *	*	1. 80	*	Cum Volume (acre-ft)	*	19. 57	*	9. 00	*
* C & E Loss (ft)	*	0. 07	*	Cum SA (acres)	*		*		*
	+++	+++++++		++++++++++++++++++++	+++	. + + + + + + + + .	<b>.</b>	+++++++	* *

\*\*\*\*\*

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.

Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the

overbank could be increased.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

#### CROSS SECTION OUTPUT Profile #2% \*

```
* E.G. Elev (ft)
Right OB *
                           169.40 * Element
                                                               Left OB *
                                                                          Channel *
 Vel Head (ft)
                             0.49
                                   * Wt. n-Val.
 0.070
* W.S. Elev (ft)
                                                             * 1000.00 * 1000.00
                           168. 91
                                   * Reach Len. (ft)
1000.00
                                   * Flow Area (sq ft)
* Crit W.S. (ft)
                           167.63
2288. 97
* E.G. Slope (ft/ft)
                        *0.015780
                                   * Area (sq ft)
2288. 97
 Q Total (cfs)
                        *12820.00
                                   * Flow (cfs)
*12820.00
* Top Width (ft)
                           749.81
                                    * Top Width (ft)
749.81
 Vel Total (ft/s)
                             5.60
                                    * Avg. Vel. (ft/s)
  5.60
 Max Chl Dpth (ft)
                             8. 91
                                    * Hydr. Depth (ft)
   3.05
* Conv. Total (cfs) *102055.2 *
                         *102055.2
                                    * Conv. (cfs)
                                   * Wetted Per. (ft)
* Length Wtd. (ft)
                         * 1000.00
751. 9̃6
 Min Ch El (ft)
                           180.00
                                   * Shear (lb/sq ft)
  3.00
 Al pha
                             1.00
                                   * Stream Power (lb/ft s) *
  16.80
                                   * Cum Volume (acre-ft)
 Frctn Loss (ft)
                             1. 58
                                                                 32. 20 *
                                                                            10.56
118. 01
 C & E Loss (ft)
                             0. 11
                                   * Cum SA (acres)
*************************
```

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

Warning: There is no flow in the channel. Check that the channel stations are

correctly coded. To force flow into the channel,

a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

#### CROSS SECTION OUTPUT Profile #0.2%

*****								
* E.G. Elev (ft)	*	171. 49	* Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	*	0. 36	* Wt. n-Val.	*		*		*
0. 070 *								

	Dup	DIICATE ETTECTIVE			
* W.S. Elev (ft) 1000.00 *		* Reach Len. (ft)	* 1000.00	* 1000.00	*
* Crit W.S. (ft) 4308.39 *	* 168.70	* Flow Area (sq ft)	*	*	*
* E. G. Slope (ft/ft) 4308.39 *	*0.008319	* Area (sq ft)	*	*	*
* Q Total (cfs) *20850.00 *	*20850.00	* Flow (cfs)	*	*	
* Top Width (ft)	* 1085.85	* Top Width (ft)	*	*	*
1085.85 * * Vel Total (ft/s)	* 4.84	* Avg. Vel. (ft/s)	*	*	*
* Max Chl Dpth (ft)	* 11.13	* Hydr. Depth (ft)	*	*	*
3.97 * * Conv. Total (cfs) *228601.6 *	*228601.6	* Conv. (cfs)	*	*	
* Length Wtd. (ft) 1090.22 *	* 1000.00	* Wetted Per. (ft)	*	*	*
* Min Ch El (ft)	* 180.00	* Shear (Ib/sq ft)	*	*	*
* Al pha	* 1.00	* Stream Power (lb/ft s)	*	*	*
* Frctn Loss (ft)	* 1.24	* Cum Volume (acre-ft)	* 48.56	* 12.42	*
199.57 * * C & E Loss (ft)	* 0.08	* Cum SA (acres)	*	*	*
^ *********	*****	******	*****	****	* *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel,

a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

#### SUMMARY OF MANNING'S N VALUES

Ri ver: RI VER-1

\*\*\*\*\*

******	*****	*****	*****	*****	*****	*****
* Reach	*	Ri ver Sta.	* r	า1 *	n2 *	n3 *
*****	*****	*****	*****	*****	*****	*****
*Reach-1	*	350	*	. 1*	. 045*	. 1*
*Reach-1	*	344. 95	*	. 1*	. 045*	. 1*
*Reach-1	*	331. 6	*	. 1*	. 045*	. 1*
*Reach-1	*	320	*	. 1*	. 045*	. 1*
*Reach-1	*	314. 4	*	. 1*	. 045*	. 1*
*Reach-1	*	300	*	. 1*	. 045*	. 1*
*Reach-1	*	285	*	. 1*	. 045*	. 1*
*Reach-1	*	280. 55	*	. 1*	. 045*	. 1*
*Reach-1	*	270	*	. 1*	. 045*	. 1*
*Reach-1	*	264	*	. 1*	. 045*	. 1*
*Reach-1	*	250. 12	*	. 07*	. 045*	. 07*
*Reach-1	*	250.06	*Bri d	dge *	*	*
*Reach-1	*	250	*	. 07*	. 045*	. 07*
*Reach-1	*	246	*	. 07*	. 045*	. 07*
*Reach-1	*	245	*	. 07*	. 045*	. 07*
*Reach-1	*	244. 19	*Bri d	dge *	*	*
			F	Page 104		

			Dupl i	cate Effe	cti ve	
*Reach-1	*	243. 38	*	. 07*	. 045*	. 07*
*Reach-1	*	243. 2	*	. 07*	. 045*	. 07*
*Reach-1	*	243	*	. 07*	. 045*	. 07*
*Reach-1	*	190	*	. 1*	. 045*	. 1*
*Reach-2	*	180	*	. 1*	. 045*	. 1*
*Reach-2	*	170	*	. 1*	. 045*	. 1*
*****	***	*****	****	******	****	*****
Ri ver: RI VER-2						
*****	***	*****	****	******	****	*****
* Reach	*	Ri ver Sta.	*	n1 *	n2 *	n3 *
*****	***	*****	****	******	****	*****
*Reach-1	*	250. 12	*	. 07*	. 045*	. 07*
*Reach-1	*	225	*	. 07*	. 07*	. 07*
*Reach-1	*	200	*	. 07*	. 07*	. 07*
*Reach-1	*	190	*	. 1*	. 045*	. 07*
*****	***	*****	*****	******	*****	*****

#### SUMMARY OF REACH LENGTHS

River: RIVER-1						
*****	***	*****	****	*****	*****	*****
* Reach	*	Ri ver Sta.	*	Left *	Channel *	Right *
*****	***	*****	****		*****	*****
*Reach-1	*	350	*	505*	505*	505*
*Reach-1	*	344. 95	*	1335*	1335*	1335*
*Reach-1	*	331. 6	*	820*	820*	820*
*Reach-1	*	320	*	900*	900*	550*
*Reach-1	*	314. 4	*	600*	1252*	600*
*Reach-1	*	300	*	1000*	1900*	1900*
*Reach-1	*	285	*	220*	320*	320*
*Reach-1	*	280. 55	*	1140*	1140*	1140*
*Reach-1	*	270	*	520*	520*	520*
*Reach-1	*	264	*	1338*	1338*	1000*
*Reach-1	*	250. 12	*	482*	482*	482*
*Reach-1	*	250. 06	*Br	ri dge *	*	*
*Reach-1	*	250	*	5*	40*	60*
*Reach-1	*	246	*	5*	50*	140*
*Reach-1	*	245	*	230*	230*	230*
*Reach-1	*	244. 19	*Br	ri dge *	*	*
*Reach-1	*	243. 38	*	600*	600*	300*
*Reach-1	*	243. 2	*	730*	730*	200*
*Reach-1	*	243	*	4920*	3938*	1480*
*Reach-1	*	190	*	1000*	1000*	1000*
*Reach-2	*	180	*	1000*	1000*	1000*
*Reach-2	*	170	*	0*	0*	0*

River: RIVER-2

****	******	****	*****	******	***	****	***	*****	****	****
	Reach ******							Channel		
*Reach	-1	*	250. 1	12	*	4	90*	49	0*	260*
*Reach	-1	*	225		*	4	·60*	46	0*	460*
*Reach	-1	*	200		*	8	320*	82	0*	890*
*Reach	-1	*	190		*	11	00*	110	0*	550*
****	*****	****	*****	*****	***	* * * * *	***	*****	*****	*****

River: RIVER-1

******	*****	*****	*****	*****	· * *
* Reach	* Ri	ver Sta.	* Contr.	* Expan.	*
			. 1*		· × ×
*Reach-1 *Reach-1		350         * 344. 95    *	. 1*	. 3* . 3*	
*Reach-1		331. 6 *	. 1*	. 3* . 3*	
*Reach-1		320 *	. 1*	. 3*	
*Reach-1		314. 4 *	1*	. 3*	
*Reach-1		300 *	. 1*	. 3*	
*Reach-1		285 *	. 1*	. 3*	
*Reach-1		280. 55 *	. 1*	. 3*	
*Reach-1		270 *	. 1*	. 3*	
*Reach-1		264 *	. 1*	. 3*	
*Reach-1		250. 12 *	. 3*	. 5*	
*Reach-1	4		i dge *		
*Reach-1 *Reach-1	4	250 * 246 *	. 3* . 3*	. 5* . 5*	
*Reach-1	4	245 *	. 3 . 3*	. 5 . 5*	
*Reach-1			i dge *	. 5	
*Reach-1		243. 38 *	. 3*	. 5*	
*Reach-1		243. 2 *	. 1*	. 3*	
*Reach-1	* 2	243 *	. 1*	. 3*	
*Reach-1	*	190 *	. 1*	. 3*	
*Reach-2		180 *	. 1*	. 3*	
*Reach-2		170 * ********	. 1*	. 3*	
********		*****	*****	*****	· × ×
River: RIVE	K-2				
*****	*****	*****	*****	*****	**
* Reach	* Ri	ver Sta.	* Contr.	* Expan.	*
*****	*****	******	*****	*****	· * *
*Reach-1	* 2	250. 12 *	. 1*	. 3*	
*Reach-1		225 *	. 1*	. 3*	
*Reach-1		200 *	. 1*	. 3*	
*Reach-1	* * * * * * * * * * * * * * * * * * *	190 *	. 1*	. 3*	
*****	* * * * * * * * * * * * * * * * * * * *		*****	* * * * * * * * * * *	· · · ·
Drofilo Out	put Table -	Standard T	ahlo 1		
				*****	*********
*****	*****				
*****		******	*******	*****	*********
* Ri ver		*****	*****	*****	**********
	* Reach				
Elev * Crit	* Reach W. S. * E. G.	* Ri v	er Sta *	Profile	* Q Total * Min Ch El * W.S.
Froude # Ch	W. S. * E. G. I *	* Riv Elev * E.	er Sta * G. Slope *	Profile Vel Chnl	* Q Total * Min Ch El * W.S. * Flow Area * Top Width *
Froude # Ch *	W. S. * E. G. I * *	* Ri v El ev * E. *	er Sta * G. Slope *	Profile Vel Chnl	* Q Total * Min Ch El * W.S. * Flow Area * Top Width * * (cfs) * (ft) *
Froude # Ch	W. S. * E. G. I * *	* Ri v El ev * E. *	er Sta * G. Slope *	Profile Vel Chnl	* Q Total * Min Ch El * W.S. * Flow Area * Top Width *
Froude # Ch * (ft) * *	W. S. * E. G.   *   (ft) *	* Ri v El ev * E. * (ft) *	er Sta * G. Slope * * (ft/ft) *	Profile Vel Chnl (ft/s)	* Q Total * Min Ch El * W.S. * Flow Area * Top Width * * (cfs) * (ft) * * (sq ft) * (ft) *
Froude # Ch  (ft) *  **********************************	W. S. * E. G.   * (ft) *	* Ri v El ev * E. * (ft) *	er Sta * G. Slope *  (ft/ft) *	Profile Vel Chnl (ft/s)	* Q Total * Min Ch El * W.S. * Flow Area * Top Width * * (cfs) * (ft) * * (sq ft) * (ft) *
Froude # Ch  (ft) *  **********************************	W. S. * E. G.   * (ft) *	* Ri v El ev * E. * (ft) *	er Sta * G. Slope *  (ft/ft) *	Profile Vel Chnl (ft/s)	* Q Total * Min Ch El * W.S. * Flow Area * Top Width * * (cfs) * (ft) * * (sq ft) * (ft) *
Froude # Ch  (ft) *  **********  **********************	W. S. * E. G.   * (ft) * *********	* Ri v El ev * E. (ft) *	er Sta * G. Slope *  (ft/ft) *  *********	Profile Vel Chnl (ft/s) *******	* Q Total * Min Ch El * W.S. * Flow Area * Top Width * * (cfs) * (ft) * * (sq ft) * (ft) * ***********************************
Froude # Ch  (ft) *  *********  * RI VER-2	W. S. * E. G.   * (ft) * ********** * Reach-	* Ri v El ev * E. (ft) * *********	er Sta * G. Slope *  (ft/ft) *  ***********  .12 *	Profile Vel Chnl (ft/s) *********	* Q Total * Min Ch El * W.S.  * Flow Area * Top Width *  * (cfs) * (ft) *  * (sq ft) * (ft) *  **********************************
Froude # Ch  (ft) *  *********  * RI VER-2  176.60 *	W. S. * E. G.   * (ft) * *********	* Ri v El ev * E. (ft) * *********	er Sta * G. Slope *  (ft/ft) *  ***********  .12 *	Profile Vel Chnl (ft/s) *********	* Q Total * Min Ch El * W.S. * Flow Area * Top Width * * (cfs) * (ft) * * (sq ft) * (ft) * ***********************************
Froude # Ch  (ft) *  *********  * RI VER-2	W. S. * E. G.   * (ft) * ***********************************	* Ri v El ev * E. (ft) * ***********************************	er Sta * G. Slope *  (ft/ft) *  *********  .12 * 0.001017	Profile Vel Chnl  (ft/s)  ********  1%  Floodway	* Q Total * Min Ch El * W.S.  * Flow Area * Top Width *  * (cfs) * (ft) *  * (sq ft) * (ft) *  **********************************
Froude # Ch  (ft) *  *********  * RI VER-2  176. 60 *  0. 00 *	W. S. * E. G.   * (ft) * ***********************************	* Ri v El ev * E. (ft) * ***********************************	er Sta * G. Slope *  (ft/ft) *  *********  .12 * 0.001017	Profile Vel Chnl  (ft/s)  ********  1%  Floodway	* Q Total * Min Ch El * W.S.  * Flow Area * Top Width *  * (cfs) * (ft) *  * (sq ft) * (ft) *  **********************************
Froude # Ch  (ft) *  ********  *******  * RI VER-2  176. 60 *  0. 00 *  * RI VER-2  177. 14 *  0. 00 *	W. S. * E. G.   (ft) *   *********  * Reach-  170. 89 *  * Reach-  171. 65 *	* Ri v El ev * E. (ft) * ***********************************	er Sta * G. Slope *  (ft/ft) *  *********  .12 * 0.001017  .12 * 0.001679	Profile Vel Chnl  (ft/s)  ********  1%  Floodway	* Q Total * Min Ch El * W. S.  * Flow Area * Top Width *  * (cfs) * (ft) *  * (sq ft) * (ft) *  **********************************
Froude # Ch  (ft) *  ********  *******  * RI VER-2  176. 60 *  0. 00 *  * RI VER-2  177. 14 *  0. 00 *  * RI VER-2	W. S. * E. G.   (ft) *   ********  * Reach-  170. 89 *  * Reach-  171. 65 *  * Reach-	* Ri v El ev * E. (ft) * ***********************************	er Sta * G. Slope *  (ft/ft) *  *********  .12 * 0.001017  .12 * 0.001679	Profile Vel Chnl  (ft/s)  ********  1%  Floodway  10%	* Q Total * Min Ch El * W.S.  * Flow Area * Top Width *  * (cfs) * (ft) *  * (sq ft) * (ft) *  **********************************
Froude # Ch  (ft) *  ********  *******  * RI VER-2  176. 60 *  0. 00 *  * RI VER-2  177. 14 *  0. 00 *  * RI VER-2  172. 65 *	W. S. * E. G.   (ft) *   *********  * Reach-  170. 89 *  * Reach-  171. 65 *	* Ri v El ev * E. (ft) * ***********************************	er Sta * G. Slope *  (ft/ft) *  *********  .12 * 0.001017  .12 * 0.001679	Profile Vel Chnl  (ft/s)  ********  1%  Floodway  10%	* Q Total * Min Ch El * W. S.  * Flow Area * Top Width *  * (cfs) * (ft) *  * (sq ft) * (ft) *  **********************************
Froude # Ch  (ft) *  ********  *******  * RI VER-2  176. 60 *  0. 00 *  * RI VER-2  177. 14 *  0. 00 *  * RI VER-2  172. 65 *  0. 00 *	W. S. * E. G.   (ft) *   *********  * Reach-7  170. 89 *  * Reach-7  171. 65 *  * Reach-7  169. 34 *	* Ri v El ev * E. (ft) * ***********************************	er Sta * G. Slope *  (ft/ft) *  *********  .12 * 0.001017  .12 * 0.001679  .12 * 0.001391	Profile Vel Chnl  (ft/s)  ********  1%  Floodway  10%	* Q Total * Min Ch El * W.S.  * Flow Area * Top Width *  * (cfs) * (ft) *  * (sq ft) * (ft) *  **********************************
Froude # Ch  (ft) *  ********  *******  * RI VER-2  176. 60 *  0. 00 *  * RI VER-2  177. 14 *  0. 00 *  * RI VER-2  172. 65 *  0. 00 *  * RI VER-2	W. S. * E. G.   (ft) *   *********  * Reach-  170. 89 *  * Reach-  171. 65 *  * Reach-  169. 34 *  * Reach-	* Ri v El ev * E. (ft) * ***********************************	er Sta * G. Slope *  (ft/ft) *  *********  .12 * 0.001017  .12 * 0.001679  .12 * 0.001391	Profile Vel Chnl  (ft/s)  ********  1%  *I oodway  10%  2%	* Q Total * Min Ch El * W.S.  * Flow Area * Top Width *  * (cfs) * (ft) *  * (sq ft) * (ft) *  ******************************  * 15880.00 * 180.00 *  * 6316.63 * 873.59 *  * 15880.00 *  * 3037.93 * 784.62 *  * 12820.00 * 180.00 *
Froude # Ch  (ft) *  ********  *******  * RI VER-2  176. 60 *  0. 00 *  * RI VER-2  177. 14 *  0. 00 *  * RI VER-2  172. 65 *  0. 00 *	W. S. * E. G.   (ft) *   *********  * Reach-7  170. 89 *  * Reach-7  171. 65 *  * Reach-7  169. 34 *	* Ri v El ev * E. (ft) * ***********************************	er Sta * G. Slope *  (ft/ft) *  *********  12 * 0.001017  .12 * 0.001679  .12 * 0.001391	Profile Vel Chnl  (ft/s)  ********  1%  Floodway  10%  2%  **	* Q Total * Min Ch El * W. S.  * Flow Area * Top Width *  * (cfs) * (ft) *  * (sq ft) * (ft) *  *****************************  * 15880.00 * 180.00 *  * 6316.63 * 873.59 *  * 15880.00 *  * 4490.05 * 530.00 *  * 3037.93 * 784.62 *
Froude # Ch  (ft) *  ********  *******  * RI VER-2  176. 60 *  0. 00 *  * RI VER-2  177. 14 *  0. 00 *  * RI VER-2  172. 65 *  0. 00 *  * RI VER-2	W. S. * E. G.   (ft) *   *********  * Reach-  170. 89 *  * Reach-  171. 65 *  * Reach-  169. 34 *  * Reach-	* Ri v El ev * E. (ft) * ***********************************	er Sta * G. Slope *  (ft/ft) *  *********  .12 * 0.001017  .12 * 0.001679  .12 * 0.001391	Profile Vel Chnl  (ft/s)  ********  1%  Floodway  10%  2%  **	* Q Total * Min Ch El * W.S.  * Flow Area * Top Width *  * (cfs) * (ft) *  * (sq ft) * (ft) *  ******************************  * 15880.00 * 180.00 *  * 6316.63 * 873.59 *  * 15880.00 *  * 3037.93 * 784.62 *  * 12820.00 * 180.00 *

0 00 *		DI	upricate Er	rective		
0. 00 * * RI VER-2 177. 11 *	* Reach-1 171.47 *	* 250. 177. 26 *	12 * 0 0.001422 *	O. 2% *	20850. 00 * * 6762. 74	180. 00 * * 885. 01 *
0.00 * *	*	*		*		* *
* RI VER-2 176. 04 *	* Reach-1	* 225 176. 26 *	* 1 0. 002490 *	1% * * 4.58	15880. 00 * * 4318. 24	166. 00 * * 701. 46 *
0. 27 * * RI VER-2 176. 58 *		* 225 176. 81 *	* F 0. 002065 *	FI oodway * * 4.34	15880. 00 * * 4134. 40	166. 00 * * 510. 00 *
0. 25 * * RI VER-2 171. 82 * 0. 35 *	* Reach-1	* 225 172. 01 *	* 1 0. 005304 *	10% * * 4.40	5905. 00 * * 1736. 36	166.00 * * 545.95 *
* RI VER-2 174. 28 * 0. 33 *	* Reach-1	* 225 174. 55 *	0.004003 *	2% * * 5. 03	12820. 00 * * 3157. 28	166. 00 * * 615. 57 *
* RI VER-2 176. 26 * 0. 34 *	* Reach-1	* 225 176. 62 *	* ( 0. 003890 *	0. 2% * * 5. 82	20850. 00 * * 4471. 99	166. 00 * * 713. 82 *
* *	*	*	*	*	*	*
* RI VER-2 175. 32 * 0. 19 *	* Reach-1	* 200 175. 45 *	* 1 0. 001243 *	1% * * 3. 50	15880. 00 * * 5726. 81	164. 00 * * 881. 89 *
* RI VER-2 175. 89 * 0. 19 *	* Reach-1	* 200 176. 07 *	* F 0. 001241 *	FI oodway * * 3.54	15880. 00 * * 4667. 14	164. 00 * * 465. 00 *
* RI VER-2 170. 72 * 0. 19 *	* Reach-1	* 200 170. 80 *	* 1 0. 001498 *	10% * * 2. 57	5905.00 * * 2560.25	164. 00 * * 566. 37 *
* RI VER-2 173. 07 * 0. 24 *	* Reach-1	* 200 173. 25 *	0. 002020 *	2% * 3. 78	12820. 00 * * 3978. 27	164. 00 * * 678. 91 *
* RI VER-2 174. 90 * 0. 27 *	* Reach-1	* 200 175. 16 *	* 0 0.002527 *	0. 2% * * 4. 85	20850. 00 * * 5365. 97	164.00 * * 843.20 *
*	* *				*	
* RI VER-2 174. 62 * 0. 00 *	* Reach-1 168.07 *	* 190 174. 67 *	* 1 0.000636 *	1% * *	15880. 00 * * 8800. 63	180. 00 * * 1414. 27 *
* RI VER-2 175. 36 * 0. 00 *	* Reach-1 168.04 *	* 190 175. 40 *	* F 0.000467 *	FI oodway *	15880. 00 * * 9388. 74	* 1315. 00 *
* RI VER-2 167. 14 * 0. 00 *	* Reach-1 166. 41 *	* 190 167. 54 *	* 1 0. 020588 *	10% * *	5905. 00 * * 1162. 58	180.00 * * 538.65 *
* RI VER-2 168. 91 * 0. 00 *	* Reach-1 167.63 *	169. 40 *		*	12820. 00 * * 2288. 97	180.00 * * 749.81 *
* RI VER-2 171. 13 * 0. 00 *	* Reach-1 168. 70 *	* 190 171. 49 *	* ( 0. 008319 *	O. 2% *	20850.00 * * 4308.39	180. 00 * * 1085. 85 *
*	*	*	*	*	*	*
* RI VER-1 181. 84 *	* Reach-1	* 350 182. 36 *	* 1 0. 001074 * Page 10	* 7.73	17700. 00 * * 6736. 57	160.00 * * 1123.98 *

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0.31 *
              * FI oodway * 17700.00 * 160.00 * 0.001188 * 8.24 * 4592.22 * 440.00
* RIVER-1
182. 21 *
   0.33 *
                                                   6.73 * 2934.89 * 689 51
                                          * 10%
* RI VER-1
                            * 350
              * Reach-1
                                   0.001107 *
                                                                         689.51 *
177.83 *
                        178.38 *
    0.30 *
                                                      * 15000.00 * 160.00 *
* RIVER-1
                            * 350
                                           * 2%
              * Reach-1
                        181.18 *
                                    0.001219 *
                                                   7. 88 * 5361. 23 *
                                                                       1045.37 *
180. 57 *
   0.33 *
                                                                    160.00 *
                                           * 0.2%
* RIVER-1
              * Reach-1
                            * 350
                                                      * 25700.00 *
                        184. 73 *
                                                   8. 24 * 9596. 19 *
                                   0.001042 *
                                                                       1271.98 *
184. 23 *
   0.31 *
                                        * 1%
* RIVER-1
              * 17700.00 *
                        181. 96 * 0. 000382 *
                                                   4. 70 * 9689. 97 *
181.77 *
   0.19 *
                                                                     159.00 *
* RIVER-1
                          * 344.95
                                       * Floodway * 17700.00 *
              * Reach-1
                        182. 43 * 0. 000339 *
                                                   4.50 * 9033.94 *
182. 26 *
                                                                       850.00 *
    0.18 *
                                                   8/80.00 * 159.00 *
3.71 * 5319.22 * 942 20
                           * 344.95
                                          * 10%
* RI VER-1
              * Reach-1
177.84 *
                        177. 98 * 0. 000320 *
                                                                       942. 29 *
   0.16 *
                                          * 2%
* RI VER-1
                            * 344.95
                                                      * 15000.00 * 159.00 *
              * Reach-1
                        180. 73 * 0. 000398 *
                                                   4.59 * 8213.99 *
                                                                        1174. 91 *
180. 53 *
   0.19 *
                          * 344.95
                                                      * 25700.00 * 159.00 *
* RIVER-1
                                        * 0.2%
              * Reach-1
                                                   5. 37 * 12582. 56 *
184. 10 *
                        184. 32 * 0. 000430 *
                                                                       1274.77 *
    0.20 *
                                        * 1%
              * Reach-1 * 331.6
                                                    * 17700.00 * 159.60 *
* RIVER-1
                                                   6. 89 * 6311. 73 *
                        181. 18 * 0. 000904 *
180. 72 *
   0.28 *
                                                                     159. 60 *
                                         * FI oodway * 17700.00 *
717 * 6.29 * 6810.65 *
                           * 331.6
* RIVER-1
              * Reach-1
                        181. 78 * 0. 000717 *
181.41 *
                                                                        840.00 *
   0.25 *
                                                   8/80.00 * 159.60 *
5.49 * 3261.54 * 670 01
* RIVER-1
                           * 331.6
                                          * 10%
              * Reach-1
176. 96 *
                        177. 33 * 0. 000778 *
                                                                       670. 91 *
    0.25 *
                                         * 2%
                          * 331.6
* RI VER-1
                                                      * 15000.00 * 159.60 *
              * Reach-1
                        179.90 * 0.001000 *
                                                   6. 89 * 5122. 05 *
                                                                          858.28 *
179. 39 *
   0.29 *
                                                   7. 73 * 8375. 43 * 940 34
* RI VER-1
                            * 331.6
                                           * 0.2%
              * Reach-1
182.95 *
                        183.46 * 0.000977 *
                                                                         940.36 *
   0.30 *
* RI VER-1
              * Reach-1 * 320
                                         * 1%
                                                   * 17700.00 *
5.72 * 10126.84 *
                                                                     159. 40 *
                        180.42 *
                                    0.000806 *
                                                                        2126.55 *
180. 18 *
   0. 26 *
                                         * Fl oodway * 17700.00 * 159.40 * 876 * 6.12 * 6119.94 * 600.00 *
* RIVER-1
                           * 320
              * Reach-1
                        181. 11 *
                                    0.000876 *
180. 79 *
    0.27 *
                           * 320
                                           * 10%
                                                   * 8780.00 * 159.40 * 5.76 * 3734.14 * 1040.24 *
* RI VER-1
              * Reach-1
176. 18 *
                        176. 54 *
                                    0.001220 *
    0.30 *
                            * 320
                                          * 2%
                                                      * 15000.00 * 159.40 *
* RI VER-1
              * Reach-1
                                    0.001172 *
                        178.97 *
                                                   6. 42 * 7091. 83 * 1721. 16 *
178.61 *
                                      Page 108
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```
0.30 *
                                                    * 25700.00 * 159.40 *
              * Reach-1 * 320
* RI VER-1
                                    * 0.2%
                                                  5. 42 * 15483. 78 *
                       182.74 * 0.000598 *
182.57 *
                                                                     2350. 31 *
  0. 23 *
    *
              * 17700.00 * 159.10 *
* RIVER-1
                       180. 15 * 0. 000149 *
                                                  2. 75 * 18599. 08 *
180. 11 *
            172. 28 *
   0.11 *
              * Reach-1
                                          * Floodway * 17700.00 * 159.10 *
* RI VER-1
                          * 314.4
180. 77 *
                                                  2. 88 * 16086. 19 *
                        180. 81 * 0. 000156 *
            172.27 *
                                                                      1385.00 *
    0.12 *
                                                  * 8780.00 *
2.47 * 11058.94 *
* RI VER-1
                         * 314.4
                                       * 10%
             * Reach-1
                                                                     159. 10 *
176. 14 *
            170. 68 *
                       176. 17 * 0. 000167 *
                                                                       1857.75 *
    0.12 *
             * Reach-1 * 314.4
* RIVER-1
                                         * 2%
                                                    * 15000.00 *
                                                                    159. 10 *
178. 56 *
                       178.60 * 0.000179 *
                                                  2. 84 * 15620. 45 *
            171. 92 *
                                                                       2301.14 *
   0.12 *
                                       * 0.2%
                                                                    159. 10 *
                         * 314.4
                                                    * 25700.00 *
* RIVER-1
             * Reach-1
182.46 *
            173. 13 *
                       182. 50 * 0. 000163 *
                                                  3. 12 * 23268. 25 *
                                                                      3200.67 *
  0.12 *
* RIVER-1
                                          * 1%
                                                                    158. 70 *
             * Reach-1
                           * 300
                                                     * 17700.00 *
                                                  3.51 * 14127.02 *
179. 93 *
            172.50 * 180.00 *
                                   0.000243 *
                                                                       3785.08 *
    0.15 *
                                          * Floodway * 17700.00 * 158.70 * 9 * 3.79 * 11836.38 * 1080.00
* RI VER-1
                           * 300
             * Reach-1
180. 56 *
            172.53 *
                        180.65 *
                                   0.000269 *
                                                                       1080.00 *
    0.15 *
                                                  * 8780.00 * 158.70 * 3.08 * 7852.84 * 1744.1
* RI VER-1
             * Reach-1
                            * 300
                                          * 10%
175. 93 *
                       176.00 *
            170.83 *
                                   0.000260 *
                                                                      1744.11 *
    0.14 *
                         * 300
                                         * 2%
* RIVER-1
                                                    * 15000.00 *
             * Reach-1
                                                                    158. 70 *
                                   0.000303 *
                                                  3. 70 * 11348. 80 *
178. 33 *
            172.09 *
                       178.42 *
                                                                      3671.19 *
   0.16 *
                                                  25/UU.00 * 158.70 * 3.90 * 18205.25 * 3835 50
* RI VER-1
            * Reach-1
                                          * 0.2%
182. 27 *
                                   0.000254 *
                                                                     3835.50 *
  0.15 *
             * Reach-1 * 285
                                         * 1%
                                                    * 17700.00 * 158.20 *
* RIVER-1
                       179.38 *
179. 17 *
                                   0.000597 *
                                                  5. 51 * 9421. 47 *
                                                                       3298.35 *
            171.61 *
   0.23 *
                                          * Floodway * 17700.00 * 158.20 * 85 * 5.57 * 7252.10 * 605.00
* RIVER-1
                            * 285
             * Reach-1
179.76 *
            171. 52 *
                        179.99 *
                                   0.000585 *
                                                                        605.00 *
    0.23 *
                          * 285
                                                  * 8780.00 * 158.20 * 4.64 * 4916.41 * 909.1
* RI VER-1
             * Reach-1
                                          * 10%
175. 14 *
            168.58 * 175.33 *
                                   0.000594 *
                                                                        909.17 *
    0.22 *
                          * 285
* RI VER-1
             * Reach-1
                                         * 2%
                                                     * 15000.00 *
                                                                    158. 20 *
                                                  6. 29 *
177. 24 *
                       177.55 *
                                   0.000907 *
                                                          6948. 92 *
                                                                       2045.14 *
            170. 44 *
   0.28 *
                                                  25/UU. 00 * 158. 20 * 5. 91 * 12469. 62 * 3337 67
             * Reach-1
                           * 285
                                         * 0.2%
* RI VER-1
                       181.74 *
181.53 *
                                   0.000583 *
            173.59 *
                                                                     3337.67 *
   0.23 *
                                        * 1%
* RIVER-1
             * Reach-1 * 280.55
                                                     * 17700.00 * 158.00 *
            170. 94 * 179. 21 * 0. 000534 *
                                                  5. 11 * 8904. 67 *
178.99 *
                                                                     2157.83 *
                                      Page 109
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0 00 *		D	upricate E	rrective		
179. 55 *	* Reach-1 170.67 *	* 280. 179. 82 *	55 * 0. 000580	FI oodway * * 5.44	17700. 00 * * 6641. 81 *	158. 00 * 600. 00 *
0. 23 * * RI VER-1 174. 98 * 0. 20 *	* Reach-1 167.87 *	* 280. 175. 16 *	55 * 0. 000502	10% * * 4. 16	8780. 00 * * 4504. 07 *	158. 00 * 857. 98 *
* RI VER-1 177. 02 * 0. 25 *	* Reach-1 169. 97 *	* 280. 177. 30 *	55 * 0. 000720	2% * * 5. 48	15000. 00 * * 6489. 39 *	158. 00 * 1601. 98 *
* RI VER-1 181. 33 * 0. 23 *	172. 95 *	* 280. 181. 57 *	55 * 0. 000565	0. 2% * * 5. 71	25700. 00 * * 12411. 70 *	158. 00 * 3215. 98 *
*	*	*	*	*	*	*
*		* 270 178. 10 *	* 0. 002039	1% * * 8.30	17700. 00 * * 3845. 96 *	157. 70 * 2276. 72 *
* RI VER-1 178. 14 * 0. 36 *	* Reach-1 173. 39 *			FI oodway * 7.63	17700. 00 * * 4206. 93 *	157. 70 * 457. 44 *
* RI VER-1 173. 44 * 0. 40 *	* Reach-1 170. 74 *	* 270 174. 06 *	* 0. 002276	10% * * 6. 99	8780. 00 * * 2106. 93 *	157. 70 * 434. 03 *
* RI VER-1 172. 91 *	* Reach-1 172.76 *	175. 14 *	0. 008585	* 13.07	15000. 00 * * 1878. 85 *	431.11 *
* RI VER-1 179. 32 *		* 270 180. 33 *	* 0. 002408	0. 2% * * 9. 88	25700.00 * * 4755.52 *	157. 70 * 2353. 02 *
*	*	*	*	*	*	*
*	*	*	*	*	*	*
* * RI VER-1 177. 27 *	*				* 17700.00 * * 7685.60 *	*
* * RI VER-1 177. 27 * 0. 22 * * RI VER-1 178. 08 *	*     * Reach-1 168.83 *     * Reach-1	* 264 177. 44 * * 264	* 0. 000529 *	1% * 5.30 FI oodway *		* 157. 50 * 3597. 63 * 157. 50 *
* * RI VER-1 177. 27 * 0. 22 * * RI VER-1 178. 08 * 0. 20 * * RI VER-1 173. 41 *	*     * Reach-1 168.83 *     * Reach-1 168.83 *	* 264 177. 44 * * 264 178. 22 *	0. 000529 * 0. 000439	1% *	17700.00 * * 7685.60 * 17700.00 *	* 157. 50 * 3597. 63 * 157. 50 * 652. 91 *
* * RI VER-1 177. 27 * 0. 22 * * RI VER-1 178. 08 * 0. 20 * * * RI VER-1 173. 41 * 0. 18 * * RI VER-1 172. 81 *	* Reach-1 168. 83 * * Reach-1 168. 83 * * Reach-1 167. 07 *	* 264 177. 44 * * 264 178. 22 * * 264 173. 51 *	0. 000529  * 0. 000439  * 0. 000376	1%	17700.00 * * 7685.60 * 17700.00 * * 8152.06 *	* 157. 50 * 3597. 63 * 157. 50 * 652. 91 * 157. 50 * 1345. 10 *
* * RI VER-1 177. 27 * 0. 22 * * RI VER-1 178. 08 * 0. 20 * * RI VER-1 173. 41 * 0. 18 * * RI VER-1 172. 81 * 0. 33 * * RI VER-1 179. 22 *	* Reach-1 168. 83 *  * Reach-1 168. 83 *  * Reach-1 167. 07 *  * Reach-1 168. 36 *  * Reach-1	* 264 177. 44 *	0. 000529  * 0. 000439  * 0. 000376  * 0. 001343	1%	17700.00 * * 7685.60 * 17700.00 * * 8152.06 * 8780.00 * * 5436.77 *	* 157. 50 * 3597. 63 * 157. 50 * 652. 91 * 157. 50 * 1345. 10 * 157. 50 * 1323. 44 *
* * RI VER-1 177. 27 * 0. 22 * * RI VER-1 178. 08 * 0. 20 * * RI VER-1 173. 41 * 0. 18 * * RI VER-1 172. 81 * 0. 33 * * RI VER-1 179. 22 * 0. 26 * *	* Reach-1 168. 83 *  * Reach-1 168. 83 *  * Reach-1 167. 07 *  * Reach-1 168. 36 *  * Reach-1	* 264 177. 44 * * 264 178. 22 * 173. 51 * * 264 173. 13 * * 264 179. 48 *	0. 000529  * 0. 000439  * 0. 000376  * 0. 001343	1%	17700.00 *	* 157. 50 * 3597. 63 * 157. 50 * 652. 91 * 157. 50 * 1345. 10 * 157. 50 * 1323. 44 *
* RI VER-1 177. 27 * 0. 22 * 178. 08 * 0. 20 * 178. 08 * 0. 20 * 179. 21 * 179. 22 * 0. 26 * 179. 22 * 179. 24 * 179. 24 * 179. 25 * 179. 25 * 179. 26 * 179. 26 * 179. 279. 279. 279. 279. 279. 279. 279. 2	* Reach-1 168. 83 *  * Reach-1 168. 83 *  * Reach-1 167. 07 *  * Reach-1 168. 36 *  * Reach-1 170. 02 *  * Reach-1	* 264 177. 44 *	0. 000529  0. 000439  0. 000376  0. 001343  0. 000723  *	1%	17700.00 *	* 157. 50 * 3597. 63 * 157. 50 * 652. 91 * 157. 50 * 1345. 10 * 157. 50 * 1323. 44 * 157. 50 * 3828. 29 *  * 157. 00 *
* RI VER-1 177. 27 *	* Reach-1 168. 83 *      * Reach-1 168. 83 *      * Reach-1 167. 07 *      * Reach-1 168. 36 *      * Reach-1 170. 02 *      * *      * Reach-1 162. 72 *      * Reach-1	* 264 177. 44 *	0. 000529  0. 000439  0. 000376  0. 001343  0. 000723  *  12   0. 000142	1%	17700.00 * * 7685.60 * 17700.00 * * 8152.06 * 8780.00 * * 5436.77 * 15000.00 * * 5086.74 * 25700.00 * * 8830.13 *	* 157. 50 * 3597. 63 * 157. 50 * 652. 91 * 157. 50 * 1345. 10 * 157. 50 * 1323. 44 * 157. 50 * 3828. 29 *  * 157. 00 * 3455. 81 * 157. 00 *
* RI VER-1 177. 27 *	* Reach-1 168. 83 *  * Reach-1 168. 83 *  * Reach-1 167. 07 *  * Reach-1 168. 36 *  * Reach-1 170. 02 *  * *  * Reach-1 162. 72 *  * Reach-1 162. 72 *  * Reach-1	* 264 177. 44 *	0. 000529  0. 000439  0. 000376  0. 001343  0. 000723  *  12	1%	17700.00 *	* 157.50 * 157.50 * 652.91 * 157.50 * 1345.10 * 157.50 * 1323.44 * 157.50 * 3828.29 *  * 157.00 * 210.00 *
* RI VER-1 177. 27 *	* Reach-1 168. 83 *  * Reach-1 168. 83 *  * Reach-1 167. 07 *  * Reach-1 168. 36 *  * Reach-1 170. 02 *  * *  * Reach-1 162. 72 *  * Reach-1 163. 70 *	* 264 177. 44 *	0. 000529  0. 000439  0. 000376  0. 001343  0. 000723  *  12 0. 000142  12 0. 000121  12 0. 000625	1%	17700.00 * * 7685.60 *  17700.00 * * 8152.06 *  8780.00 * * 5436.77 *  15000.00 * * 5086.74 *  25700.00 * * 8830.13 *  *  2220.00 * * 820.40 *  2220.00 * 860.61 *	* 157.50 * 3597.63 * 157.50 * 652.91 * 157.50 * 1345.10 * 157.50 * 1323.44 * 157.50 * 3828.29 *  * * 157.00 * 3455.81 * 157.00 * 210.00 * 157.00 * 350.35 *

0. 21 * * RI VER-1 179. 16 * 0. 04 *	* Reach-1 166.00 *	* 250.	12 * 0. 2% 0. 000015 *	*	5250. 00 * * 18844. 62 *	
*	*	*	*	*	*	*
* RI VER-1	* Reach-1	* 250. *	06 *	*	Bri dge *	*
* *	*	* *	*	*	*	* *
* RI VER-1 175. 37 * 0. 11 *	* Reach-1 162. 37 *	* 250 175. 48 *	* 1% 0. 000146 *	* 2. 62	2220. 00 * * 847. 42 *	156. 84 * 4520. 53 *
* RI VER-1 176. 25 * 0. 10 *	* Reach-1 162.37 *	* 250 176. 35 *	* FI oo 0. 000123 *	dway * 2.49	2220. 00 * * 891. 58 *	156. 84 * 150. 00 *
* RI VER-1 170. 18 * 0. 26 *	* Reach-1 163. 27 *			* 5. 15	3025. 00 * * 587. 91 *	156. 84 * 174. 26 *
* RI VER-1 169. 73 * 0. 23 *	* Reach-1 162.67 *	* 250 170. 03 *	* 2% 0.000702 *	* 4. 39	2480. 00 * * 565. 50 *	156. 84 * 143. 25 *
* RI VER-1 177. 10 * 0. 06 *	* Reach-1 165.42 *	* 250 177. 11 *	* 0.2% 0.000037 *	* 1. 41	5250. 00 * * 15250. 77 *	156. 84 * 4711. 45 *
*	*	*	*	*	*	*
* RI VER-1 175. 40 * 0. 07 *	* Reach-1 162.38 *	* 246 175. 43 *	* 1% 0. 000055 *	* 1. 61	2220. 00 * * 1994. 71 *	156. 80 * 4524. 48 *
* RI VER-1 176. 28 * 0. 06 *	* Reach-1 162.38 *	* 246 176. 31 *	* Floo 0.000047 *	dway * 1.54	2220. 00 * * 2135. 44 *	156. 80 * 160. 00 *
* RI VER-1 170. 28 * 0. 19 *			* 10% 0.000478 *		3025. 00 * * 1173. 99 *	
* RI VER-1 169. 80 * 0. 17 *		* 246 169. 92 *	* 2% 0.000383 *	* 3. 26	2480. 00 * * 1097. 44 *	
* RI VER-1 176. 95 * 0. 14 *	* Reach-1 165.16 *	* 246 177. 08 *	* 0. 2% 0. 000215 *	* 3. 38	5250.00 * * 2242.72 *	156. 80 * 4694. 99 *
*	*	*	*	*	* *	* *
* RI VER-1 175. 15 * 0. 16 *	* Reach-1 163.40 *	* 245 175. 37 *	* 1% 0.000314 *		2220. 00 * * 586. 08 *	
* RI VER-1 176. 05 *	* Reach-1 163.40 *	* 245 176. 25 *	* FI oo 0. 000264 *	dway * 3.59	2220. 00 * * 617. 80 *	156. 80 * 160. 00 *
0. 15 * * RI VER-1 169. 13 * 0. 43 *	* Reach-1 164.55 *	* 245 170. 14 *	* 10% 0. 002570 *	* 8. 05	3025.00 * * 375.60 *	
* RI VER-1 169. 03 * 0. 36 *	* Reach-1 163.78 *	* 245 169. 72 *	* 2% 0. 001785 *	* 6. 67	2480. 00 * * 371. 89 *	156. 80 * 120. 74 *
* RI VER-1 175. 54 *	* Reach-1 167. 27 *	* 245 176. 73 *	* 0.2% 0.001625 * Page 111	* 8. 75	5250. 00 * * 599. 89 *	

		Du	ıplicate E	ffecti ve		
0. 37   *	*	*	*	*	*	*
*	*	*	*	*	*	*
	* Reach-1	* 244.	19 *	*	Bri dge *	*
* * *	*	*	*	*	*	*
* RI VER-1 174. 53 *	* Reach-1 161.59 *	* 243.1 174.62 *	38 * 0. 000128	1% * 2. 43	2220. 00 * * 915. 03 *	156. 70 * 4129. 41 *
0. 10 * * RI VER-1 175. 41 * 0. 10 *	* Reach-1 161.59 *	* 243. 175. 49 *	38 * 0. 000108	FI oodway * 2.30	2220. 00 * * 963. 63 *	156. 70 * 155. 00 *
* RI VER-1 166. 87 * 0. 36 *	* Reach-1 162.43 *				3025.00 * * 493.80 *	156. 70 * 122. 47 *
* RI VER-1 168. 10 * 0. 24 *	* Reach-1 161.87 *	* 243.1 168.40 *	38 * 0. 000811	2% * * 4.42	2480. 00 * * 561. 71 *	156. 70 * 149. 18 *
* RI VER-1 170. 36 * 0. 38 *	* Reach-1 164.45 *	* 243. 171. 27 *	38 * 0. 001865	0. 2% * 7. 65	5250. 00 * * 686. 19 *	156. 70 * 652. 65 *
*	*	*	*	*	*	*
* RI VER-1 174. 56 * 0. 03 *	* Reach-1 160.58 *	* 243.1 174.56 *	2 * 0. 000011	1% * * 0. 71	2220. 00 * * 6130. 80 *	155. 10 * 2406. 38 *
* RI VER-1 175. 37 * 0. 07 *	* Reach-1 160. 56 *	* 243. 175. 41 *	2 * 0. 000087	FI oodway * * 1.66	2220. 00 * * 1336. 58 *	155. 10 * 75. 00 *
* RI VER-1 166. 29 * 0. 25 *	* Reach-1 161.30 *	* 243. 1 166. 54 *	2 * 0. 000909	10% * * 4. 20	3025.00 * * 904.90 *	155. 10 * 1020. 70 *
* RI VER-1 167. 95 * 0. 14 *	* Reach-1 160.81 *	* 243.1 168.04 *	2 * 0. 000279	2% * * 2. 61	2480.00 * * 1516.39 *	155. 10 * 1461. 51 *
* RI VER-1 170. 41 * 0. 16 *	* Reach-1 162. 97 *	* 243. 170. 51 *	2 0. 000327	0. 2% * * 3. 26	5250. 00 * * 3227. 91 *	155. 10 * 1792. 09 *
*	*	*	*	*	*	*
* RI VER-1 174. 56 * 0. 01 *	* Reach-1 158.84 *	* 243 174. 56 *	* 0. 000002	1% * * 0. 31	2220. 00 * * 14305. 87 *	153. 20 * 3081. 12 *
* RI VER-1 175. 35 * 0. 05 *	* Reach-1 158.83 *	* 243 175. 37 *	* 0. 000037	FI oodway * * 1.18	2220. 00 * * 1874. 61 *	153. 20 * 100. 00 *
* RI VER-1 166. 22 * 0. 11 *	* Reach-1 159.58 *	* 243 166. 25 *	o. 000158	10% * * 1.86	3025.00 * * 2932.32 *	153. 20 * 2123. 97 *
* RI VER-1 167. 95 * 0. 05 *		167. 96 *	0. 000038	* 1.03	2480. 00 * * 4873. 10 *	2394.65 *
* RI VER-1 170. 42 * 0. 06 *	* Reach-1 161. 29 *	* 243 170. 43 *	o. 000050	0. 2% * * 1. 33	5250. 00 * * 8387. 83 *	153. 20 * 2738. 31 *
*	*	*	*	*	*	*

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* 1%
                                                          * 2220.00 * 153.80 *
* RIVER-1
                * Reach-1 * 190
                                                      0. 22 * 30081. 07 *
                           174.55 *
                                        0.000001 *
174.55 *
    0.01 *
                                               * FI oodway * 2220.00 * 153.80 * 0.70 * 7374.63 * 499.61
* RI VER-1
                               * 190
                * Reach-1
175. 31 *
                           175. 32 *
                                        0.000008 *
                                                                               499.61 *
    0.03 *
                                                         * 3025.00 * 153.80 * 1.28 * 8916.52 * 2255.79
                               * 190
                                                * 10%
* RIVER-1
                * Reach-1
                           165. 97 *
                                        0.000058 *
                                                                               2255. 79 *
165. 96 *
    0.07 *
                                                         * 2480.00 * 153.80 * 0.66 * 13504.33 * 2475.58
* RI VER-1
                * Reach-1
                                * 190
                                                * 2%
                                        0.000012 *
                           167.90 *
167. 90 *
                                                                                 2475.58 *
    0.03 *
                                                         * 5250.00 * 153.80 * 0.87 * 19610.87 * 2490.59
                              * 190
* RI VER-1
                                                * 0.2%
                  Reach-1
170. 36 *
                           170. 36 *
                                        0.000017 *
                                                                               2490.59 *
    0.04 *
                                                                             153.30 *
* RIVER-1
                * Reach-2
                              * 180
                                               * 1%
                                                           * 18100.00 *
                         174.54 *
                                        0.000057 *
                                                         1. 89 * 32148. 49 *
174.52 *
    0.07 *
                                                        vay * 18100.00 *     153.30 *
1.96 *   28169.07 *     2415.00 *
                              * 180
                                               * Floodway * 18100.00 *
* RI VER-1
                * Reach-2
                                        0.000058 *
175. 26 *
                          175. 27 *
    0.07 *
                                                         8930.00 * 153.30 * 5.00 * 6568.77 * 2314 74
* RI VER-1
                               * 180
                                                * 10%
                 Reach-2
                           165.67 *
                                        0.000840 *
                                                                                2314.76 *
165. 49 *
    0.25 *
                                                            * 15300.00 * 153.30 *
                             * 180
* RIVER-1
                                                * 2%
                * Reach-2
                           167. 71 *
                                        0.000637 *
                                                         4. 85 * 11717. 52 *
                                                                                 2549.62 *
167.59 *
    0.23 *
                                                         * 26100.00 * 153.30 * 5.05 * 18389.87 * 2838.38 *
* RI VER-1
                                * 180
                                                * 0.2%
                 Reach-2
170.07 *
                          170. 17 *
                                        0.000558 *
   0. 22 *
                                                         * 18100.00 * 152.70 * 1.82 * 31921.84 * 3112.90
* RIVER-1
             * 170
                                              * 1%
174.47 *
                                        0.000052 *
   0.07 *
                                               * Floodway * 18100.00 * 152.70 * 16 * 1.76 * 29608.68 * 2300.00 *
* RIVER-1
                              * 170
                * Reach-2
175. 21 *
             163. 32 * 175. 22 *
                                        0.000046 *
    0.07 *
                              * 170
                                                         * 8930.00 * 152.70 * 4.19 * 6871.70 * 1728.07
* RI VER-1
                                               * 10%
               * Reach-2
                                        0.000601 *
             161. 36 * 164. 94 *
164.82 *
                                                                               1728.07 *
    0.21 *
                                                         * 15300.00 * 152.70 * 4.68 * 11002.93 * 2130.80
* RI VER-1
               * Reach-2
                                * 170
                                                * 2%
             162. 94 * 167. 09 *
166. 97 *
                                        0.000600 *
                                                                                 2130.80 *
    0.22 *
* RI VER-1
              * Reach-2 * 170
                                               * 0.2%
                                                          * 26100.00 *
                                                                               152. 70 *
169. 47 *
             164. 19 * 169. 59 *
                                                         5. 22 * 17234. 27 *
                                       0.000601 *
    0.23 *
Profile Output Table - Encroachment 1
* River * Reach * River Sta * Profile * W.S. Elev * Prof Delta WS * E.G. Elev * Top Wdth Act * Q Left * Q Channel * Q Right * Enc Sta L * Ch Sta L *
* River * Reach
Ch Sta R * Enc Sta R *
```

Duplicate Effective (ft) \* (ft) \* (cfs) \* (cfs) \* (cfs) \* (ft) \* (ft) (ft) (ft) RI VER-2 Reach-1 250. 12 176.60 \* \* 15880.00 \* 176.70 \* 873.59 \* 3650.00 \* 3695.00 \* \* Reach-1 \* Floodway \* 177. 14 \* 0.53 \* RI VER-2 \* 250.12 530.00 \* 15880.00 \* 3870.00 \* 177.33 \* 3650.00 \* 3695.00 \* 4400.00 \* \* Reach-1 \* 250.12 \* 10% -3.95 \* RI VER-2 172.65 \* 5905.00 \* 172.71 \* 784.62 \* 3650.00 \* 3695.00 \* RI VER-2 \* Reach-1 250. 12 -1.53 \* 175.07 \* \* 12820.00 \* 3650.00 \* 175.17 \* 839.09 \* 3695.00 \* 0.51 \* RI VER-2 \* Reach-1 \* 0.2% \* 250.12 177. 11 \* \* 20850.00 \* 177.26 \* 885.01 \* 3650.00 \* 3695.00 \* \* 225 RI VER-2 \* Reach-1 \* 1% 176.04 \* 1657.53 \* 13019.68 \* 701.46 \* 1202.79 \* 240.00 \* 176. 26 \* 280.00 \* \* Floodway \* 176.58 \* 1661.47 \* 13227.92 \* 200. \* 225 0.54 \* \* RI VER-2 \* Reach-1 510.00 \* 240.00 \* 990.62 \* 200.00 \* 176. 81 280.00 \* 710.00 \* \* 225 \* 10% -4.22 \* RI VER-2 Reach-1 171.82 \* 545.95 \* 4758.14 \* 172.01 \* 299.15 \* 847.71 \* 240.00 \* 280.00 \* \* 225 RI VER-2 \* Reach-1 -1.76 \* 174. 28 \* 1464. 11 \* 10483. 98 \* 240.00 \* 174.55 \* 615.57 \* 871.91 \* 280.00 \* \* 225 \* 0.2% 0.22 \* RI VER-2 \* Reach-1 2155.47 \* 17087.46 \* 176.62 \* 713.82 \* 1607.07 \* 240.00 \* 280.00 \* \* RI VER-2 Reach-1 \* 200 \* 1% 175.32 \* 881.89 \* 7445.62 \* 7950.11 \* 175.45 \* 484.27 \* 220.00 \* 430.00 \* 7925. 57 \* 220 0.57 \* \* Floodway \* RI VER-2 \* Reach-1 \* 200 220.00 \* 220.00 \* 176.07 465.00 \* 7954.43 \* 430.00 \* 685.00 \* \* 200 \* 10% RI VER-2 Reach-1 170.72 \* -4.60 \* 566.37 \* 36.51 \* 2977.01 \* 2891.48 \* 220.00 \* 170.80 \* 430.00 \* RI VER-2 \* 200 \* 2% -2.24 \* \* Reach-1 173.07 \* 6329.44 \* 6250.58 \* 220.00 \* 173.25 \* 678.91 \* 239.98 \* 430.00 \* \* 200 \* 0.2% RI VER-2 \* Reach-1 174. 90 \* -0.42 \* 843.20 \* 587.15 \* 9895.63 \* 10367.22 \* 220.00 \* 175.16 \* 430.00 \* RI VER-2 \* 190 Reach-1 174.62 \* 174.67 \* 1414.27 \* \* 15880.00 \* 1970.00 \* 2020.00 \*

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* RI VER-2 175. 40 *	* Reach-1 1315.00 *	Dupl i * 190 *	* FI oodway * 175.36 * 0.74 * * 15880.00 * 4485.00 * 1970.00 *
2020. 00 * * RI VER-2 167. 54 * 2020. 00 *	5800.00 *     * Reach-1     538.65 *	* 190	* 10%
* RI VER-2 169. 40 * 2020. 00 *	* Reach-1 749.81 *	* 190 *	* 2%
* RI VER-2 171. 49 * 2020. 00 *	* Reach-1 1085.85 *	* 190 *	* 0. 2%
* *	* *	*	* * * * * *
* RI VER-1 182. 36 * 2030. 00 *	* Reach-1 1123.98 *	* 350 3699. 03 *	* 1%
* RI VER-1 182. 87 * 2030. 00 *	* Reach-1 440.00 * 2280.00 *	* 350 3243.46 *	* FI oodway * 182.21 * 0.37 * 10557.45 * 3899.09 * 1840.00 * 1965.00 *
* RI VER-1 178. 38 * 2030. 00 *	* Reach-1	* 350 1215. 03 *	* 10%
* RI VER-1 181. 18 * 2030. 00 *	* Reach-1 1045.37 *	* 350 2855. 30 *	* 2%
* RI VER-1 184. 73 * 2030. 00 *	* Reach-1 1271. 98 *	* 350 6186. 40 *	* 0. 2%
* *	* *	*	*
* RI VER-1 181. 96 * 2050. 00 *	* Reach-1 1209.57 *	* 344.95 2875.52 *	* 1%
* RI VER-1 182. 43 * 2050. 00 *	* Reach-1 850.00 * 2450.00 *	* 344.95 2720.19 *	* FI oodway * 182. 26 * 0. 49 * 9116. 10 * 5863. 71 * 1600. 00 * 1950. 00 *
* RI VER-1 177. 98 * 2050. 00 *		* 344.95 562.25 *	* 10%
* RI VER-1 180. 73 * 2050. 00 *	* Reach-1	* 344. 95 1935. 35 *	* 2%
* RI VER-1 184. 32 * 2050. 00 *	* Reach-1 1274.77 *	* 344.95 5467.68 *	* 0. 2%
* *	* *	*	*
* RI VER-1 181. 18 * 2040. 00 *		* 331.6 4172.87 *	* 1%
* RI VER-1 181. 78 * 2040. 00 *	* Reach-1 840.00 * 2240.00 *	* 331.6 4682.99 *	* Fl oodway * 181.41 * 0.69 * 10210.58 * 2806.43 * 1400.00 * 1955.00 *
* RI VER-1 177. 33 * 2040. 00 *	* Reach-1 670. 91 *	* 331.6 993.70 *	* 10%
* RI VER-1 179. 90 * 2040. 00 *	* Reach-1 858. 28 *	* 331.6 2839.74 *	* 2%
2010.00			Page 115

* RI VER-1 183. 46 *	* Reach-1	Duplicate Effects	2% * ·	182. 95 *	2. 23 * 1955. 00 *
2040. 00 *	* *	*	*	*	*
* RI VER-1 180. 42 *	* Reach-1 * 3 2126, 55 * 4362	220 * 1% 2. 51 * 7966. 13	* 5371.37 *	180. 18 *	1720. 00 *
1810. 00 *  * RI VER-1  181. 11 *  1810. 00 *	* Reach-1 * 3 600.00 * 3619 2100.00 *	320 * FI 9. 37 * 8861. 46	oodway * * 5219.17 *	180. 79  * 1500. 00  *	0. 62 * 1720. 00 *
* RI VER-1 176. 54 *	* Reach-1	20 * 10 5. 55 * 5956. 01		176. 18 *	-4. 00 * 1720. 00 *
1810. 00 * * RI VER-1 178. 97 *	* Reach-1 * 3 1721.16 * 3054	\$20		178. 61 *	-1. 57 * 1720. 00 *
1810.00 * * RI VER-1 182.74 *	* Reach-1 * 3	20 * 0. 8. 80 * 8717. 55	2% * * * * 9428.65 *	182. 57 *	2. 39 * 1720. 00 *
1810.00 *	* *	*	*	*	*
* RI VER-1 180. 15 *		* 14. 4 * 1% . 97 * 3975. 73	* * 13022.30 *	180. 11 *	1975. 00 *
2055. 00 * * RI VER-1 180. 81 * 2055. 00 *	* Reach-1 * 3	314. 4 * FI 9. 76 * 4314. 29	oodway *	180. 77  * 1950. 00  *	0. 66 * 1975. 00 *
* RI VER-1 176. 17 *	* Reach-1 * 3	\$14. 4 * 10 5. 63 * 2778. 17	* 5716. 20 *	176. 14 *	-3. 97 * 1975. 00 *
2055. 00 * * RI VER-1 178. 60 * 2055. 00 *	* Reach-1 * 3	314. 4 * 2% 9. 11 * 3756. 08	* * 10684.81 *	178. 56 *	-1.55 * 1975.00 *
* RI VER-1 182. 50 * 2055. 00 *	* Reach-1	* 0. 3. 35 * 5096. 90	2% * * 19454.75 *	182.46 *	2. 35 * 1975. 00 *
* *	* * *	*	* *	*	*
* RI VER-1 180. 00 * 2480. 00 *	* Reach-1 * 3		* * 11545. 10 *	179. 93 *	2400.00 *
* RI VER-1 180. 65 *		800 * FI 8. 38 * 5667. 08	oodway *	180. 56  * 2240. 00  *	0. 63 * 2400. 00 *
2480. 00 * * RI VER-1 176. 00 *	3320.00 *	800 * 10 <sup>o</sup> 2. 09 * 3471. 13	* 5216. 79 *	175. 93 *	-4.00 * 2400.00 *
2480.00 * * RI VER-1 178.42 *	* Reach-1 * 3	800 * 2% 5. 52 * 4873. 52	* 9720. 97 *	178. 33 *	-1.60 * 2400.00 *
2480. 00 * * RI VER-1 182. 35 *	* Reach-1 * 3	800 * 0. 6. 35 * 6372. 80	2% * * * * 16671.86 *	182. 27 *	2. 34 * 2400. 00 *
2480.00 *	* *	*	*	*	*
* RI VER-1 179. 38 *	* Reach-1 * 2 1285 87 * 7639		* * 3091.71 *	179. 17 *	3060.00 *
3130.00 *	*	Page 116			

Duplicate Effective \* 285 \* Floodway \* \* RI VER-1 Reach-1 179. 76 \* 0.59 \* 2588. 15 \* 2635. 00 \* 7836.79 \* 3060.00 \* 179.99 \* 605.00 \* 7275. 06 \* 3130.00 \* 3240.00 \* \_\_\_\_\_175. 14 \* 1427. 83 \* \* 285 \* Reach-1 \* 10% -4.03 \* RI VER-1 4562.72 \* 3060.00 \* 857.08 \* 2789.45 \* 175.33 \* 3130.00 \* \* 2% \* 285 -1.94 \* RI VER-1 Reach-1 177. 24 \* 2741.24 \* 177.55 \* 1240.10 \* 5148.08 \* 7110.68 \* 3060.00 \* 3130.00 \* \* 285 2.36 \* \* 0.2% RI VER-1 Reach-1 181.53 \* 181.74 \* 1297.67 \* 12975.82 \* 8450.44 \* 4273.74 \* 3060.00 \* 3130.00 \* \* 1% RI VER-1 \* Reach-1 \* 280.55 178.99 \* 1352.16 \* 8937.45 \* 4615.54 \* 179.21 \* 4147.01 \* 4945.00 \* 5045.00 \* RI VER-1 \* Reach-1 \* 280.55 \* Floodway \* 179. 55 \* 0.55 \* 9811. 08 \* 3738. 77 \* 4585. 00 \* 600.00 \* 179.82 \* 4150.15 \* 4945.00 \* 5045.00 \* 5185.00 \* \* 280.55 \* 10% RI VER-1 Reach-1 174.98 \* -4.01 \* 5612.16 \* 2268.09 \* 857.98 \* 4945.00 \* 175.16 \* 899.75 \* 5045.00 \* -1.97 \* \* 280.55 \* 2% RI VER-1 Reach-1 177.02 \* 3968.91 \* 8500.34 \* 177.30 \* 1098.55 \* 2530.75 \* 4945.00 \* 5045.00 \* \* 280.55 2.34 \* RI VER-1 \* Reach-1 \* 0.2% 181.33 \* 1650.00 \* 6442.81 \* 4945.00 \* 181.57 \* 7931.08 \* 11326.11 \* 5045.00 \* \* 270 \* RIVER-1 \* Reach-1 \* 1% 177.35 \* 178.10 \* 5868.46 \* 11772.96 \* 58.58 \* 3550.00 \* 455.64 \* 3655.00 \* \* 270 \* Floodway \* 178. 14 \* 0.79 \* RI VER-1 Reach-1 68.02 \* 178.76 \* 3550.00 \* 457.44 \* 6184.50 \* 11447.48 \* 3210.00 \* 3655.00 \* . 173.44 \* 8.18 \* 3700.00 \* \* 270 \* 10% -3.91 \* RI VER-1 Reach-1 174.06 \* 1735.98 \* 7035.84 \* 3550.00 \* 434.03 \* 3655.00 \* RI VER-1 Reach-1 \* 270 \* 2% 172. 91 \* -4.44 \* 10.20 \* 431.11 \* 3550.00 \* 175.14 \* 2552.96 \* 12436.85 \* 3655.00 \* 1.97 \* \* 0.2% \* 270 179.32 \* RI VER-1 \* Reach-1 180.33 \* 9519.98 \* 16060.03 \* 120.00 \* 3550.00 \* 466.54 \* 3655.00 \* \* RIVER-1 \* 264 \* 1% \* Reach-1 177. 27 \* 586.09 \* 11948.86 \* 5398.25 \* 352.89 \* 177.44 \* 4970.00 \* 5025.00 \* vay \* 178.08 \* 369.11 \* 4400.00 \* \* 264 \* Floodway \* 0.81 \* \* Reach-1 RI VER-1 178.22 \* 582. 91 \* 12051. 30 \* 5279.58 \* 4970.00 \* 5025.00 \* 5052.91 \* \* 264 \* 10% -3.86 \* Reach-1 173.41 \* RI VER-1 151.68 \* 173.51 \* 579.14 \* 5542.75 \* 3085.56 \* 4970.00 \* 5025.00 \* \* 264 \* 2% \* Reach-1 -4.46 \* RI VER-1 172.81 \* 253.30 \* 173.13 \* 578.05 \* 9314.32 \* 5432.38 \* 4970.00 \* 5025.00 \*

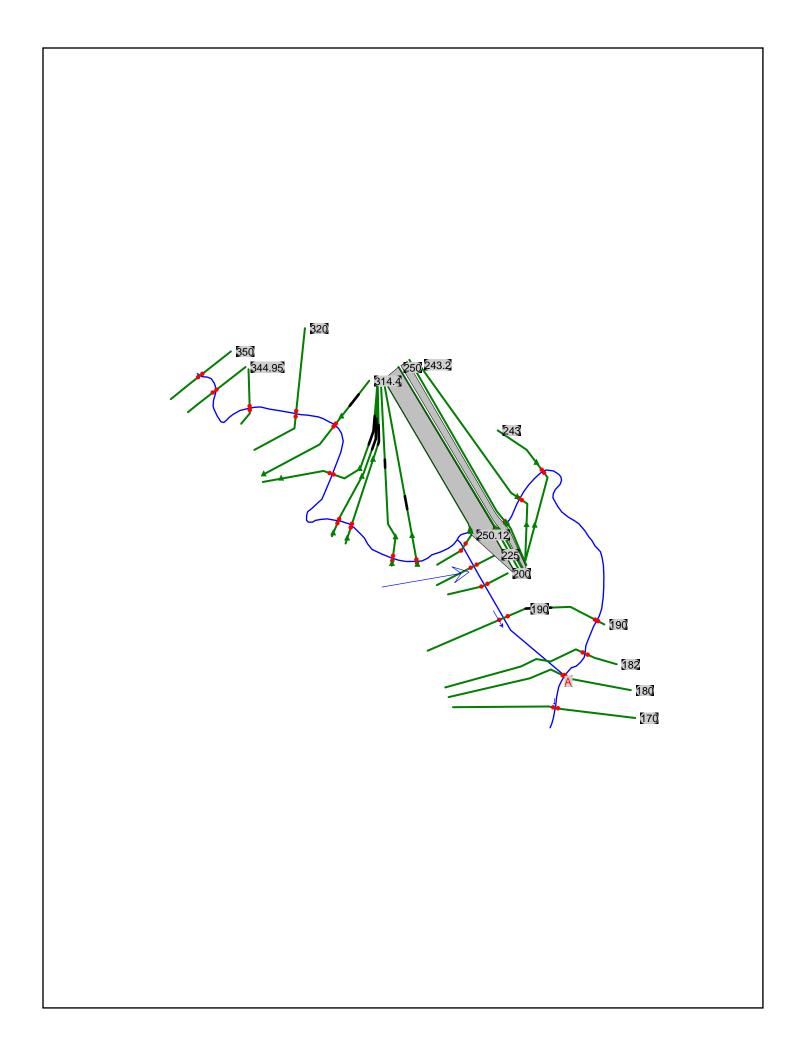
* RI VER-1	* Reach-1	Dupl i * 264	cate Effective * 0.2%	ve *	179. 22 *		1. 95 *
179. 48 *	589. 59 *	17693.83 *	7457. 46 *	548. 71	*	*	4970.00 *
5025.00 * *	*	*	*	*	*		*
*	*	*	*		*	*	*
* RI VER-1 176. 85 *	* Reach-1 45.00 *	* 250. 12 *	* 1% 2220. 00 *	*	176. 73 *	*	3650. 00 *
3695. 00 * * RI VER-1 177. 73 *	* Reach-1 45.00 *	* 250. 12 *	* FI ood 2220. 00 *	lway *	177. 62 * * 3540. 00	*	0. 89 * 3650. 00 *
3695. 00 * * RI VER-1 172. 92 *	3750.00 *     * Reach-1     45.00 *	* 250. 12 *	* 10% 3025. 00 *	*	172. 56 *	*	-4. 17 * 3650. 00 *
3695.00 * * RI VER-1 171.57 *	* Reach-1 45.00 *	* 250. 12 *	* 2% 2480. 00 *	*	171. 28 * *	*	-5. 45 * 3650. 00 *
3695.00 * * RI VER-1	* * Reach-1	* 250. 12	* 0.2%	*	179.16 *	*	2. 43 *
179. 16 * 3695. 00 *	3674.16 *	4041.44 *	895.62 *	312. 94		^	3650.00 *
* *	* *	*	*	*	*	*	*
* RI VER-1 176. 85 *	* Reach-1	* 250.06 *	BR U * 1% 2220. 00 *	*	169.50 *	*	3650. 00 *
3695. 00 * * RI VER-1 177. 73 *	* Reach-1	* 250.06 *	BR U * FI ood 2220. 00 *	lway *	169. 50 * * 3540. 00	*	0. 00 * 3650. 00 *
3695. 00 * * RI VER-1 172. 91 *	3750.00 *     * Reach-1	* 250.06 *	BR U * 10% 3025.00 *	*	169. 50 *	*	0. 00 * 3650. 00 *
3695. 00 * * RI VER-1 171. 57 *	* Reach-1 *	* 250.06 *	BR U * 2% 2480.00 *	*	169. 50 *	*	0. 00 * 3650. 00 *
3695. 00 * * RI VER-1 179. 16 *	* * Reach-1 1855, 50 *	* 250.06 2285.71 *	BR U * 0.2% 2734.98 *	* 229. 31	179. 16 * *	*	9. 66 * 3650. 00 *
3695. 00 * *	* *	*	*	*	*	*	*
* * RI VER-1 175. 48 *	* Reach-1 *	* 250.06 *	BR D * 1% 2220.00 *	*	169. 50 * *	*	* 3930. 00 *
3980. 00 * * RI VER-1 176. 35 *	* Reach-1 *	* 250.06 *	BR D * Flood 2220.00 *	lway *	169. 50 * * 3880. 00	*	0. 00 * 3930. 00 *
3980. 00 * * RI VER-1 170. 59 *	4030.00 *     * Reach-1 *	* 250.06 *	BR D * 10% 3025.00 *	*	169. 50 *	*	0. 00 * 3930. 00 *
3980. 00 * * RI VER-1 170. 03 *	* Reach-1 *	* 250.06 *	BR D * 2% 2480.00 *	*	169.50 *	*	0. 00 * 3930. 00 *
3980. 00 * * RI VER-1 178. 62 *	* * Reach-1 1889.11 *	* 250.06 2285.71 *	BR D * 0.2% 2734.98 *	* 229. 31	178. 41 * *	*	8. 91 * 3930. 00 *
3980. 00 * *	1009. 11 *	2203. / I *	2734. <del>9</del> 0 *	229. 31 *	*		3930.00
*	*	*	*		*	*	*
* RI VER-1 175. 48 *	* Reach-1 50.00 *	* 250	* 1% 2220. 00 *	*	175. 37 * *	*	3930. 00 *
3980.00 *	^		Page 118				

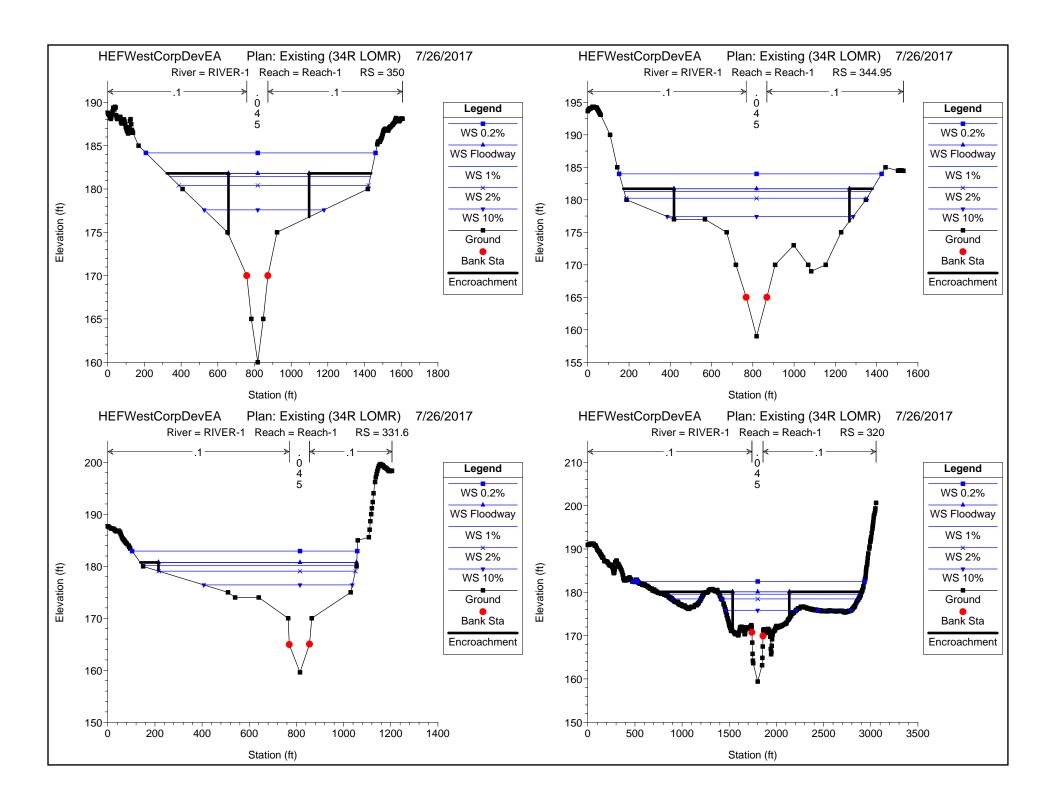
* RI VER-1 176. 35 *	* Reach-1 50.00		Dup * 250	ol i *	cate Effecti * Flood 2220.00 *	ve dway *	176. 25 * * 3880. 00		0. 88 * 3930. 00 *
3980. 00 * * RI VER-1 170. 59 *	4030.00 *     * Reach-1     50.00		* 250	*	* 10% 3025. 00 *	*	170.18 *	*	-5. 19 * 3930. 00 *
3980. 00 * * RI VER-1 170. 03 * 3980. 00 *	* Reach-1 50.00	*	* 250	*	* 2% 2480. 00 *	*	169. 73 * *	*	-5. 64 * 3930. 00 *
* RI VER-1 177. 11 * 3980. 00 *	* Reach-1 4711.45	*	* 250 2867. 08	*	* 0. 2% 1320. 25 *	* 1062. 67	177. 10 *	*	1.74 * 3930.00 *
* * *	*	*	*	*	*	*	*	*	*
* RI VER-1 175. 43 * 3980. 00 *	* Reach-1 160.00 *		* 246 385. 46	*	* 1% 1370. 15 *	* 464. 38	175. 40 *	*	3930.00 *
* RI VER-1 176. 31 * 3980. 00 *	* Reach-1 160.00 4040.00 *	*	* 246 378. 30	*	* FI ood 1380. 48 *	dway * 461.22	176. 28 * * 3880. 00	*	0. 88 * 3930. 00 *
* RI VER-1 170. 44 * 3980. 00 *	* Reach-1 160.00	*	* 246 365. 96	*	* 10% 2218. 16 *	* 440. 88	170. 28 *	*	-5. 13 * 3930. 00 *
* RI VER-1 169. 92 * 3980. 00 *	* Reach-1 157.75 *	*	* 246 283. 67	*	* 2% 1854. 59 *	* 341. 75	169. 80 * *	*	-5. 61 * 3930. 00 *
* RI VER-1 177. 08 * 3980. 00 *	* Reach-1 160.00 *	*	* 246 960. 45	*	* 0.2% 3132.45 *	* 1157. 10	176. 95 * *	*	1.55 * 3930.00 *
* *	*	*	*	*	*	*	*	*	*
* RI VER-1 175. 37 *	* Reach-1 35.00	*	* 245	*	* 1% 2220. 00 *	*	175.15 * *	*	3940.00 *
3975. 00 * * RI VER-1 176. 25 *	* Reach-1 35.00	*	* 245	*	* FI ood 2220. 00 *	dway *	176. 05 * * 3890. 00	*	0. 91 * 3940. 00 *
3975. 00 * * RI VER-1 170. 14 * 3975. 00 *	4050.00 *     * Reach-1     35.00	*	* 245	*	* 10% 3025. 00 *	*	169. 13 *	*	-6. 01 * 3940. 00 *
* RI VER-1 169. 72 * 3975. 00 *	* Reach-1 35.00	*	* 245	*	* 2% 2480. 00 *	*	169. 03 *	*	-6. 12 * 3940. 00 *
* RI VER-1 176. 73 * 3975. 00 *	* Reach-1 35.00	*	* 245	*	* 0. 2% 5250. 00 *	*	175. 54 *	*	0. 39 * 3940. 00 *
*	*	*	*	*	*	*	*	*	*
* RI VER-1 175. 37 *	* Reach-1	*	* 244.19	9 *	BR U * 1% 2220.00 *	*	170. 90 * *	*	* 3940. 00 *
3975. 00 * * RI VER-1 176. 25 *	* Reach-1	*	* 244.19	9 *	BR U * FI ood 2220. 00 *	dway *	170. 90 * * 3890. 00	*	0. 00 * 3940. 00 *
3975. 00 * * RI VER-1 169. 95 *	4050.00 * * Reach-1 30.00	*	* 244.19	9 *	BR U * 10% 3025.00 *	*	168. 45 * *	*	-2. 45 * 3940. 00 *
3975. 00 * * RI VER-1 169. 61 *	* Reach-1 30,00	*	* 244.19	9 *	BR U * 2% 2480.00 *	*	168.63 *	*	-2. 27 * 3940. 00 *
3975.00 *	*				Page 110				

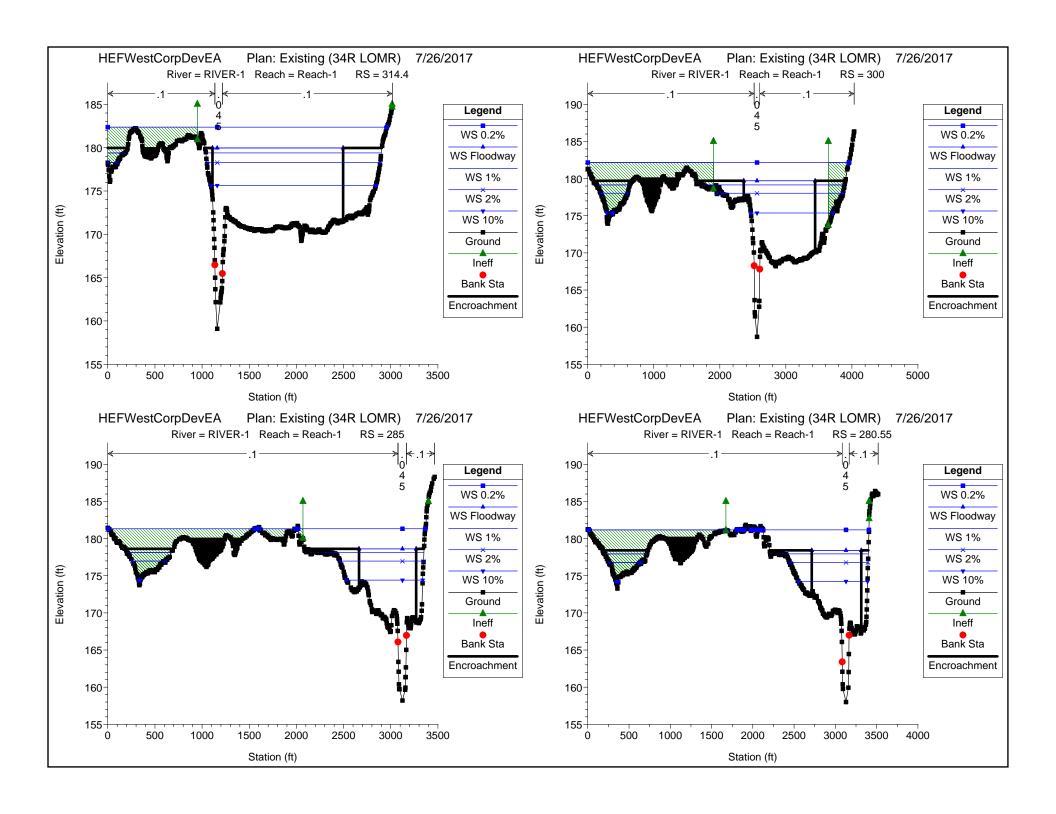
* RI VER-1 176. 73 *	* Reach-1 *	Dupl * 244. 19 *	cate Effective BR U * 0.2% * 5133.47 * 133.64	175.54 *	4. 64 * 3940. 00 *
3975.00 *	*	*	* *	* *	*
* RI VER-1	* * Reach-1 *	* 244.19 *	BR D * 1% * 2220.00 *	170. 90 *	* 2005 00 *
174. 62 * 3940. 00 * * RI VER-1	* * Reach-1	* 244.19	BR D * Floodway *	170. 90 *	3885. 00 * 0. 00 *
175. 49 * 3940. 00 *	3990. 00 *	*	2220. 00 *	* 3835.00 *	3885.00 *
* RI VER-1 168. 22 * 3940. 00 *	* Reach-1 30.00 *	* 244.19	BR D * 10% * 3025.00 *	166. 25 *	-4. 65 * 3885. 00 *
* RI VER-1 168. 77 *	* Reach-1 30.00 *	* 244.19	BR D * 2% * 2480.00 *	167.80 *	-3. 10 * 3885. 00 *
3940. 00 * * RI VER-1 176. 73 *	* Reach-1 *	* 244.19	BR D * 0.2% * 133.64	175.54 *	4. 64 * 3885. 00 *
3940.00 *	* *	*	* *	* *	*
* * RI VER-1 174. 62 *	* Reach-1 55.00 *	* 243.38	* 1% * 2220.00 *	174.53 *	* 3885. 00 *
3940. 00 * * RI VER-1 175. 49 *	* * Reach-1 55.00 *	* 243.38	* FI oodway * 2220.00 *	175. 41 * * 3835. 00 *	0. 88 * 3885. 00 *
3940. 00 * * RI VER-1 167. 45 *	3990. 00 * * Reach-1 55. 00 *	* 243.38	* 10% * 3025. 00 *	166. 87 *	-7. 66 * 3885. 00 *
3940. 00 * * RI VER-1 168. 40 *	* Reach-1 55.00 *	* 243.38	* 2% * 2480. 00 *	168. 10 *	-6. 42 * 3885. 00 *
3940. 00 * * RI VER-1 171. 27 *	* Reach-1 55.00 *	* 243.38 *	* 0. 2% * 5250. 00 *	170. 36 *	-4. 16 * 3885. 00 *
3940.00 *	* *	*	* *	* *	*
* RI VER-1 174. 56 *	* Reach-1 700.00 *	* 243.2 152.90 *	* 1% * 899. 57 * 1167. 54	174.56 *	3485.00 *
3560. 00 * * RI VER-1 175. 41 *	* Reach-1 75.00 *	* 243.2 <sub>*</sub>	* FI oodway * 2220.00 *	175. 37 * * 3485. 00 *	
3560. 00 * * RI VER-1 166. 54 *	3560.00 * * Reach-1 242.85 *	* 243. 2 150. 63 *	* 10%	166. 29 *	-8. 27 * 3485. 00 *
3560. 00 * * RI VER-1 168. 04 *	* Reach-1 492.36 *	* 243.2 177.39 *	* 2% * 2039. 48 * 263. 12	167. 95 *	-6. 61 * 3485. 00 *
3560. 00 * * RI VER-1 170. 51 *	* Reach-1 700.00 *	* 243.2 393.04 *	* 0.2% * 3142.05 * 1714.91	170. 41 *	-4. 15 * 3485. 00 *
3560.00 *	* *	*	* *	* *	*
* RI VER-1 174. 56 *	* Reach-1 1430.00 *	* 243 430.59 *	* 1% * 555. 63 * 1233. 79	174. 56 *	* 1250. 00 *
1350.00 *	*		Page 120		

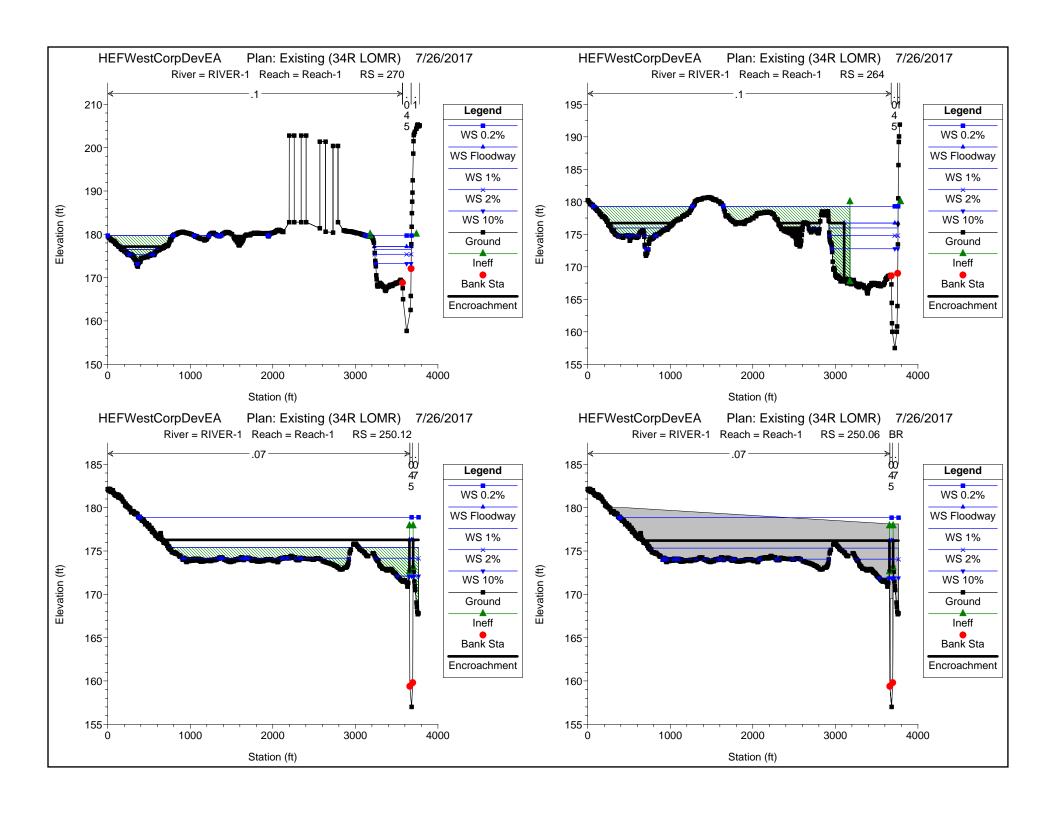
		5	. 566		
* RI VER-1 175. 37 *	* Reach-1 100.00 *	* 243 * *	cate Effective * Floodway * 2220.00 *	175. 35 * * 1250. 00 *	0. 79 * 1250. 00 *
1350. 00 * * RI VER-1 166. 25 * 1350. 00 *	1350.00 *     * Reach-1     1031.78 *	* 243 952. 28 *	* 10%	166. 22 *	-8. 34 * 1250. 00 *
* RI VER-1 167. 96 * 1350. 00 *	* Reach-1 1205. 29 *	* 243 707. 20 *	* 2% * 1164. 03 * 608. 77	167. 95 *	-6. 60 * 1250. 00 *
* RI VER-1 170. 43 * 1350. 00 *	* Reach-1 1430.00 *	* 243 1265. 79 *	* 0. 2% * 1843. 23 * 2140. 98	170. 42 *	-4. 14 * 1250. 00 *
*	* *	*	* *	* *	*
* RI VER-1 174. 55 * 2020. 00 *	* Reach-1 2497.59 *	* 190 17. 43 *	* 1% * 219. 63 * 1982. 94	174.55 *	1970.00 *
* RI VER-1 175. 32 * 2020. 00 *	* Reach-1 499.61 * 2437.00 *	* 190 60.80 *	* Floodway * 729.00 * 1430.20	175. 31 * * 1937. 39 *	0. 76 * 1970. 00 *
* RI VER-1 165. 97 * 2020. 00 *	* Reach-1 2255.79 *	* 190 31.75 *	* 10% * 741. 51 * 2251. 74	165. 96 *	-8. 59 * 1970. 00 *
* RI VER-1 167. 90 * 2020. 00 *	* Reach-1 2475.58 *	* 190 22.70 *	* 2% * 444. 78 * 2012. 52	167. 90 *	-6. 65 * 1970. 00 *
* RI VER-1 170. 36 * 2020. 00 *	* Reach-1 2490.59 *	* 190 42.89 *	* 0. 2% * 697. 65 * 4509. 46	170. 36 *	-4. 20 * 1970. 00 *
*	*	*	* *	* *	*
* RI VER-1 174. 54 * 2035. 00 *	* Reach-2 3306.02 *	* 180 3792. 98 *	* 1% * 2594. 96 * 11712. 06		1970. 00 *
* RI VER-1 175. 27 * 2035. 00 *	* Reach-2 2415.00 * 4235.00 *	* 180 1474.31 *	* Floodway * 2781.15 * 13844.55	175. 26 * * 1820. 00 *	0. 74 * 1970. 00 *
* RI VER-1 165. 67 * 2035. 00 *	* Reach-2	* 180 1660.06 *	* 10%	165. 49 *	-9. 04 * 1970. 00 *
* RI VER-1 167. 71 * 2035. 00 *	* Reach-2 2549, 62 *	* 180 3126. 94 *	* 2% * 4463. 94 * 7709. 12	167. 59 * *	-6. 93 * 1970. 00 *
* RI VER-1					
170. 17 *	* Reach-2 2838.38 *	* 180 5447. 23 *	* 0. 2% * 5466. 23 * 15186. 54	170. 07 *	-4.45 * 1970.00 *
170. 17 * 2035. 00 * *	2838.38 *		* 0. 2% * 5466. 23 * 15186. 54 * *	170. 07 *	
170. 17 * 2035. 00 *  *  *  *  *  *  *  *  *  *  *  *  *	2838.38 *  *  *  * Reach-2 3112.90 *	5447. 23 *	5466. 23 * 15186. 54 * *	170.07 *  *  *  *  174.47 *	1970. 00 *
170. 17 * 2035. 00 *  *  * RI VER-1 174. 48 * 2040. 00 *  * RI VER-1 175. 22 *	2838.38 *  *  *  * Reach-2 3112.90 *  * Reach-2 2300.00 *	5447. 23 *  *  *  *  *  *  170	5466. 23 * 15186. 54	170.07 *  *  *  *  174.47 *  175.21 *	1970. 00 *  *  1965. 00 *  0. 74 *
170. 17 * 2035. 00 *  *  * RI VER-1 174. 48 * 2040. 00 *  * RI VER-1 175. 22 * 2040. 00 *  * RI VER-1 164. 94 *	* Reach-2 3112.90 *  * Reach-2 2300.00 * 3225.00 * * Reach-2 1728.07 *	* 170 8352.65 *	* * * * * * * * * * * * * * * * * * *	170.07 *  *  *  *  174.47 *  *  175.21 *  925.00 *  164.82 *	1970.00 *  *  1965.00 *  0.74 * 1965.00 *  -9.65 *
170. 17 * 2035. 00 *  *  * RI VER-1 174. 48 * 2040. 00 *  * RI VER-1 175. 22 * 2040. 00 *  * RI VER-1	2838.38 *  *  *  * Reach-2 3112.90 *  * Reach-2 2300.00 * 3225.00 *  * Reach-2	* 170 8352.65 * * 170 8160.29 *	* 1% * 2944. 02 * 6803. 33 * FI oodway * 2939. 71 * 7000. 00 * 10% *	170.07 *  *  *  174.47 *  175.21 *  925.00 *  164.82 *  166.97 *	1970.00 *  *  1965.00 *  0.74 * 1965.00 *  -9.65 * 1965.00 *  -7.50 *

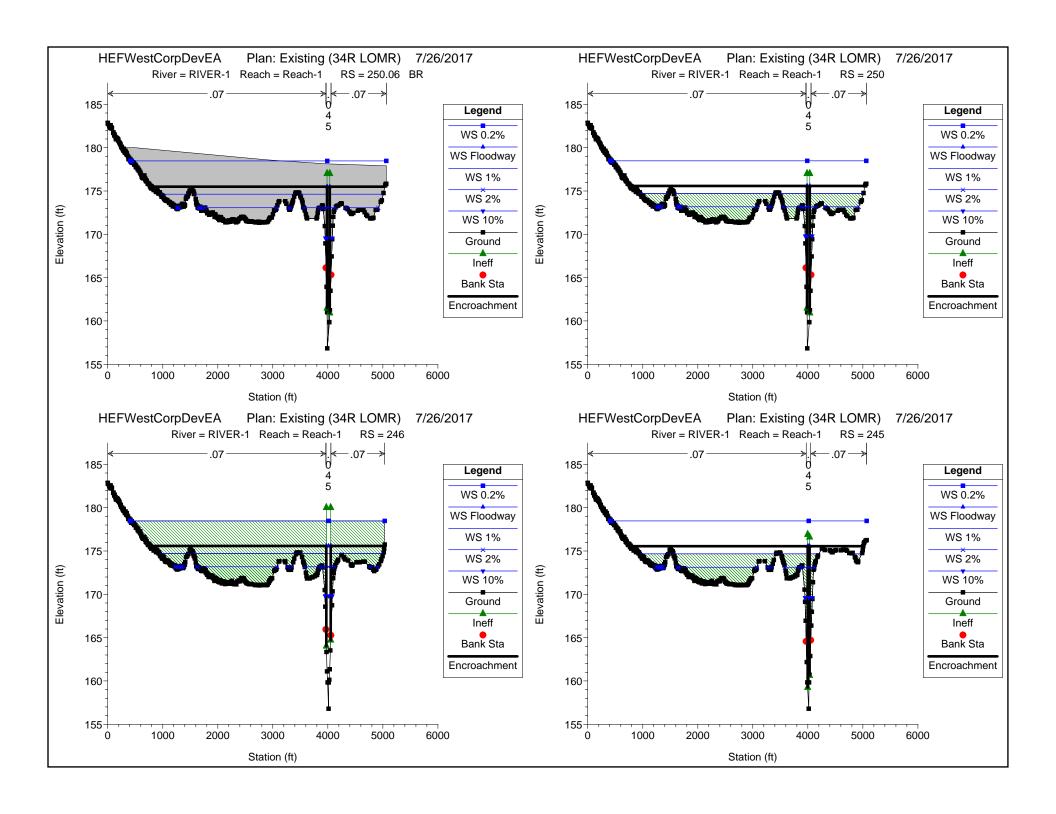
# APPENDIX D BROAD RUN EXISTING CONDITIONS MODEL

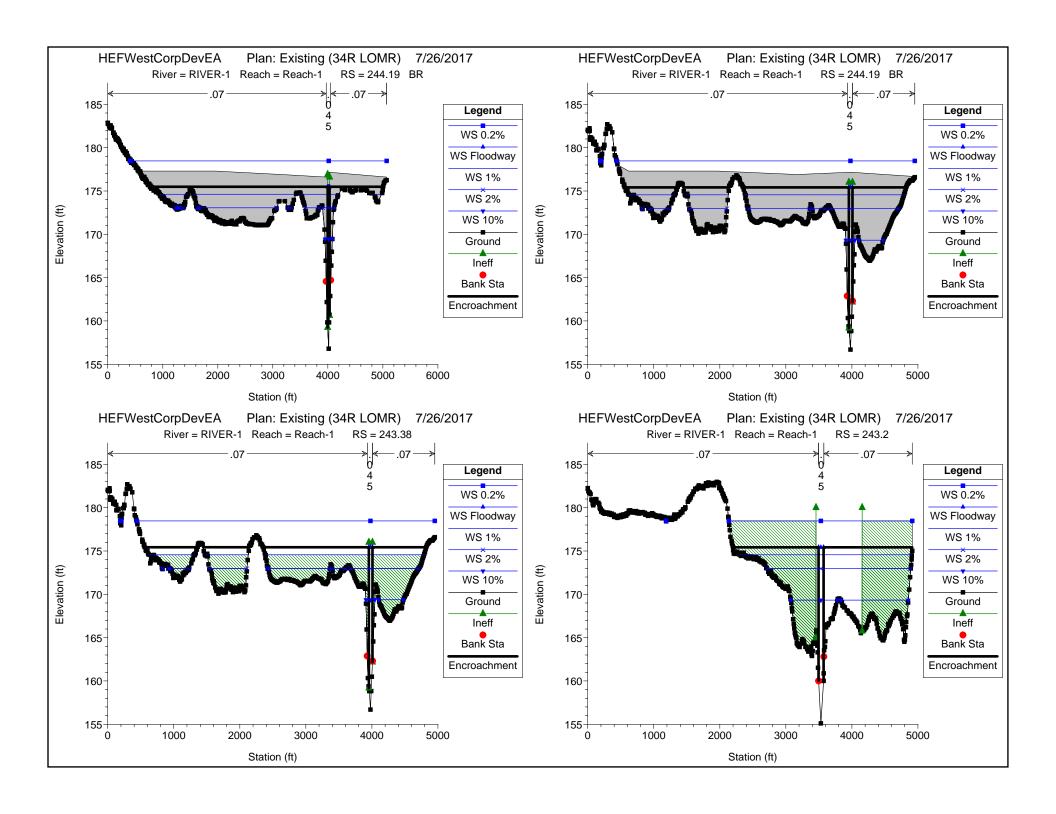


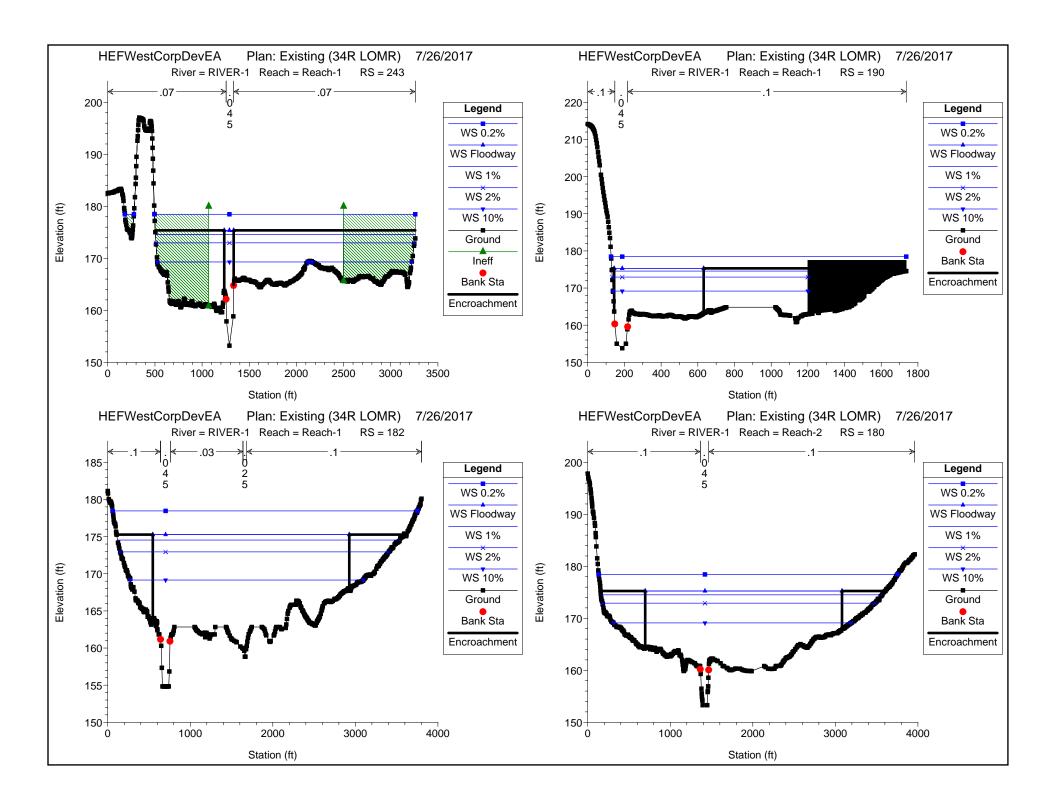


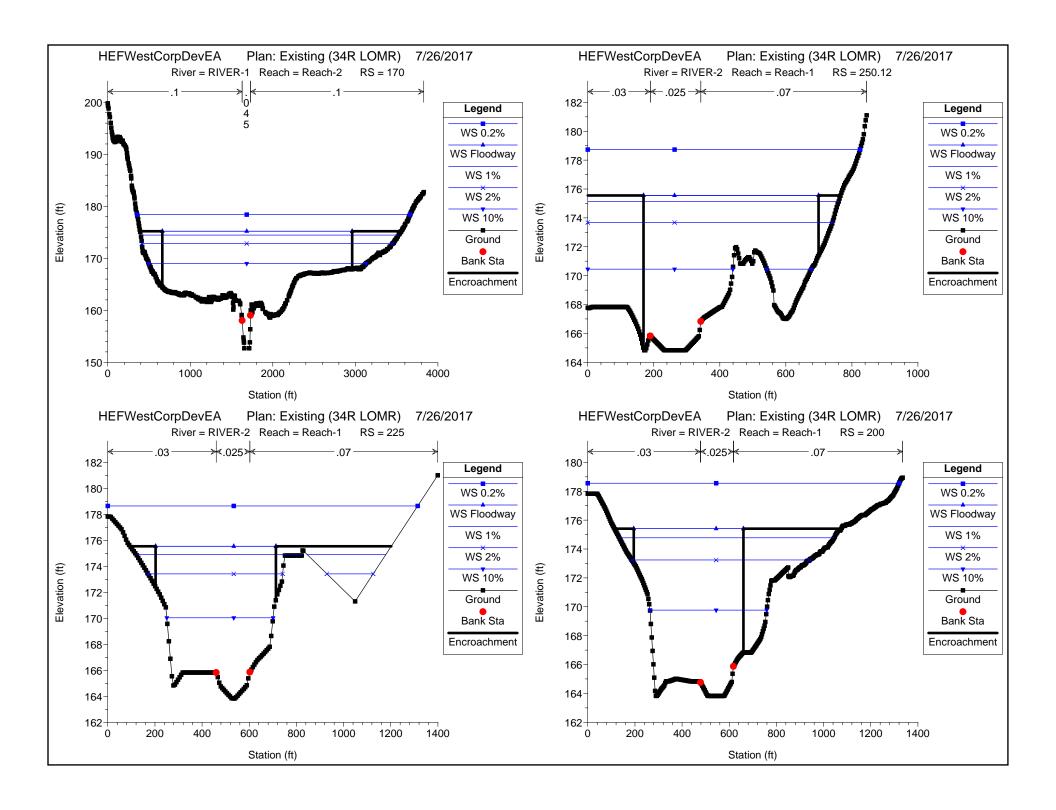


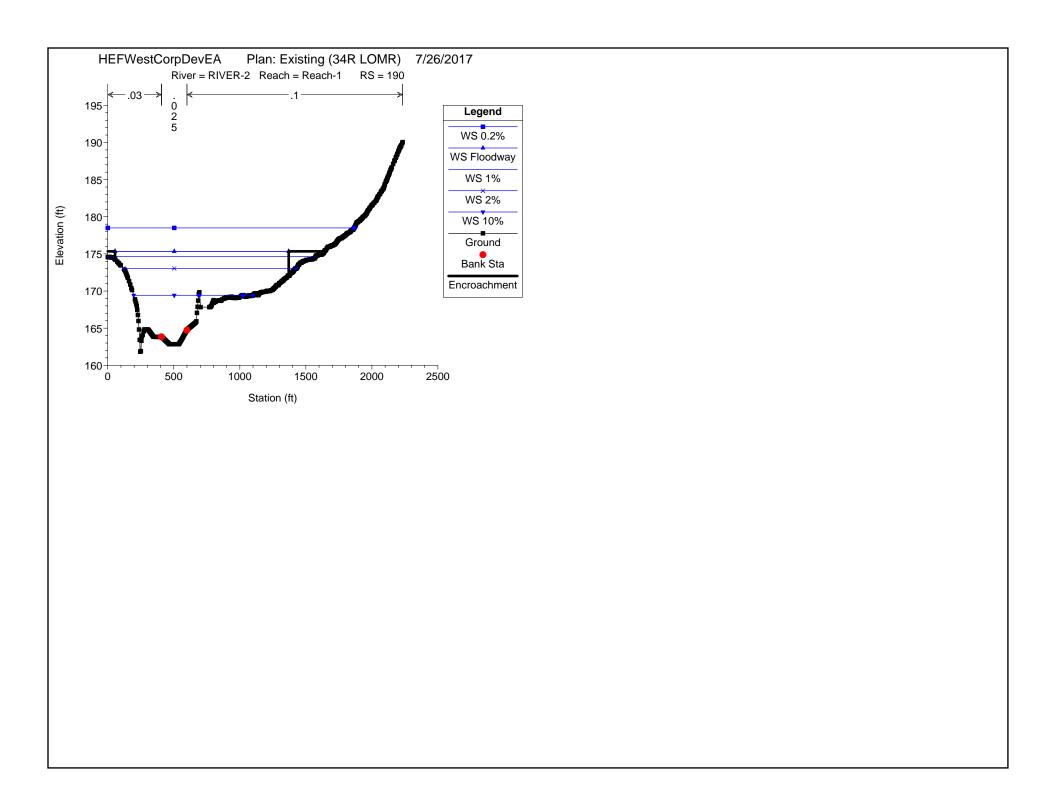












HEC-RAS HEC-RAS 5.0.1 April 2016 U.S. Army Corps of Engineers Hydrologic Engineering Center 609 Second Street Davis, California

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Χ	Χ	Χ	Χ			Χ	Χ	Χ	Χ	Χ
XXX	XXXX	XXXX	Χ		XXX	XX	XX	XXX	XXX	XXXX
Χ	Χ	Χ	Χ			Χ	Χ	Χ	Χ	Х
Χ	Χ	Χ	Χ	Χ		Χ	Χ	Χ	Χ	Х
Χ	Χ	XXXXXX	XX	XX		Χ	Χ	Χ	Χ	XXXXX

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PROJECT DATA

Project Title: HEFWestCorpDevEA
Project File: HEFWestCorpDevEA.prj
Run Date and Time: 7/26/2017 3:31:28 PM

Project in English units

Project Description: All Elevations in NGVD 29 NGVD29 = NAVD88 + 0.827

Manassas, Prince William County, Virginia

Manassas Regional Airport - West Corporate Development and East Side Parcel CLOMR

Broad Run

Model beings at FEMA X/S "R" STA. 170

Model

ends at FEMA X/S "Z" STA. 350

Duplicate Effective Model:

Effecti ve

including FEMA issued LOMRS - divided flow reach

Existing Conditions

2017 Manassas Regional Airport Runway 34R Extension Program LOMR -Ongoing with FEMĂ

Proposed Conditions Model: West Corporate Development

Proposed Layout

Revisions to X/S 314.4 through X/S 264

PLAN DATA

Plan Title: Existing (34R LOMR)

Plan File: C:\Users\wilsons\Desktop\HEF EA\Broad Run HEC-RAS\HEFWestCorpDevEA.p03

Geometry Title: Existing (34R LOMR)

Geometry File: C:\Users\wilsons\Desktop\HEF EA\Broad Run HEC-RAS\HEFWestCorpDevEA. g04

Flow Title : Existing (34R LOMR)
Flow File : C:\Users\wilsons\Desktop\HEF EA\Broad Run

HEC-RAS\HEFWestCorpDevEA. f03

Plan Summary Information:

Cross Sections = 25 Number of: Multiple Openings = 0 Culverts = Inline Structures = 0 0 Bri dges 2 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01 Critical depth calculation tolerance = 0.01 Maximum number of iterations 20 Maximum difference tolerance 0.3 Flow tolerance factor 0.001

Computation Options

Critical depth computed only where necessary

Conveyance Calculation Method: At breaks in n values only Friction Slope Method: Program Selects Appropriate method Friction Slope Method: Computational Flow Regime:

Subcritical Flow

Encroachment Data

Equal Conveyance = True

Left Offset 0 0 Right Offset =

Ri ver = RS 350 344. 95 331. 6 320 285 280. 55 270 264 250. 12 250 246 245 243. 38 243. 2 243 190 182	RIVER-1 Profile Floodway	Reach = Method	Reach-1 Val ue1 658 418 215 1536 1110 2363 2664 2714 3229 3106. 1 3655 3985 3972 3996 3954 3495. 8 1235 144 546	Val ue2 1098 1268 1055 2136 2495 3443 3269 3314 3678 3759 3700 4035 4052 4031 4009 3571.1 1335 632 2926
Ri ver = RS 180 170	RIVER-1 Profile Floodway Floodway	Reach = Method 1 1	Reach-2 Val ue1 696 661	Val ue2 3080 2961
Ri ver = RS 250. 12 225 200 190	RIVER-2 Profile Floodway Floodway Floodway Floodway	Reach = Method 1 1 1 1	Reach-1 Val ue1 169 203 195 55 Pa	Val ue2 699 713 660 1370 ge 2

******	*****	******	* * * * * * * * * * * * * * * *	*****
FLOW DATA				
Flow Title: Exist Flow File: C:\Us	ing (34R LOMR) ers\wilsons\Des	ktop\HEF EA\Broad	Run HEC-RAS\H	EFWestCorpDevEA. f03
Flow Data (cfs) ****************			******	******
* River	Reach	RS *	1%	Floodway
10% * RI VER-1	2% Reach-1	0. 2% * 350 *	17700	17700
8780 * RI VER-1 1450	15000 Reach-1 950	25700 * 250.12 * 700 *	800	800
* RI VER-1 3015	Reach-1 2805	243 * 2100 *	2665	2665
* RI VER-1	Reach-1	182 *	19965	19965
* RI VER-1	17155 Reach-2	180 *	19965	19965
10495 * RI VER-2 7480	17155 Reach-1 14350	27500 * 250.12 * 25400 *	17300	17300
******	14300	******	* * * * * * * * * * * * * * * *	******
Boundary Conditio	ins ******		******	*****
* River Downstream ******	Reach *	Profile *******	* ******	Upstream
******				
* RI VER-1 Known WS = 174.47		1%	*	
* RI VER-1 Known WS = 175.21	Reach-2	FI oodway	^	
* RIVER-1 Known WS = 169	Reach-2	10%	*	
* RI VER-1 Known WS = 172.85	Reach-2	2%	*	
* RI VER-1 Known WS = 178.41	Reach-2	0. 2%	*	
	*****	******	*****	******
*****		* * * * * * * * * * * * * * * * * *	* * * * * * * * * * * * * * * * * * * *	****
GEOMETRY DATA				
Geometry Title: E Geometry File : C HEC-RAS\HEFWestCo	:: \Users\wi I sons`	MR) \Desktop\HEF EA\B	road Run	
Reach Connection		*****	*****	*****
* Ri ver *******	Reach	* Upstream B	oundary * Dowr	nstream Boundary *
* RI VER-1 * RI VER-1	Reach-1 Reach-2	* * A	* A	*
IXI VEIX		Page 3		

#### Existing - 34R LOMR \* RI VER-2 Reach-1 JUNCTION INFORMATION Name: A Description: Energy computation Method Tri butary Length across Junction Reach Ri ver Reach Length Angl e Ri ver RI VER-1 Reach-1 to RIVER-1 Reach-2 635 RI VER-2 Reach-1 to RIVER-1 Reach-2 1760 CROSS SECTION RI VER: RI VER-1 REACH: Reach-1 RS: 350 I NPUT Description: XS 350 (LETTERED CROSS-SECTION Z) SOUTHERN RAI LROAD Station Elevation Data num= El ev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev El ev Sta El ev 0 188. 79 3. 27 188. 68 6. 54 188. 56 9. 82 188. 42 13.09 188.22 19. 63 36 52. 36 68. 72 188. 09 189. 24 188. 29 189. 21 22. 91 39. 27 26. 18 189.37 16. 36 188. 6 188. 97 29. 45 42.54 32.72 189. 48 189. 41 45.81 188. 5 188. 17 187. 74 188. 28 187. 56 49.09 188. 2 188.08 55.63 58. 9 188. 23 187. 75 62. 18 75. 27 65.45 188.33 188. 3 71. 99 78. 54 187.83 85.08 187. 79 187. 51 81.81 187.95 88. 36 188.03 91.63 94. 9 98.17 187. 16 101.45 186. 96 104. 72 186. 72 107. 99 186. 57 111. 26 186.41 114.54 186. 57 117.81 187. 13 121. 08 187. 84 124. 35 188. 06 127.63 187.48 180 168 185 130.9 186. 81 134. 17 186. 66 137. 44 186. 49 408 653 175 758 170 783 165 818 160 848 165 170 923 185. 49 1479. 58 185. 89 1495. 96 186. 84 1512. 34 186. 75 1528. 72 187. 21 1545. 11 185. 15 1473. 03 185. 61 1489. 41 186. 63 1505. 79 186. 9 1522. 17 187. 09 1538. 55 175 180 1469.75 873 1418 185. 4 185. 45 1482. 86 186. 11 1499. 24 186. 92 1515. 62 186. 76 1532 187. 26 1551. 66 185. 45 1486. 13 186. 35 1502. 51 186. 96 1518. 9 186. 92 1535. 28 187. 4 1554. 94 1476.3 185.76 1492.68 186.79 1509.07 186.8 1525.45 187.11 187. 45 1558. 21 187.58 1541.83 187. 77 1568. 04 187. 95 1584. 42 188. 19 1574. 59 1561.49 187.63 1564.76 187. 96 1571. 32 188.09 187. 81 1590. 98 188. 01 1581. 15 188. 01 1597. 53 1577.87 187. 84 1587. 7 187.88 188. 14 1604. 08 188. 13 1607. 36 1594. 25 188. 1 1600. 8 188. 11 Manning's n Values num= n Val Sta n Val Sta n Val Sta n V . 1 758 . 045 873 . 1 Lengths: Left Channel Right Coeff Contr. 505 505 505 .1 Bank Sta: Left Ri ght Expan. 873 . 3 CROSS SECTION OUTPUT Profile #1% \*

* Crit W.S. (ft)	* Ex	isting - 34R LOMR * Flow Area (sq ft)	* 1962.60	* 1930. 52	*
2419. 50 *		110W /110d (3q 11)	1702.00	1730. 32	
* E.G. Slope (ft/ft)	*0.000898	* Area (sq ft)	* 1962.60	* 1930. 52	*
2419.50 * * Q Total (cfs) 2858.28 *	*17700.00	* Flow (cfs)	* 2441.78	*12399. 94	*
* Top Width (ft) 559.68 *	* 1094.81	* Top Width (ft)	* 420.13	* 115.00	*
* Vel Total (ft/s) 1.18 *	* 2.80	* Avg. Vel. (ft/s)	* 1.24	* 6.42	*
* Max Chl Dpth (ft) 4.32 *	* 21.46	* Hydr. Depth (ft)	* 4.67	* 16.79	*
* Conv. Total (cfs) 95367.2 *	*590563.6	* Conv. (cfs)	* 81470.3	*413726. 2	*
* Length Wtd. (ft) 560.03 *	* 505.00	* Wetted Per. (ft)	* 420. 32	* 116.76	*
* Min Ch El (ft) 0.24 *	* 160.00	* Shear (Ib/sq ft)	* 0. 26	* 0.93	*
* Al pha 0. 29 *	* 3.73	* Stream Power (Ib/ft s)	* 0.33	* 5. 96	*
* Frctn Loss (ft) 2052.13 *	* 0.34	* Cum Volume (acre-ft)	* 1547.17	* 586.41	*
* C & E Loss (ft) 210.34 *	* 0.07	* Cum SA (acres)	* 294.23	* 31.05	*
=	******	*******	****	*****	**

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

# 

****							
* E.G. Elev (ft) Right OB *	* 182.36	* Element	*	Left OB	*	Channel	*
* Vel Head (ft)	* 0.56	* Wt. n-Val.	*	0. 100	*	0. 045	*
0.100 * * W.S. Elev (ft) 505.00 *	* 181.80	* Reach Len. (ft)	*	505.00	*	505.00	*
* Cri t W.S. (ft) 1501.23 *	*	* Flow Area (sq ft)	*	942. 30	*	1969. 96	*
* E.G. Slope (ft/ft) 1501.23 *	*0.000980	* Area (sq ft)	*	942. 30	*	1969. 96	*
* Q Total (cfs) 2436.86 *	*17700.00	* Flow (cfs)	*	1867. 46	* *	13395. 68	*
* Top Width (ft) 225.00 *	* 440.00	* Top Width (ft)	*	100.00	*	115. 00	*
* Vel Total (ft/s) 1.62 *	* 4.01	* Avg. Vel. (ft/s)	*	1. 98	*	6. 80	*
* Max Chl Dpth (ft) 6.67 *	* 21.80	* Hydr. Depth (ft)	*	9. 42	*	17. 13	*
* Conv. Total (cfs) 77842.4 *	*565403.8	* Conv. (cfs)	*	59653.7	* 4	127907.8	*
* Length Wtd. (ft) 230.29 *	* 505.00	* Wetted Per. (ft)	*	107. 16	*	116. 76	*
* Min Ch El (ft) 0.40 *	* 160.00	* Shear (Ib/sq ft)	*	0. 54	*	1. 03	*
* Al pha	* 2. 22	* Stream Power (lb/ft s)	*	1. 07	*	7. 02	*
* Frctn Loss (ft)	* 0.35	* Cum Volume (acre-ft)	*	510. 21	*	602. 85	*
1325.63 * * C & E Loss (ft)	* 0.11	* Cum SA (acres) Page 5	*	56. 24	*	30. 76	*

												9	U			****										
94. 78		*																								
*****	< *	*	: <b>*</b> *	* * *	* * :	* * *	* * *	* * *	***	***	***	***	* * * *	***	* * *	* * *	* * *	* * * *	***	* * *	***	* * *	* * * *	****	***	<b>*</b> *
+++++++	+ +	*	- +																							

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

# CROSS SECTION OUTPUT Profile #10%

***********************										
*****										
* E.G. Elev (ft) Right OB *	* 177. 96	* Element	*	Left OB	*	Channel	*			
* Vel Head (ft) 0.100 *	* 0.38	* Wt. n-Val.	*	0. 100	*	0. 045	*			
* W.S. Elev (ft) 505.00 *	* 177.59	* Reach Len. (ft)	*	505.00	*	505.00	*			
* Crit W.S. (ft) 586.05 *	*	* Flow Area (sq ft)	*	698. 42	*	1485. 16	*			
* E.G. Slope (ft/ft)	*0.000844	* Area (sq ft)	*	698. 42	*	1485. 16	*			
586.05 * * Q Total (cfs)	* 8780.00	* Flow (cfs)	*	628. 52	*	7761.83	*			
* Top Width (ft)	* 653.08	* Top Width (ft)	*	231. 83	*	115. 00	*			
* Vel Total (ft/s)	* 3. 17	* Avg. Vel. (ft/s)	*	0. 90	*	5. 23	*			
* Max Chl Dpth (ft)	* 17.59	* Hydr. Depth (ft)	*	3. 01	*	12. 91	*			
1.91 * * Conv. Total (cfs)	*302279.9	* Conv. (cfs)	*	21638. 7	* *	267226. 1	*			
13415.1 * * Length Wtd. (ft)	* 505.00	* Wetted Per. (ft)	*	231. 98	*	116. 76	*			
* Min Ch El (ft)	* 160.00	* Shear (Ib/sq ft)	*	0. 16	*	0. 67	*			
0. 10 * * Al pha	* 2.41	* Stream Power (lb/ft s)	*	0. 14	*	3. 50	*			
0.07 * * Frctn Loss (ft)	* 0. 31	* Cum Volume (acre-ft)	*	660. 50	*	446. 30	*			
966.75 * * C & E Loss (ft)	* 0.06	* Cum SA (acres)	*	122. 40	*	31. 18	*			
183. 78 *		******	ا الدال		- باد باد		ىك بك			
*******	*****	**************************************	* *	*****	× × :	*****	× ×			

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

# CROSS SECTION OUTPUT Profile #2%

******	*****	******	******
*****			
* E.G. Elev (ft) Right OB *	* 180.88	* Element	* Left OB * Channel *
* Vel Head (ft) 0.100 *	* 0.46	* Wt. n-Val.	* 0.100 * 0.045 *
* W.S. Elev (ft) 505.00 *	* 180.42	* Reach Len. (ft)	* 505.00 * 505.00 *
* Crit W.S. (ft) 1843.96 *	*	* Flow Area (sq ft)	* 1552. 36 * 1811. 15 *
* E.G. Slope (ft/ft) 1843.96 *	*0.000924	* Area (sq ft)	* 1552.36 * 1811.15 *
* Q Total (cfs) 1867. 21 *	*15000.00	* Flow (cfs)	* 1822. 86 *11309. 93 *

```
Existing - 34R LOMR
* Top Width (ft) 549.25 *
                        * 1034.56 * Top Width (ft)
                                                               370. 31 * 115. 00 *
* Vel Total (ft/s)
                             2.88 * Avg. Vel. (ft/s)
                                                                 1. 17
                                                                            6. 24
  1.01
* Max Chl Dpth (ft)
                                   * Hydr. Depth (ft)
                                                                 4. 19
                                                                           15.75
                            20.42
  3. 36
* Conv. Total (cfs) 61410.9 *
                        *493337.5
                                   * Conv. (cfs)
                                                            * 59952.5
                                                                       *371974.2
 Length Wtd. (ft)
                           505.00
                                   * Wetted Per. (ft)
                                                               370.48
                                                                         116. 76
549. 55
                                   * Shear (lb/sq ft)
* Min Ch El (ft)
                           160.00
                                                                 0.24
                                                                            0.90
  0.19
* Al pha
                             3.58
                                   * Stream Power (lb/ft s) *
                                                                 0.28
                                                                            5.59
  0. 20
* Frctn Loss (ft)
                             0.34
                                   * Cum Volume (acre-ft)
                                                            * 1183.72
                                                                          544.16
1716. 34
                                  * Cum SA (acres)
* C & E Loss (ft)
                             0.08
                                                               236. 78
                                                                           31.05
205. 28 *
**************************************
*****
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

# CROSS SECTION OUTPUT Profile #0.2%

*****	****	*****	~ ~	~ ~ ~ ~ ~ ~ ~ ~ ~ ~	~ ~ .		~ ~
*****							
* E.G. Elev (ft)	* 184.60	* Element	*	Left OB	*	Channel	*
Right OB *							
* Vel Head (ft)	* 0.43	* Wt. n-Val.	*	0. 100	*	0. 045	*
0. 100 *	* 404.47	* D	*	F0F 00		505.00	*
* W.S. Elev (ft)	* 184. 17	* Reach Len. (ft)	^	505.00	*	505.00	^
303.00	*	* [low Area (eg ft)	*	2275 07	*	2241 05	*
* Crit W.S. (ft) 3971.49 *		* Flow Area (sq ft)		3275. 87		2241. 85	
* E.G. Slope (ft/ft)	*0.000812	* Area (sq ft)	*	3275. 87	*	2241. 85	*
3971. 49 *	0.000012	Area (34 rt)		3273.07		2241.00	
* Q Total (cfs)	*25700.00	* Flow (cfs)	*	4557. 03	* *	15128. 72	*
6014. 25 *	_0,00.00	(5. 5)					
* Top Width (ft)	* 1251.96	* Top Width (ft)	*	550. 08	*	115.00	*
586. 88 *		•					
* Vel Total (ft/s)	* 2.71	* Avg. Vel. (ft/s)	*	1. 39	*	6. 75	*
1. 51 *							
* Max Chl Dpth (ft)	* 24. 17	* Hydr. Depth (ft)	*	5. 96	*	19. 49	*
0. 11	*001701 0	* (-5-)	4	15000/ /	<b>↓</b> r	-20001 4	
* Conv. Total (cfs) *211013.9 *	*901701.9	* Conv. (cfs)	^	159886. 6	^ (	530801. 4	
* Length Wtd. (ft)	* 505.00	* Wetted Per. (ft)	*	550. 29	*	116. 76	*
587. 37 *	303.00	wetted Fer. (It)		330. 29		110.70	
* Min Ch El (ft)	* 160.00	* Shear (Ib/sq ft)	*	0. 30	*	0. 97	*
0.34 *	100.00	311car (16/34 11)		0. 50		0. 77	
* Al pha	* 3.77	* Stream Power (lb/ft s)	*	0. 42	*	6. 57	*
0. 52 *		,					
<pre>* Frctn Loss (ft)</pre>	* 0.32	* Cum Volume (acre-ft)	*	2915. 13	*	697. 04	*
2960. 66 *							
* C & E Loss (ft)	* 0.06	* Cum SA (acres)	*	490. 26	*	32. 28	*
244. 72 *		*******					
******	****	******	* *	****	* * 7		* *
00000000000							

CROSS SECTION

RI VER: RI VER-1 RS: 344.95 REACH: Reach-1 Description: XS 344.95 (LETTERED CROSS-SECTION Y) Station Elevation Data num= Elev Sta Elev Sta Elev ELev Sta \*\*\*\*\*\*\*\* 3. 28 22. 94 193.66 193.86 6. 55 193. 97 9.83 194.05 13. 11 194.06 194. 13 194. 25 194. 31 194. 25 16.39 26. 22 194. 31 29.49 194.32 32.77 39. 32 55. 71 194. 21 42.6 36.05 45.88 194. 2 194 49. 16 193.82 52.43 193.63 193.43 58.99 193. 27 62.26 193.09 108 190 418 143 188 180 175 185 177 568 177 673 718 170 818 159 908 170 768 165 868 165 998 173 1068 170 1083 169 1153 170 1228 175 184. 49 1506. 82 184. 48 1510. 08 184. 51 1348 180 1443 185 1503.55 184. 52 1529. 69 184. 46 1513. 35 184. 55 1523. 16 nning's n Values num= Sta n Val Sta n Val Manning's n Values Sta n Val 768 . 045 868 Bank Sta: Left Lengths: Left Channel Right Coeff Contr. Expan. Ri ght 768 700 1400 1400 868 . 1 CROSS SECTION OUTPUT Profile #1% \* E.G. Elev (ft) \* 181.51 \* Element \* Left OB \* Channel \* Right OB \* Vel Head (ft) \* 0.22 \* Wt. n-Val. 0.100 \* 0.045 \* 0.100 \* \* W.S. Elev (ft) \* 181.29 \* Reach Len. (ft) \* 700.00 \* 1400.00 1400.00 \* \* Crit W.S. (ft) \* Flow Area (sq ft) \* 2933.74 \* 1929.09 4250.48 \* E.G. Slope (ft/ft) \*0.000440 \* Area (sq ft) \* 2933.74 \* 1929.09 4250. 48 \* 0 Total (cfs) 5479.02 \* \*17700.00 \* Flow (cfs) \* 2656.86 \* 9564.12 591.62 \* Top Width (ft) \* 1196.15 \* Top Width (ft) 100.00 504.53 \* \* Vel Total (ft/s) \* 1.94 \* Avg. Vel. (ft/s) 0.91 4.96 1. 29 \* \* Max Chl Dpth (ft) \* Hydr. Depth (ft) 4.96 22. 29 19. 29 8. 42 \*
\* Conv. Total (cfs)
\*261231.9 \* \* Conv. (cfs) \*843910.5 \*126675.1 \*456003.5 \* Length Wtd. (ft) \* 1273.51 \* Wetted Per. (ft) 592.25 100.72 505. 30 \* \* Min Ch El (ft) \* 159.00 \* Shear (lb/sq ft) 0.14 0.53 0. 23 \* Stream Power (lb/ft s) \* Al pha 3.69 0. 12 2.61 0.30 \* Frctn Loss (ft) 0.80 2013. 47

Page 8

0.03 \* Cum SA (acres)

288. 37 \*

29.80 \*

C & E Loss (ft)

204.17 \*

\*\*\*\*\*

Existing - 34R LOMR
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS	SECTION	UIITPIIT	Profile	#FI oodway
CINUSS	SECTION	001101	1101116	$\pi$ 1100uway

*******	*****	********	* *	*****	* * :	*****	* *
*****							
* E.G. Elev (ft)	* 181. 91	* Element	*	Left OB	*	Channel	*
Right OB * ` ´							
* Vel Head (ft)	* 0. 20	* Wt. n-Val.	*	0. 100	*	0.045	*
0. 100 * ` ´							
* W.S. Elev (ft)	* 181.71	* Reach Len. (ft)	*	700.00	*	1400.00	*
1400.00 *							
* Crit W.S. (ft)	*	* Flow Area (sq ft)	*	2430.73	*	1970. 92	*
4165. 35 * ` ` ´							
* E.G. Slope (ft/ft)	*0.000391	* Area (sq ft)	*	2430.73	*	1970. 92	*
4165.35 *		• •					
* Q Total (cfs)	*17700.00	* Flow (cfs)	*	2573. 98	*	9344.85	*
5781. 16 *							
<pre>* Top Width (ft)</pre>	* 850.00	<pre>* Top Width (ft)</pre>	*	350.00	*	100.00	*
400.00 *							
* Vel Total (ft/s)	* 2.07	* Avg. Vel. (ft/s)	*	1. 06	*	4. 74	*
1. 39 *							
<pre>* Max Chl Dpth (ft)</pre>	* 22.71	* Hydr. Depth (ft)	*	6. 94	*	19. 71	*
10. 41 *							
* Conv. Total (cfs)	*895150. 6	* Conv. (cfs)	*	130175. 3	* 4	472601.8	
*292373.5 *							
<pre>* Length Wtd. (ft)</pre>	* 1264. 15	* Wetted Per. (ft)	*	355. 25	*	100. 72	*
405. 71 *							
* Min Ch El (ft)	* 159.00	<pre>* Shear (lb/sq ft)</pre>	*	0. 17	*	0. 48	*
0. 25 *							
* Al pha	* 2.97	* Stream Power (lb/ft s)	*	0. 18	*	2. 26	*
0. 35 *							
* Frctn Loss (ft)	* 0.68	* Cum Volume (acre-ft)	*	490. 65	*	580. 00	*
1292. 78 *		d 0 0 0 0	.1.	<b>50</b> (0	.1.	00 51	.1.
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	*	53. 63	*	29. 51	*
91. 16 *		*****	<b>+</b> +	****	<b>+</b> + .		++
******	^ ^ ^ X X X X X X X X X		* *	^ ^ X X X X X X X X	^ *	^ ^ ^ X X X X X X X X	^ *
^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^							

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT		*******	****	*****	**:	*****	**
* E.G. Elev (ft)	* 177.60	* Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	* 0. 17	* Wt. n-Val.	*	0. 100	*	0. 045	*
0.100 * * W.S. Elev (ft)	* 177.43	* Reach Len. (ft)	*	700.00	*	1400. 00	*
1400.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	*	940. 28	*	1543. 05	*
2460.87 * * E.G. Slope (ft/ft)	*0. 000366	* Area (sq ft)	*	940. 28	*	1543. 05	*
2460.87 * * * Q Total (cfs)	* 8780.00	* Flow (cfs)	*	486. 19	*	6015. 61	*
2278.19 * * * * * * * * * * * * * * * * * * *	* 901.34	* Top Width (ft)	*	383. 01	*	100. 00	*
418.33 *  * Vel Total (ft/s) 0.93 *	* 1.78	* Avg. Vel. (ft/s)	*	0. 52	*	3. 90	*

```
Existing - 34R LOMR
 Max Chl Dpth (ft)
                          18.43 * Hydr. Depth (ft)
                                                            2.46 * 15.43 *
  5.88
* Conv. Total (cfs) *119030.3 *
                      *458734.7 * Conv. (cfs)
                                                        * 25402.5
                                                                  *314301.9
 Length Wtd. (ft)
                      * 1346.93 * Wetted Per. (ft)
                                                          383.55
                                                                    100.72
419. Ō2
* Min Ch El (ft)
                         159.00
                                * Shear (lb/sq ft)
                                                            0.06
                                                                      0.35
  0.13
                           3.38
                                * Stream Power (lb/ft s) *
 Al pha
                                                            0.03
                                                                      1.37
  0. 12
* Frctn Loss (ft)
                                * Cum Volume (acre-ft)
                           0.71
                                                          651.00
                                                                     428.75
949.09
* C & E Loss (ft)
                           0.03 * Cum SA (acres)
                                                          118.84
                                                                     29.93
179. 58 *
*************************
*****
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

# CROSS SECTION OUTPUT Profile #2%

	*****	*******	* *	****	* * :	*****	* *
****							
* E.G. Elev (ft) Right OB *	* 180. 47	* Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.100 *	* 0. 21	* Wt. n-Val.	*	0. 100	*	0. 045	*
* W.S. Elev (ft)	* 180. 26	* Reach Len. (ft)	*	700. 00	*	1400.00	*
1400.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	*	2325. 93	*	1825. 54	*
3738.21 * * E.G. Slope (ft/ft)	*0.000435	* Area (sq ft)	*	2325. 93	*	1825. 54	*
3738. 21 * * 0 Total (cfs)	*15000.00	* Flow (cfs)	*	1812. 83	*	8672. 01	*
4515.16 * * Top Width (ft)	* 1167.15	* Top Width (ft)	*	582. 30	*	100. 00	*
484.85 * * Vel Total (ft/s)	* 1. 90	* Avg. Vel. (ft/s)	*	0. 78	*	4. 75	*
1.21 * ` ´ * Max Chl Dpth (ft)	* 21. 26	* Hydr. Depth (ft)	*	3. 99	*	18. 26	*
7. 71 *			.1.	<b>U</b>	.1.		
* Conv. Total (cfs) *216563.6 *	*719455. 2	* Conv. (cfs)	^	86950. 2	^ 4	415941. 4	
* Length Wtd. (ft) 485.60 *	* 1295. 23	* Wetted Per. (ft)	*	582. 88	*	100. 72	*
* Min Ch El (ft) 0.21 *	* 159.00	* Shear (Ib/sq ft)	*	0. 11	*	0. 49	*
* Al pha	* 3.75	* Stream Power (lb/ft s)	*	0. 08	*	2.34	*
0.25 * * Frctn Loss (ft)	* 0.81	* Cum Volume (acre-ft)	*	1161. 24	*	523. 08	*
1683.98 * * C & E Loss (ft)	* 0.03	* Cum SA (acres)	*	231. 26	*	29. 80	*
199. 28 *	*****	******	* *	*****	* * :	******	* *
****							

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

This may indicate the need for additional cross sections. 1.4.

CROSS SECTION OUTPUT Profile #0.2%

\*\*\*\*\*\*\*\*\*\*\*\*

* E.G. Elev (ft)	* 184. 22	* Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft) O. 100 *	* 0. 23	* Wt. n-Val.	*	0. 100	*	0. 045	*
* W. S. Elev (ft) 1400.00 *	* 183. 99	* Reach Len. (ft)	*	700.00	*	1400.00	*
* Crit W.S. (ft) 5683.30 *	*	* Flow Area (sq ft)	*	4565. 40	*	2199. 34	*
* E.G. Slope (ft/ft) 5683.30 *	*0.000442	* Area (sq ft)	*	4565. 40	*	2199. 34	*
* Q Total (cfs) 8354.92 *	*25700.00	* Flow (cfs)	*	5417. 10	* ^	11927. 97	*
* Top Width (ft) 555.87 *	* 1271.81	* Top Width (ft)	*	615. 94	*	100.00	*
* Vel Total (ft/s) 1.47 *	* 2.06	* Avg. Vel. (ft/s)	*	1. 19	*	5. 42	*
* Max Chl Dpth (ft) 10.22 *	* 24.99	* Hydr. Depth (ft)	*	7. 41	*	21. 99	*
* Conv. Total (cfs) *397412.2 *	*1222452.0	* Conv. (cfs)		*257671.0	7	*567368. 7	
* Length Wtd. (ft) 556.72 *	* 1220.46	* Wetted Per. (ft)	*	616. 73	*	100. 72	*
* Min Ch El (ft) 0.28 *	* 159.00	* Shear (Ib/sq ft)	*	0. 20	*	0. 60	*
* Al pha 0. 41 *	* 3.44	* Stream Power (lb/ft s)	*	0. 24	*	3. 27	*
* Frctn Loss (ft) 2904.69 *	* 0.74	* Cum Volume (acre-ft)	*	2869. 67	*	671. 30	*
* C & E Loss (ft) 238.09 *	* 0.03	* Cum SA (acres)	*	483. 50	*	31. 03	*
	****	******	**	****	* * *	****	**
*****							

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

### CROSS SECTION

\*\*\*\*\*

RIVER: RIVER-1

REACH: Reach-1 RS: 331.6

## I NPUT

Description: XS 331.6 (LETTERED CROSS-SECTION X) Station Elevation Data num= 70 Sta El ev Sta El ev Sta El ev Sta El ev Sta El ev 187.7 187.33 187.26 3.28 187.6 6.55 13.1 16.38 0 187. 55 19.66 187. 26 22.93 187.16 187.24 26.21 29.49 187 32.76 186.81 36.04 186.76 39.31 186.72 42.59 186.77 45.87 49.14 186.72 186.88 52.42 186.52 55.69 186. 15 58.97 185.73 62.25 185.39 65.52 185.19 185.05 184.82 68.8 72.07 75.35 184.62 78. 63 184. 47 81.9 184. 28 88.45 183. 74 510 184 91.73 95.01 183.43 150 180 175 540 174 640 174 170 769.81 765 164.96 815 159.6 855. 37 1107. 14 165.04 865 170 1030 175 1055 180 1060 185 185. 59 1110.42 187.05 1113.69 1116.96 190.04 1120.24 191.16 188. 68 1123.51 192. 37 1126.78 194.05 1133.33 196. 21 1136.6 197. 12 1139. 87 197.79 1152.97 199.68 1149.69 199. 31 199.53 1156.24 1143.15 198.37 1146.42 198.88 199.44 1166.06 1159.51 199.58 1162.78 199. 45 1169. 33 199.24 1172.6 199.08 198.79 1175.88 198. 99 1179. 15 198. 94 1182. 42 1185.7 198. 67 1188. 97 198.47 198.34 1195.51 198. 31 1198. 79 198. 37 1202. 06 1192.24 198. 41 1205. 33 198.35 Page 11

Manning's n Values	num=	3	
Sta n Val Sta ************************************	*****	Sta n Val *********** 55. 37 . 1	
			Cooff Contraction
Bank Sta: Left Right 769.81 855.37	Lengths:	Left Channel Right 980 980 980	Coeff Contr. Expan. .1 .3
	ofile #1% ******	******	******
* E.G. Elev (ft)	* 180.67	* Element	* Left OB * Channel *
Right OB * * Vel Head (ft)	* 0.56	* Wt. n-Val.	* 0.100 * 0.045 *
0.100 * * W.S. Elev (ft)	* 180. 11	* Reach Len. (ft)	* 980.00 * 980.00 *
980.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	* 2793.54 * 1523.93 *
1442.16 * * E.G. Slope (ft/ft)	*0. 001100	* Area (sq ft)	* 2793.54 * 1523.93 *
1442.16 * *	*17700.00	* Flow (cfs)	* 3739.84 *11321.37 *
* Top Width (ft)	* 906.87	* Top Width (ft)	* 621.57 * 85.56 *
199.74 * * Vel Total (ft/s)	* 3.07	* Avg. Vel. (ft/s)	* 1.34 * 7.43 *
1.83 * * Max Chl Dpth (ft)	* 20.51	* Hydr. Depth (ft)	* 4.49 * 17.81 *
7.22 * * Conv. Total (cfs)	*533726. 4	* Conv. (cfs)	*112771.4 *341384.8 *
79570.1 * * Length Wtd. (ft)	* 980.00	* Wetted Per. (ft)	* 623.85 * 86.24 *
201.56 * * Min Ch El (ft)	* 159.60	* Shear (Ib/sq ft)	* 0.31 * 1.21 *
0. 49 * * Al pha	* 3.83	* Stream Power (lb/ft s	) * 0.41 * 9.01 *
0.90 * * Frctn Loss (ft)	* 0.79	* Cum Volume (acre-ft)	* 1472.77   *   508.55   *
1921.99 * * C & E Loss (ft)	* 0.10	* Cum SA (acres)	* 278.62 * 26.82 *
192. 85 * *********************************	*****	*******	******
*****			
is less than 0.7 or grea	ter than	ream conveyance divided e need for additional cr	by downstream conveyance)
CROSS SECTION OUTPUT Pro			033 3001 0113.
*********	*****	***********	*******
* E.G. Elev (ft) Right OB *	* 181. 20	* Element	* Left OB * Channel *
* Vel Head (ft)	* 0.45	* Wt. n-Val.	* 0.100 * 0.045 *
0.100 * * W.S. Elev (ft)	* 180.75	* Reach Len. (ft)	* 980.00 * 980.00 *
980.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	* 3113.53 * 1578.92 *
1570.46 * * E.G. Slope (ft/ft)	*0.000873	* Area (sq ft)	* 3113.53 * 1578.92 *
1570.46 * * Q Total (cfs)	*17700.00	* Flow (cfs) Page 12	* 4296. 15 *10699. 60 *

	Exi	sting - 34R LOMR					
2704.25 * * Top Width (ft)	* 840.00	* Top Width (ft)	*	554. 81	*	85. 56	*
199.63 * * Vel Total (ft/s) 1 72 *	* 2.83	* Avg. Vel. (ft/s)	*	1. 38	*	6. 78	*
* Max Chl Dpth (ft)	* 21.15	* Hydr. Depth (ft)	*	5. 61	*	18. 45	*
7.87 * * Conv. Total (cfs) 91534.0 *	*599113.0	* Conv. (cfs)	*14	45416. 8	*3	362162. 2	*
* Length Wtd. (ft) 202.16 *	* 980.00	* Wetted Per. (ft)	*	558. 73	*	86. 24	*
* Min Ch El (ft) 0.42 *	* 159.60	* Shear (Ib/sq ft)	*	0. 30	*	1. 00	*
* Al pha 0. 73 *	* 3.59	* Stream Power (lb/ft s)	*	0. 42	*	6. 76	*
* Frctn Loss (ft) 1200.61 *	* 0.73	* Cum Volume (acre-ft)	*	446. 11	*	522. 96	*
* C & E Loss (ft) 81.52 *	* 0.04	* Cum SA (acres)	*	46. 36	*	26. 53	*
	*****	*******	***	* * * * * * * *	* * *	:****	**
CROSS SECTION OUTPUT Pr	ofile #10%						
		********	***	*****	***	:****	**
* E.G. Elev (ft)	* 176.86	* Element	*	Left OB	*	Channel	*
Ri ght OB * * Vel Head (ft) 0.100 *	* 0.43	* Wt. n-Val.	*	0. 100	*	0. 045	*
* W.S. Elev (ft) 980.00 *	* 176.43	* Reach Len. (ft)	*	980. 00	*	980. 00	*
* Cri t W. S. (ft) 738. 93 *	*	* Flow Area (sq ft)	*	970. 46	*	1208. 86	*
* E.G. Slope (ft/ft) 738.93 *	*0.000932	* Area (sq ft)	*	970. 46	*	1208. 86	*
* Q Total (cfs) 849.51 *	* 8780.00	* Flow (cfs)	*	845. 23	*	7085. 26	*
* Top Width (ft) 181.77 *	* 629.93	* Top Width (ft)	*	362. 60	*	85. 56	*
* Vel Total (ft/s) 1.15 *	* 3.01	* Avg. Vel. (ft/s)	*	0. 87	*	5. 86	*
* Max Chl Dpth (ft) 4.07 *	* 16.83	* Hydr. Depth (ft)	*	2. 68	*	14. 13	*
* Conv. Total (cfs) 27823.3 *	*287563.9	* Conv. (cfs)	* 2	27683. 1	*2	232057. 6	*
* Length Wtd. (ft) 183.19 *	* 980.00	* Wetted Per. (ft)	*	364. 85	*	86. 24	*
* Min Ch El (ft) 0.23 *	* 159.60	* Shear (Ib/sq ft)	*	0. 15	*	0. 82	*
* Al pha 0. 27 *	* 3.08	* Stream Power (lb/ft s)	*	0. 13	*	4. 78	*
* Frctn Loss (ft) 897.67 *	* 0.72	* Cum Volume (acre-ft)	*	635. 65	*	384. 52	*
* C & E Loss (ft) 169.94 *	* 0.07	* Cum SA (acres)	*	112. 85	*	26. 95	*
	*****	*******	***	* * * * * * * * *	* * *	:****	**
CROSS SECTION OUTPUT Pr	ofila #2%						
*********		*******	***	****	* * *	:****	**
********* * E. G. Elev (ft)	* 179.62	* Element	*	Left OB	*	Channel	*
Ri ght OB *		Page 13					

	Fv	isting - 34R LOMR								
* Vel Head (ft) 0.100 *	* 0.55	* Wt. n-Val.	*	0. 100	*	0. 045	*			
* W.S. Elev (ft)	* 179.07	* Reach Len. (ft)	*	980. 00	*	980. 00	*			
* Crit W.S. (ft)	*	* Flow Area (sq ft)	*	2181. 97	*	1435. 25	*			
1237.41 * * E.G. Slope (ft/ft)	*0. 001100	* Area (sq ft)	*	2181. 97	*	1435. 25	*			
1237.41 * * 0 Total (cfs)	*15000.00	* Flow (cfs)	*	2677. 12	*1	0244. 80	*			
2078.08 * * Top Width (ft)	* 833.67	* Top Width (ft)	*	553. 12	*	85. 56	*			
195.00 * * Vel Total (ft/s)	* 3.09	* Avg. Vel. (ft/s)	*	1. 23	*	7. 14	*			
1.68 * * Max Chl Dpth (ft)	* 19.47	* Hydr. Depth (ft)	*	3. 94	*	16. 77	*			
6.35 * * Conv. Total (cfs)	*452313.8	* Conv. (cfs)	*	80726.6	*3	08924. 4	*			
62662.8 * * Length Wtd. (ft)	* 980.00	* Wetted Per. (ft)	*	555. 38	*	86. 24	*			
196.68 * * Min Ch El (ft)	* 159.60	* Shear (Ib/sq ft)	*	0. 27	*	1. 14	*			
0. 43 * * Al pha	* 3.71	* Stream Power (lb/ft s)	*	0. 33	*	8. 16	*			
0.73 * * Frctn Loss (ft)	* 0.82	* Cum Volume (acre-ft)	*	1125. 02	*	470. 68	*			
1604.03 * * C & E Loss (ft)	* 0.09	* Cum SA (acres)	*	222. 14	*	26. 82	*			
	*****	********	**	*****	***	****	**			
*****										
CROSS SECTION OUTPUT										
*******	******		**	*****	* * *	*****	**			
*****		*******	* * *				**			
******** * E.G. Elev (ft) Right OB *	* 183.45	**************************************		Left OB		Channel				
********  * E. G. El ev (ft) Ri ght OB *  * Vel Head (ft) 0.100 *	* 183.45 * 0.52	**************************************	*	Left 0B 0.100	*	Channel 0. 045	*			
********  * E. G. El ev (ft) Ri ght OB *  * Vel Head (ft)	* 183.45 * 0.52 * 182.93	**************************************	* *	Left 0B 0.100 980.00	* *	Channel 0. 045 980. 00	*			
********  * E. G. El ev (ft) Ri ght OB *  * Vel Head (ft)	* 183.45 * 0.52 * 182.93 *	**********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)	* *	Left 0B 0.100 980.00 4608.99	* * *	Channel 0. 045 980. 00 1765. 06	* * *			
********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	* 183. 45 * 0. 52 * 182. 93 * *0. 000981	*********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)	* * * *	Left 0B 0. 100 980. 00 4608. 99 4608. 99	* * * *	Channel 0. 045 980. 00 1765. 06 1765. 06	* * * * *			
*********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	* 183. 45 * 0. 52 * 182. 93 * *0. 000981 *25700. 00	*********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)	* * * * *	Left 0B 0. 100 980. 00 4608. 99 4608. 99 7765. 95	*	Channel 0. 045 980. 00 1765. 06 1765. 06 3659. 35	* * * * *			
*********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	* 183. 45 * 0. 52 * 182. 93 * *0. 000981 *25700. 00 * 954. 88	********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)	* * * * * *	Left 0B 0. 100 980. 00 4608. 99 4608. 99 7765. 95 666. 76	*	Channel 0. 045 980. 00 1765. 06 1765. 06 3659. 35 85. 56	* * * * * *			
*********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	* 183. 45 * 0. 52 * 182. 93 * *0. 000981 *25700. 00	********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)	* * * * *	Left 0B 0. 100 980. 00 4608. 99 4608. 99 7765. 95	*	Channel 0. 045 980. 00 1765. 06 1765. 06 3659. 35	* * * * *			
*********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	* 183. 45 * 0. 52 * 182. 93 * *0. 000981 *25700. 00 * 954. 88	********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)	* * * * * *	Left 0B 0. 100 980. 00 4608. 99 4608. 99 7765. 95 666. 76 1. 68	*	Channel 0. 045 980. 00 1765. 06 1765. 06 3659. 35 85. 56	* * * * * *			
*********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	* 183. 45 * 0. 52 * 182. 93 * *0. 000981 *25700. 00 * 954. 88 * 3. 07	********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)	* * * * * * * *	Left 0B	*	Channel 0. 045 980. 00 1765. 06 1765. 06 3659. 35 85. 56 7. 74	* * * * * * *			
*********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	* 183. 45  * 0. 52  * 182. 93  *  *0. 000981  *25700. 00  * 954. 88  * 3. 07  * 23. 33	*********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)	* * * * * * * *	Left 0B	*	Channel 0. 045 980. 00 1765. 06 1765. 06 3659. 35 85. 56 7. 74 20. 63	*			
*********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	* 183. 45 * 0. 52 * 182. 93 * *0. 000981 *25700. 00 * 954. 88 * 3. 07 * 23. 33 *820490. 0	********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)  * Conv. (cfs)	* * * * * * * * * * * * * * * * * * *	Left 0B	*	Channel 0. 045 980. 00 1765. 06 1765. 06 3659. 35 85. 56 7. 74 20. 63 36084. 0	*			
*********  * E. G. El ev (ft) Ri ght OB *  * Vel Head (ft)	* 183. 45  * 0. 52  * 182. 93  *  *0. 000981  *25700. 00  * 954. 88  * 3. 07  * 23. 33  *820490. 0  * 980. 00	********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)  * Conv. (cfs)  * Wetted Per. (ft)	* * * * * * * * * * *	Left 0B	*	Channel 0. 045 980. 00 1765. 06 1765. 06 3659. 35 85. 56 7. 74 20. 63 36084. 0 86. 24	* * * * * * * *			
*********  * E. G. El ev (ft) Ri ght OB *  * Vel Head (ft)	* 183. 45  * 0. 52  * 182. 93  *  *0. 000981  *25700. 00  * 954. 88  * 3. 07  * 23. 33  *820490. 0  * 980. 00  * 159. 60	********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)  * Conv. (cfs)  * Wetted Per. (ft)  * Shear (lb/sq ft)	* * * * * * * * * * * * * * * * * * * *	Left 0B	*	Channel 0. 045 980. 00 1765. 06 1765. 06 3659. 35 85. 56 7. 74 20. 63 36084. 0 86. 24 1. 25	* * * * * * * * *			

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Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1 REACH: Reach-1

RS: 320

I NPUT

Description: XS 320 INSERTED CROSS-SECTION TO EVALUATE IMPACT OF PROP. SITE

```
Existing - 34R LOMR
                                                                                                                                                                                                                           180. 33 1370. 23
179. 5 1399. 74
178. 32 1439. 07
175. 69 1465. 3
173. 5 1494. 8
171. 78 1517. 75
170. 77 1557. 08
170. 52 1586. 59
                                                                                                   180. 23 1363. 68
179. 99 1383. 35
                                                                                                                                                               180. 23 1366. 96
     1350.57
                                       180. 32 1357. 12
                                                                                                                                                                                                                                                                                           180.53
                                       180.49 1380.07
                                                                                                                                                                179. 93 1396. 46
     1373.51
                                                                                                                                                                                                                                                                                          179.36
                                                                                                    178. 45 1416. 13
176. 61 1458. 74
174. 59 1481. 69
172. 44 1504. 63
                                                                                                                                                               178. 54 1425. 96
176. 07 1462. 02
174 1488. 24
172. 13 1511. 19
    1403. 01
1442. 35
1471. 85
                                      179. 05 1412. 85
177. 22 1452. 19
174. 8 1475. 13
172. 67 1501. 36
                                                                                                                                                                                                                                                                                            177.37
                                                                                                                                                                                                                                                                                            175.43
                                                                                                                                                                                                                                                                                            173.11
     1498.08
                                                                                                                                                                                                                                                                                            171.25
                                                                                                   171. 14 1534. 14
170. 42 1576. 75
170. 11 1596. 42
     1521.02
                                                                                                                                                                                                                                                                                           170.52
                                       171. 13 1530. 86
                                                                                                                                                                171.05 1550.53
1521.02 171.13 130.30 171.14 134.14 171.03 130.35 170.77 137.08 170.42 1576.75 170.36 1580.03 170.52 1586.59 170.45 1589.86 170.34 1593.14 170.11 1596.42 170.06 1599.7 170.38 1602.98 170.79 1609.53 171.2 1612.81 171.62 1616.09 171.87 1619.37 171.95 1629.2 172.07 1635.76 171.93 1642.31 171.92 1648.87 171.68 1652.15 171.47 1655.42 171.14 1661.98 170.36 1665.26 170.35 1668.54 170.66 1675.09 171.48 1678.37 171.77 1681.65 171.88 1694.76 171.89 1698.04 171.86 1704.6 171.64 1707.87 171.73 1714.43 171.79 1720.99 172.03 1727.54 172.09 1734.1 172.41 1737.38 172.02 1740.65 170.76 1743.93 168.4 1747.21 165.79 1750.49 164.22 1753.77 163.64 1801 159.41848.298 163.1711851.575 164.861854.852 167.4961858.129 169.936 1861.405 171.1991864.682 171.3651867.959 171.3951871.236 171.461874.513 171.245 1877.79 170.8781881.066 170.6411884.312 170.6141887.558 170.781890.803 170.954 1894.049 171.0031897.294 170.999 1900.54 171.071903.786 171.2431907.031 171.424 1910.277 171.558 1917.67 171.35 1920.95 171.35 1924.23 171.06 1930.78 170.59 1934.06 169.75 1940.62 166.92 1943.89 165.69 1947.17 166.22 1950.45 167.63 171.47 1983.23 171.25 1986.51 171.47 1989.79 171.6 1993.06 171.87 2032.4 172.08 2038.96 172.06 2045.51 172.28 2048.79 172.31 2055.35 172.24 2058.63 172.32
                                       170. 34 1570. 2
170. 34 1593. 14
                                                                                                                                                                170. 36 1580. 03
     1566.92
                                                                                                                                                                                                                                                                                            170.45
                                                                                                                                                              171. 6 1993. 06
172. 02 2019. 29
172. 31 2055. 35
172. 69 2097. 96
173. 78 2133. 96
175. 06 2176. 48
175. 9 2215. 72
176. 29 2258. 24
176. 71 2307. 31
176. 33 2340. 01
175. 97 2379. 26
176. 02 2431. 6
175. 76 2467. 57
175. 74 2503. 55
175. 6 2536. 26
175. 74 2562. 43
175. 74 2562. 43
175. 74 2562. 43
175. 74 2562. 43
175. 74 2562. 43
175. 74 2778. 3
175. 74 2778. 3
176. 23 2817. 55
177. 07 2846. 98
178. 89 2886. 23
180. 53 2918. 94
183. 13 2945. 11
186. 41 2964. 73
                                                                                                                                                                                                                            172. 24 2058. 63
                                       172.06 2045.51
                                                                                                    172. 28 2048. 79
                                                                                                                                                                                                                                                                                           172.32
     2038.96
                                                                                                                                                                                                                          172. 24 2058. 63
172. 8 2104. 52
173. 94 2143. 77
175. 33 2183. 02
175. 97 2228. 81
176. 66 2268. 06
176. 48 2313. 85
176. 22 2353. 1
176. 09 2398. 89
175. 93 2438. 14
175. 84 2477. 39
175. 65 2510. 09
                                                                                                  172. 28 2048. 79
172. 67 2094. 68
173. 56 2130. 69
174. 72 2169. 93
175. 68 2209. 18
176. 34 2245. 16
176. 64 2287. 68
176. 28 2333. 47
176. 16 2375. 99
175. 98 2415. 24
175. 76 2461. 03
     2068. 46
2107. 79
                                      172. 47 2088. 13
173. 02 2120. 87
                                                                                                                                                                                                                                                                                           172.85
                                     173. 02 2120. 87

174. 57 2156. 85

175. 34 2202. 64

176. 28 2241. 89

176. 68 2277. 87

176. 45 2326. 93

176. 14 2369. 45

175. 91 2408. 7

175. 88 2451. 22

175. 69 2487. 2

175. 73 2526. 45

175. 72 2555. 88

175. 8 2575. 51

175. 63 2621. 3

175. 62 2657. 28

175. 57 2706. 34

175. 33 2742. 32
                                                                                                                                                                                                                                                                                           174.21
     2153. 58
2186. 29
                                                                                                                                                                                                                                                                                             175. 3
176. 3
    2238. 62
2274. 6
2320. 39
2359. 64
                                                                                                                                                                                                                                                                                           176. 57
176. 49
                                                                                                                                                                                                                                                                                          176. 22
175. 9
     2405.43
                                                                                                                                                                                                                                                                                           175.74
                                                                                                  175. 98 2415. 24
175. 76 2461. 03
175. 66 2493. 74
175. 7 2532. 99
175. 78 2559. 16
175. 7 2595. 13
175. 64 2624. 57
175. 71 2673. 63
175. 57 2716. 15
     2444.68
                                                                                                                                                                                                                                                                                           175.66
     2483. 93
                                                                                                                                                                                                                                                                                           175.63
                                                                                                                                                                                                                             175. 65 2510. 09
175. 69 2542. 8
175. 8 2565. 7
175. 73 2608. 22
175. 58 2640. 92
175. 72 2696. 53
175. 46 2725. 96
    2516. 64
2552. 61
2572. 24
2614. 76
2650. 74
                                                                                                                                                                                                                                                                                           175.63
                                                                                                                                                                                                                                                                                           175. 75
175. 74
175. 63
                                                                                                                                                                                                                                                                                            175. 75
     2703.07
                                                                                                                                                                                                                                                                                            175.44
                                                                                                  175. 57 2716. 15
175. 46 2748. 86
175. 64 2771. 76
176. 09 2807. 73
176. 78 2837. 17
178. 69 2882. 96
180. 34 2912. 4
183. 01 2941. 83
185. 81 2961. 46
                                                                                                                                                                                                                            175. 46 2725. 96
175. 66 2755. 4
175. 71 2784. 84
176. 49 2824. 09
177. 61 2856. 79
179. 09 2892. 77
181. 06 2922. 21
183. 7 2948. 38
187. 11 2968
191. 67 2997. 44
    2729. 24
2761. 94
2794. 65
                                       175. 33 2742. 32
                                                                                                                                                                                                                                                                                            175.58
                                      175. 65 2765. 21
175. 88 2804. 46
                                                                                                                                                                                                                                                                                           175.74
                                                                                                                                                                                                                                                                                            176.62
                                      175. 66 2804. 46
176. 75 2830. 63
178. 31 2876. 42
180. 05 2909. 13
182. 33 2938. 56
185. 28 2954. 92
    2827. 36
2866. 61
2902. 59
2932. 02
                                                                                                                                                                                                                                                                                           178
179. 35
                                                                                                                                                                                                                                                                                           181. 42
184. 58
     2951.65
                                                                                                                                                                  186. 41 2964. 73
                                                                                                                                                                                                                                                                                            187.95
                                                                                                                                                                 190. 59 2994. 17
     2974.54
                                       188. 97 2984. 35
                                                                                                    190.11 2987.63
                                                                                                                                                                                                                                                                                            191.91
                                                                                                                                                                                                                            194. 62 3020. 33
                                       192. 27 3003. 98
                                                                                                                                                                  193. 72 3017. 06
     3000.71
                                                                                                     192.72 3010.52
                                                                                                                                                                                                                                                                                           195.21
                                                                                                                                                                  197. 09 3033. 42 197. 68 3039. 96
         3023.6
                                      195. 65 3026. 88
198. 85 3049. 77
                                                                                                    196. 29 3030. 15
199. 37 3056. 31
                                                                                                                                                                                                                                                                                           198.19
         3046.5
                                                                                                                                                                  200.65
 Manning's n Values
                                                                                                    num=
                                                                                                                           Šta
  Sta n Val Sta
                                                                                             n Val
                                                                                                                                                                   n Val
                                                   . 1 1740. 65
                                                                                                        . 0451858. 129
                                                                                                                                                                           . 1
                                                                                                   Lengths: Left Channel Right Coeff Contr. Expan. 860 860 550 .1 .3
 Bank Sta: Left Right
                            1740. 651858. 129
```

# $$\operatorname{\textsc{Existing}}$- 34R LOMR $$\operatorname{\textsc{CROSS}}$ SECTION OUTPUT $$\operatorname{\textsc{Profile}}$ $\#1\%$$

CRUSS SECTION OUTPUT PROTITE #1%									
*****									
* E.G. Elev (ft) Right OB *	*	179. 77	*	Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.100 *	*	0. 21	*	Wt. n-Val.	*	0. 100	*	0. 045	*
* W. S. Elev (ft) 550.00 *	*	179. 56	*	Reach Len. (ft)	*	860.00	*	860.00	*
* Crit W.S. (ft) 4906.65 *	*		*	Flow Area (sq ft)	*	3100. 78	*	2019. 51	*
* E.G. Slope (ft/ft) 4906.65 *	*0	. 000519	*	Area (sq ft)	*	3100. 78	*	2019. 51	*
* Q Total (cfs)	*1	7700. 00	*	Flow (cfs)	*	3168. 38	*	9861. 01	*
* Top Width (ft)	*	1920. 86	*	Top Width (ft)	*	765. 77	*	117. 48	*
* Vel Total (ft/s)	*	1. 77	*	Avg. Vel. (ft/s)	*	1. 02	*	4. 88	*
0.95 * * Max Chl Dpth (ft)	*	20. 16	*	Hydr. Depth (ft)	*	4. 05	*	17. 19	*
* Conv. Total (cfs)	*7	77252. 9	*	Conv. (cfs)	*1	139131. 7	* /	133022. 6	
* Length Wtd. (ft)	*	709. 08	*	Wetted Per. (ft)	*	766. 81	*	122. 05	*
1039.95 *  * Min Ch El (ft)	*	159. 40	*	Shear (Ib/sq ft)	*	0. 13	*	0. 54	*
* Al pha	*	4. 40	*	Stream Power (lb/ft s)	*	0. 13	*	2. 62	*
0.15 * * Frctn Loss (ft)	*	0. 27	*	Cum Volume (acre-ft)	*	1406. 46	*	468. 69	*
1850.57 * * C & E Loss (ft)	*	0. 05	*	Cum SA (acres)	*	263. 01	*	24. 54	*
178.93 *	+++	++++++			L 4L 4	· + + + + + + + + + + + + + + + + + + +	<b>-</b> + 4		
****	^ ^		^ .						. ^

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

# 

^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^		^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^
* 180.43	* Element	* Left OB	* Channel *
* 0. 31	* Wt. n-Val.	* 0. 100	* 0.045 *
* 180. 12	* Reach Len. (ft)	* 860.00	* 860.00 *
*	* Flow Area (sq ft)	* 1808.50	* 2085. 22 *
*0. 000615	* Area (sq ft)	* 1808.50	* 2085. 22 *
*17700.00	* Flow (cfs)	* 2763. 10	*11330. 29 *
* 600.00	* Top Width (ft)	* 204.65	* 117.48 *
* 2.82	* Avg. Vel. (ft/s)	* 1.53	* 5.43 *
* 20.72	* Hydr. Depth (ft)	* 8.84	* 17.75 *
* /13543. 2		*111389. 4	* 456759. 9
	Page 17		
	* 0.31 * 180.12 *  *0.000615 *17700.00 * 600.00 * 2.82 * 20.72	* 180.12 * Reach Len. (ft)  * * Flow Area (sq ft)  *0.000615 * Area (sq ft)  *17700.00 * Flow (cfs)  * 600.00 * Top Width (ft)  * 2.82 * Avg. Vel. (ft/s)  * 20.72 * Hydr. Depth (ft)	* 0.31 * Wt. n-Val.

```
*145393.9 *
* Length Wtd. (ft)
                    * 721.31 * Wetted Per. (ft)
                                                   * 214.30 * 122.05 *
286. 17
 Min Ch El (ft)
                        159.40 * Shear (lb/sq ft)
                                                        0.32
                                                                  0.66
  0.32
 Al pha
                         2.48
                              * Stream Power (lb/ft s) *
                                                        0.50
                                                                  3.57
  0. 48
* Frctn Loss (ft)
                         0.32
                               * Cum Volume (acre-ft)
                                                       390.74
                                                                481.74
1156. 15
                         0.07 * Cum SA (acres)
                                                        37.82
 C & E Loss (ft)
                                                                 24. 24
**************************
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

#### 

```
*****
* E.G. Elev (ft)
                        * 176.07 * Element
                                                             Left OB *
                                                                        Channel *
Right OB *
* Vel Head (ft)
                           0. 22
                                  * Wt. n-Val.
                                                              0.100
                                                                         0.045
 0. 100
* W.S. Elev (ft)
                        * 175.86
                                  * Reach Len. (ft)
                                                                        860.00
                                                              860.00
550.00 *
* Crit W.S. (ft)
                                   * Flow Area (sq ft)
                                                           * 1159. 20
                                                                     * 1584.35
1323. 93
* E.G. Slope (ft/ft)
                                   * Area (sq ft)
                                                           * 1159.20
                        *0.000541
                                                                     * 1584.35
1323. 93
* 0 Total (cfs)
                        * 8780.00
                                   * Flow (cfs)
                                                           * 1031.42
                                                                      * 6724.37
1024. 21
* Top Width (ft)
                        * 1104.02
                                   * Top Width (ft)
                                                              280.07
                                                                        117.48
706. 46
* Vel Total (ft/s)
                            2. 16
                                   * Avg. Vel. (ft/s)
                                                               0.89
                                                                          4. 24
  0.77
 Max Chl Dpth (ft)
                                  * Hydr. Depth (ft)
                           16. 46
                                                               4. 14
                                                                         13.49
1.87 *
* Conv. Total (cfs)
                        *377309.1
                                  * Conv. (cfs)
                                                                     *288971.0
                                                           * 44324.0
 Length Wtd. (ft)
                           752.54
                                  * Wetted Per. (ft)
                                                              280.82
                                                                        122.05
708. 70
* Min Ch El (ft)
                           159.40
                                   * Shear (lb/sq ft)
                                                               0.14
                                                                          0.44
  0.06
                            3.00
* Al pha
                                  * Stream Power (lb/ft s) *
                                                               0.12
                                                                          1.86
  0.05
* Frctn Loss (ft)
                            0.32
                                   * Cum Volume (acre-ft)
                                                              611.69 *
                                                                        353.10 *
874.46
* C & E Loss (ft)
                             0.04
                                  * Cum SA (acres)
                                                              105.62 *
                                                                         24.66
159.95 *
```

Warning: Divided flow computed for this cross-section.

## CROSS SECTION OUTPUT Profile #2%

```
Existing - 34R LOMR
                        * 178.47 * Reach Len. (ft)
* W.S. Elev (ft)
                                                              860.00
                                                                     * 860.00
550.00
* Crit W.S. (ft)
                                   * Flow Area (sq ft)
                                                           * 2343.32
                                                                      * 1891.60
3789.09
* E.G. Slope (ft/ft)
                                  * Area (sq ft)
                        *0.000574
                                                           * 2343.32
                                                                      * 1891.60
3789. 09
* 0 Total (cfs)
                        *15000.00
                                  * Flow (cfs)
                                                           * 2454.85
                                                                      * 9299.95
3245. 20
                                   * Top Width (ft)
* Top Width (ft)
                        * 1758.41
                                                              628.25
                                                                        117.48
1012. 68
 Vel Total (ft/s)
                            1.87
                                   * Avg. Vel. (ft/s)
                                                                1.05
                                                                           4.92
  0.86
 Max Chl Dpth (ft)
                            19.07
                                   * Hydr. Depth (ft)
                                                                3.73
                                                                          16.10
3.74 *
* Conv. Total (cfs)
*135491.1 *
                                   * Conv. (cfs)
                                                           *102492.8
                                                                      *388283.9
                        *626267.8
* Length Wtd. (ft)
                           720.47
                                   * Wetted Per. (ft)
                                                              629.19
                                                                        122.05
1014. 99
 Min Ch El (ft)
                           159.40
                                  * Shear (lb/sq ft)
                                                                          0.56
                                                                0.13
  0.13
                             4.39
                                  * Stream Power (lb/ft s) *
 Al pha
                                                                0.14
                                                                           2.73
  0.11
* Frctn Loss (ft)
                            0.30
                                  * Cum Volume (acre-ft)
                                                           * 1074.12
                                                                        433.26
1547. 48
* C & E Loss (ft)
                             0.05
                                  * Cum SA (acres)
                                                              208.85
                                                                         24.54
```

Warning: Divided flow computed for this cross-section.

The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

## CROSS SECTION OUTPUT Profile #0.2%

*****	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	* * * * * * * * * * * * * * * * * * * *	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	****
*****				
* E.G. Elev (ft) Right OB *	* 182.67	* Element	* Left OB	* Channel *
* Vel Head (ft) 0.100 *	* 0.16	* Wt. n-Val.	* 0. 100	* 0.045 *
* W. S. Elev (ft) 550.00 *	* 182.50	* Reach Len. (ft)	* 860.00	* 860.00 *
* Crit W.S. (ft) 8020.86 *	*	* Flow Area (sq ft)	* 6181.03	* 2365.09 *
* E. G. Slope (ft/ft) 8020.86 *	*0.000397	* Area (sq ft)	* 6181.03	* 2365.09 *
* Q Total (cfs) 9050.81 *	*25700.00	* Flow (cfs)	* 5422.44	*11226.75 *
* Top Width (ft)	* 2427.25	* Top Width (ft)	* 1234. 22	* 117.48 *
1075.56 * * Vel Total (ft/s) 1.13 *	* 1.55	* Avg. Vel. (ft/s)	* 0.88	* 4.75 *
* Max Chl Dpth (ft) 7.46 *	* 23.10	* Hydr. Depth (ft)	* 5. 01	* 20.13 *
* Conv. Total (cfs) *454234.4 *	*1289811.0	* Conv. (cfs)	*272137. 1	*563438.9
* Length Wtd. (ft) 1078.02 *	* 688.74	* Wetted Per. (ft)	* 1235.37	* 122.05 *
* Min Ch El (ft)	* 159.40	* Shear (Ib/sq ft)	* 0.12	* 0.48 *
0. 18 *  * Al pha 0. 21 *	* 4.34	* Stream Power (lb/ft s)	* 0.11	* 2.28 *
U. Z I				

\* Frctn Loss (ft) \* 0.21 \* Cum Volume (acre-ft) \* 2674.58 \* 561.13 \* 2668.25 \* 2668. 25 \* 0.03 \* Cum SA (acres) C & E Loss (ft) \* 451.81 \* 25.77 \* 211.53 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RI VER: RI VER-1

RS: 314.4 REACH: Reach-1

I NPUT

Description: XS 314.4 (LETTERED CROSS-SECTION W) Station Elevation Data num= 486 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 178. 01 177. 23 177. 79 177. 78 178. 26 176. 25 177. 74 177. 98 3. 28 36. 07 9.84 16. 39 176. 69 22.95 176. 07 177. 76 177. 42 26. 23 55. 74 39. 35 177. 47 177. 73 42. 63 72. 14 177. 41 177. 78 52.46 65. 58 85. 25 68.86 78.69 178.05 81.97 91.81 178.06 98.37 178. 15 101.65 178.12 178. 46 124.6 104.93 178.37 108. 2 114. 76 178.53 118.04 178.71 178.76 178. 7 179. 25 127.88 131. 16 178.85 147.55 179. 2 150.83 179. 14 160.67 179.16 163.95 170. 5 179. 31 180.34 179.33 190.18 179.49 193.46 179.48 216. 41 249. 2 295. 1 321. 33 357. 4 373. 8 222. 97 255. 76 298. 38 327. 89 181. 04 181. 93 182. 24 181. 7 203. 29 226. 25 259. 03 179.78 209.85 179. 9 180. 4 181.25 209. 85 242. 64 288. 54 318. 05 347. 57 370. 52 181. 82 182. 19 181. 78 236.08 181.69 181.8 181. 9 268. 87 311. 5 344. 29 367. 24 182. 07 181. 96 181. 38 180. 17 182. 25 181. 87 182. 14 181. 72 301.66 331.17 181. 21 179. 75 180.77 360.68 180. 98 363.96 181 179. 51 386. 91 377.08 179. 46 179. 21 179. 12 393.47 396. 75 400.03 416. 42 179.01 179.05 409.86 178. 96 179.05 426. 26 455. 77 498. 4 537. 74 570. 53 596. 76 419. 7 452. 49 491. 84 179.01 178. 94 449. 21 485. 28 178.99 432.82 442.65 178.88 178.94 178. 76 179. 15 178. 9 178. 97 459.05 178. 9 465.61 179.03 511. 51 544. 3 577. 09 179. 13 179. 77 521. 35 554. 14 179.04 179.43 527.91 179.71 531. 18 567. 25 593. 48 180. 11 557.42 180. 3 180.44 180.43 180. 37 179. 69 178. 56 590. 2 613. 16 639. 39 180. 49 179. 91 180. 42 179. 77 180. 46 179. 8 583.65 179.95 606.6 179.54 600.04 622. 99 645. 95 636. 11 668. 9 179.04 626.27 178.8 632.83 178.44 178.91 179.37 659.06 179.96 662.34 180.04 672.18 179.97 180.03 180 675.46 180.03 678.74 685.29 180.06 688.57 180. 16 695.13 180.14 180. 25 180. 83 714. 8 767. 27 180.32 734. 48 777. 1 701.69 721. 36 180. 42 180. 78 760.71 180.87 763. 99 786. 94 180.88 770.54 180.82 180.85 180.74 180. 97 181. 3 181. 37 181. 16 816. 45 852. 52 885. 31 921. 37 832. 84 862. 35 901. 7 937. 77 813. 17 849. 24 800.06 180.88 180.94 823.01 181.04 181.01 842. 68 868. 91 908. 26 181. 23 181. 29 181. 24 181. 44 181. 24 181. 28 181.42 855.8 181.26 875. 47 914. 82 181. 17 181. 25 891. 86 927. 93 181. 19 181. 09 947.61 181.03 954. 16 180.73 957.44 180. 66 960.72 180. 49 967. 28 180.04 973. 84 990. 23 180. 34 980. 39 181. 51 1003. 35 180. 94 970.56 179. 96 180.03 977. 12 983. 67 181.38 181. 68 996. 79 180. 63 1019. 74 178. 72 1052. 53 176. 53 1078. 76 175. 43 1104. 99 181.61 181. 4 1009. 91 986.95 180.89 181. 4 1009. 91 180. 52 1032. 86 177. 71 1062. 37 176. 25 1088. 6 174. 54 1111. 55 169. 45 1131. 23 163. 66 1144. 34 163. 06 1203. 36 165. 47 1219. 76 169. 2 1239. 43 173. 02 1259. 1 180. 63 1023. 02 178. 11 1055. 81 176. 28 1082. 04 174. 95 1108. 27 170. 63 1127. 95 164. 99 1141. 06 180. 72 1016. 46 179. 48 1045. 97 1013.18 179.85 1039. 42 177.05 179. 48 1045. 97 176. 86 1075. 48 175. 76 1098. 44 172. 53 1121. 39 167. 01 1135. 36 159. 1 1193. 53 1068.93 175.84 1091.88 174.03 171. 63 1124. 67 166. 48 1137. 78 1118. 11 1134. 5 168.44 162.17 162. 15 163. 79 1160 1196. 8 162.66 1200.08 163.31 
 163. 39 1209. 92
 163. 79 1213. 2
 164. 6 1215. 54
 165. 47 1219. 76

 167. 62 1226. 31
 168. 13 1229. 59
 168. 3 1236. 15
 169. 2 1239. 43

 170. 94 1245. 99
 171. 96 1249. 27
 172. 85 1252. 55
 173. 02 1259. 1

 172. 89 1265. 66
 172. 56 1272. 22
 172. 18 1275. 5
 172. 06 1285. 34
 1206.64 166.8 1223.04 169.79 172.98 1242.71 1262.38 171.99

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Existing - 34R LOMR
                                                                     171. 95 1301. 73
171. 66 1334. 52
                          171. 92 1291. 89
                                                                                                                171. 78 1308. 29
  1288.61
                                                                                                                                                             171. 7 1314. 85
                                                                                                                                                                                                       171.74
                                                                                                                171. 78 1308. 29
171. 52 1341. 08
171. 25 1380. 42
170. 98 1416. 49
170. 76 1462. 4
170. 6 1505. 02
                                                                                                                                                           171. 7 1314. 85
171. 56 1344. 36
171. 17 1386. 98
170. 91 1419. 77
170. 74 1468. 96
170. 7 1511. 58
                                                                                                                                                                                                        171.49
     1321.4
                           171.66 1324.68
  1350. 91
1393. 54
1426. 33
1485. 35
                          171. 52 1357. 47
171. 04 1400. 1
170. 91 1442. 72
                                                                      171. 38 1377. 15
171. 05 1403. 38
170. 89 1455. 84
                                                                                                                                                                                                        171.16
                                                                                                                                                                                                        170.94
                                                                                                                                                                                                        170.77
                           170.66 1488.63
                                                                      170.71 1498.47
                                                                                                                                                                                                        170.62
                           170. 59 1521. 42
170. 48 1564. 05
                                                                      170. 53 1527. 98
170. 47 1567. 32
                                                                                                                 170. 64 1547. 65
170. 51 1573. 88
                                                                                                                                                            170. 55 1554. 21
170. 51 1577. 16
  1518.14
                                                                                                                                                                                                         170.4
  1557.49
                                                                                                                                                                                                        170.58
                                                                      170. 53 1596. 83
                                                                                                                 170.56 1603.39
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  1583.72
                           170.49
                                                      1587
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                                                                                                                                                           170. 51 1600. 67
170. 55 1636. 18
170. 41 1668. 97
170. 46 1701. 76
170. 83 1783. 74
170. 87 1823. 1
  1616. 51
1642. 74
1675. 53
1718. 16
1754. 23
1793. 58
                                                                                                                170. 53 1632. 9
170. 45 1665. 69
                           170. 52 1619. 79
                                                                      170.58 1623.07
                                                                                                                                                                                                        170.41
                          170. 32 1619. 79
170. 36 1646. 02
170. 35 1685. 37
170. 4 1724. 72
170. 58 1757. 51
170. 9 1800. 14
                                                                     170. 56 1623. 07
170. 44 1652. 58
170. 46 1691. 92
170. 5 1731. 28
170. 59 1773. 91
170. 85 1803. 42
                                                                                                                                                                                                        170.34
                                                                                                                170. 42 1695. 2
170. 37 1737. 83
170. 72 1777. 19
170. 88 1813. 26
                                                                                                                                                                                                        170. 4
170. 43
                                                                                                                                                                                                        170.81
                                                                                                                                                                                                        170.89
                         170. 9 1800. 14
170. 83 1832. 93
170. 78 1859. 17
170. 74 1891. 96
170. 74 1924. 75
171. 02 1950. 99
171. 17 1980. 5
171. 13 2000. 18
                                                                     170. 85 1803. 42
170. 87 1836. 21
170. 74 1865. 73
170. 72 1895. 24
170. 8 1934. 59
171. 2 1957. 55
171. 27 1983. 78
171. 04 2006. 74
170. 93 2036. 25
169. 25 2055. 93
170. 56 2085. 44
                                                                                                               170. 88 1813. 26
170. 82 1842. 77
170. 77 1875. 57
170. 78 1911. 64
170. 9 1941. 15
171. 15 1967. 39
171. 27 1987. 06
171. 3 2013. 3
                                                                                                                                                           170. 85 1849. 33
170. 76 1878. 84
  1829.66
                                                                                                                                                                                                       170.78
  1855.89
                                                                                                                                                                                                        170. 7
                                                                                                                                                           170. 76 1878. 84
170. 73 1918. 2
170. 87 1944. 43
171. 25 1973. 94
171. 13 1990. 34
171. 05 2019. 85
170. 28 2046. 09
169. 74 2062. 49
     1885.4
                                                                                                                                                                                                       170.79
  1885. 4
1921. 48
1947. 71
1977. 22
1993. 62
2023. 13
2049. 37
                                                                                                                                                                                                        171.02
                                                                                                                                                                                                        171.17
                                                                                                                                                                                                        171.09
                                                                                                                                                                                                        170.98
                                                                                                                 170. 82 2042. 81
169. 42 2059. 21
                                  171 2026. 41
                                                                                                                                                                                                        169.92
                                                                                                                                                                                                       169. 97
                           169.45 2052.65
  2065.77
                           170.06 2078.88
                                                                      170.56 2085.44
                                                                                                                 170.99 2088.72
                                                                                                                                                            170.98
                                                                                                                                                                                       2092
                                                                                                                                                                                                        170.84
                                                                                                                                                            170. 73 2114. 96
170. 29 2151. 03
  2095. 28
2118. 23
                                                                      170. 83 2105. 12
170. 53 2144. 47
                                                                                                                 170. 9 2111. 68
170. 27 2147. 75
                           170.81 2101.84
                                                                                                                                                                                                        170.52
                         170. 81 2101. 84
170. 47 2131. 35
170. 53 2167. 42
170. 27 2200. 22
170. 36 2229. 73
170. 29 2265. 8
170. 23 2295. 32
170. 56 2337. 95
                                                                    170. 53 2144. 47
170. 46 2170. 7
170. 23 2206. 78
170. 46 2236. 29
170. 32 2269. 08
170. 2 2298. 6
170. 82 2341. 23
171. 17 2370. 74
171. 51 2393. 7
171. 48 2429. 77
171. 54 2462. 57
171. 46 2498. 64
171. 67 2537. 99
172. 09 2560. 95
171. 86 2590. 46
                                                                                                                                                                                                        170.39
                                                                                                               170. 27 2147. 75
170. 52 2180. 54
170. 3 2213. 34
170. 53 2242. 85
170. 25 2275. 64
170. 25 2311. 72
170. 88 2347. 79
                                                                                                                                                           170. 29 2151. 03
170. 39 2187. 1
170. 27 2219. 89
170. 56 2249. 41
170. 3 2282. 2
170. 25 2324. 83
170. 91 2354. 35
  2160. 87
2196. 94
                                                                                                                                                                                                       170. 26
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  2226. 45
2255. 97
2285. 48
                                                                                                                                                                                                       170. 38
170. 19
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  2331.39
                                                                                                                                                                                                        171.02
                         170. 56 2337. 95
171. 26 2364. 19
171. 55 2390. 42
171. 58 2419. 93
171. 37 2452. 73
171. 59 2488. 8
171. 71 2528. 15
172. 05 2557. 67
172. 05 2583. 9
172. 1 2613. 42
172 38 2642 93
                                                                                                                170. 88 2347. 79
171. 32 2377. 3
171. 63 2400. 26
171. 44 2436. 33
171. 56 2472. 4
171. 54 2508. 48
171. 94 2541. 27
172. 01 2564. 22
171. 87 2597. 02
                                                                                                                                                            171. 3 2383. 86
  2360.91
                                                                                                                                                                                                        171.5
                                                                                                                                                           171. 3 2383. 86
171. 67 2406. 82
171. 27 2442. 89
171. 41 2475. 68
171. 69 2511. 76
171. 99 2547. 83
172. 02 2570. 78
  2387. 14
2416. 65
                                                                                                                                                                                                       171.57
                                                                                                                                                                                                       171. 38
  2446. 17
2482. 24
2515. 03
2551. 11
2577. 34
                                                                                                                                                                                                       171.57
                                                                                                                                                                                                        171.65
                                                                                                                                                                                                       171. 99
172. 15
                                                                                                                                                            172. 03 2600. 3
172. 22 2636. 37
                                                                                                                                                                               2600. 3
                                                                      171. 86 2590. 46
                                                                                                                                                                                                        172.01
                          172. 1 2613. 42
172. 38 2642. 93
172. 42 2685. 56
172. 43 2711. 8
  2606.86
                                                                      172. 14 2623. 25
                                                                                                                 172. 12 2626. 53
                                                                                                                                                                                                        172.31
                                                                                                                172. 38 2659. 33
172. 32 2695. 4
172. 6 2721. 63
                                                                                                                                                            172. 41 2665. 88
172. 32 2701. 96
172. 72 2728. 19
                                                                      172. 33 2649. 49
  2639.65
                                                                                                                                                                                                        172.51
                                                                     172. 33 2649. 49
172. 43 2692. 12
172. 47 2715. 07
172. 85 2744. 59
172. 28 2767. 54
174. 24 2790. 5
174. 85 2820. 01
  2682. 28
2708. 52
                                                                                                                                                                                                        172.52
                         172. 42 2685. 56
172. 43 2711. 8
172. 89 2741. 31
172. 46 2757. 71
173. 95 2787. 22
174. 71 2813. 45
                                                                                                                                                                                                         172.7
                                                                                                                172. 6 2721. 63
173. 06 2747. 87
172. 64 2770. 82
174. 21 2800. 34
174. 95 2833. 13
176. 37 2865. 92
                                                                                                                                                           172. 72 2726. 19
173. 13 2751. 15
172. 89 2774. 1
174. 49 2803. 62
175. 28 2839. 69
176. 87 2872. 48
  2734. 75
2754. 43
                                                                                                                                                                                                        172.87
                                                                                                                                                                                                        173.33
  2780. 66
2806. 9
                                                                                                                                                                                                       174. 51
175. 52
  2846.25
                           175.87
                                             2852.81
                                                                      176.05 2859.37
                                                                                                                                                                                                        177.19
                                                2885.6
                                                                                                                 178. 64 2895. 44
  2879.04
                           177.59
                                                                      178.05 2892.16
                                                                                                                                                            179.03 2908.56
                                                                                                                                                                                                        180.23
                           180.73 2921.67
  2915.11
                                                                      180.98 2924.95
                                                                                                                 181. 17 2931. 51
                                                                                                                                                            181. 35 2941. 35
                                                                                                                                                                                                        181.53
  2947. 91
2987. 26
                           181.84 2954.47
                                                                      182. 25 2967. 58
183. 65 3003. 66
                                                                                                                 182.58 2974.14
                                                                                                                                                            182. 71     2980. 7
184. 29   3010. 22
                                                                                                                                                                                                        182.92
                           183. 23 2993. 82
                                                                                                                 184. 02 3006. 94
                                                                                                                                                                                                       184.48
                           184.74
  3016.77
Manning's n Values
                                                                      num=
                                                        Sta
                                                                                                   Sta
           Sta n Val
                                                                      n Val
                                                                                                                   n Val
                          . 1 1135. 36
                                                                         . 045 1215. 54
                                                                     Lengths: Left Channel Right 600 1120 600
                                                                                                                                      Right Coeff Contr.
Bank Sta: Left
                                             Ri ght
                                                                                                                                                                                                          Expan.
                   1135. 36 1215. 54
                                                                                                                                                                                                             . 3
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Existing - 34R LOMR
Ineffective Flow
                     num=
           Sta R
                           Permanent
   Sta L
                    El ev
             950
                     185
                                F
    3015 3016.77
                     185
                                F
Blocked Obstructions
                         num=
                    El ev
   Sta L
           Sta R
  361. 15 664. 36 180. 04
CROSS SECTION OUTPUT Profile #1%
                                   * E.G. Elev (ft)
                            179. 46
                                     * Element
                                                                  Left OB *
                                                                              Channel *
Right OB *
* Vel Head (ft)
                                     * Wt. n-Val.
                                                                   0.100
                                                                               0.045
                               0.06
 0.100
* W.S. Elev (ft)
                             179.40
                                     * Reach Len. (ft)
                                                                  600.00
                                                                           * 1120.00
 600.00
* Crit W.S. (ft)
                            173.46
                                     * Flow Area (sq ft)
                                                                  403.79
                                                                           * 1410.64
*13443.44
* E.G. Slope (ft/ft)
*13443.44 *
                          *0.000248
                                     * Area (sq ft)
                                                                  630.92
                                                                           * 1410.64
* 0 Total (cfs)
                          *17700.00
                                     * Flow (cfs)
                                                                  245.11
                                                                           * 4891.40
*12563.50
* Top Width (ft)
                          * 2043.68
                                     * Top Width (ft)
                                                                  279.60
                                                                               80.18
1683. 90
                              1.16
                                     * Avg. Vel. (ft/s)
 Vel Total (ft/s)
                                                                    0.61
                                                                                3.47
  0. 93
* Max Chl Dpth (ft)
                              20.30
                                     * Hydr. Depth (ft)
                                                                    4. 24
                                                                               17.59
   7. 98
* Conv. Total (cfs)
*797444.7 *
                                     * Conv. (cfs)
                                                                * 15557.6
                          *1123475.0
                                                                           *310472.4
* Length Wtd. (ft)
                                     * Wetted Per. (ft)
                                                                   96.71
                                                                               81. 97
                             756. 81
1685. 46
 Min Ch El (ft)
                             159. 10
                                     * Shear (lb/sq ft)
                                                                    0.06
                                                                                0.27
  0. 12
                                     * Stream Power (lb/ft s) *
                               2.93
 Al pha
                                                                    0.04
                                                                                0.92
  0. 12
 Frctn Loss (ft)
                               0. 21
                                     * Cum Volume (acre-ft)
                                                               * 1369.62
                                                                              434.83
1734.73
 C & E Loss (ft)
                               0.00 * Cum SA (acres)
                                                                  252.69
                                                                               22.59
 161. 75
*****
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed
water surface.
         Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
CROSS SECTION OUTPUT Profile #Floodway
* E.G. Elev (ft)
                                                                  Left OB *
                             180.04 * Element
                                                                             Channel *
Right OB
  Vel Head (ft)
                               0.07
                                     * Wt. n-Val.
                                                                   0.100
                                                                               0.045
  0.100
* W.S. Elev (ft)
                             179. 97
                                                                          * 1120.00
                                     * Reach Len. (ft)
                                                                  600.00
600.00
* Cri t W. S. (ft)
                             173.38
                                     * Flow Area (sq ft)
                                                                  227. 92
                                                                           * 1456.64
*11735.45
* E.G. Slope (ft/ft)
                          *0.000259
                                     * Area (sq ft)
                                                                  227. 92
                                                                          * 1456.64
                                        Page 22
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	1.4.4.7.0.E. 4.E		EXI	Sι	illy - 34K LOWK					
7	*11735.45	*1	7700. 00	*	Flow (cfs)	*	200. 34	*	5269. 14	
,	* Top Width (ft)	*	1385. 00	*	Top Width (ft)	*	25. 36	*	80. 18	*
	1279. 46 * * Vel Total (ft/s) - 1.04 *	*	1. 32	*	Avg. Vel. (ft/s)	*	0. 88	*	3. 62	*
7	1.04 * * Max Chl Dpth (ft) 9.17 *	*	20. 87	*	Hydr. Depth (ft)	*	8. 99	*	18. 17	*
	* Conv. Total (cfs) *760253.0 *	*1	100238. 0		* Conv. (cfs)	*	12453. 1	7	*327531.5	
7	760233.0 * Length Wtd. (ft) 1289.16 *	*	769. 04	*	Wetted Per. (ft)	*	32. 32	*	81. 97	*
	* Min Ch El (ft) 0.15 *	*	159. 10	*	Shear (Ib/sq ft)	*	0. 11	*	0. 29	*
,	* Al pha 0. 15 *	*	2. 68	*	Stream Power (Ib/ft s)	*	0. 10	*	1. 04	*
	* Frctn Loss (ft) 1067.02 *	*	0. 22	*	Cum Volume (acre-ft)	*	370. 64	*	446. 78	*
	* C & E Loss (ft) 66.32 *	*	0.00	*	Cum SA (acres)	*	35. 55	*	22. 29	*
	OO. 32 ************************************	***	*****	**	******	* * *	*****	k * ;	*****	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

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^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^		^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	^ ^ ^		^ ^ ′		^ ^		
*****									
* E.G. Elev (ft)	* 175.71	* Element	*	Left OB	*	Channel	*		
Right OB *									
* Vel Head (ft)	* 0.07	* Wt. n-Val.	*	0. 100	*	0. 045	*		
0. 100 *									
* W.S. Elev (ft)	* 175.64	* Reach Len. (ft)	*	600.00	*	1120. 00	*		
600.00 *	* 160 10	* Fl A ( CL)	*	10/ 10	4	1100 01	*		
* Crit W.S. (ft)	* 169. 10	* Flow Area (sq ft)	^	126. 48	^	1109. 31	^		
7203. 43	*0.000200	* Aron (og ft)	*	104 40	*	1100 21	*		
* E.G. Slope (ft/ft) 7205.45 *	*0.000308	* Area (sq ft)		126. 48		1109. 31			
	* 8780.00	* Flow (cfs)	*	68. 33	*	3648. 63	*		
* Q Total (cfs) 5063.04 *	0700.00	TTOW (CT3)		00. 55		3040. 03			
* Top Width (ft)	* 1747.59	* Top Width (ft)	*	41. 05	*	80. 18	*		
1626. 36 *									
* Vel Total (ft/s)	* 1.04	* Avg. Vel. (ft/s)	*	0. 54	*	3. 29	*		
0. 70 * ` ` ´		,							
<pre>* Max Chl Dpth (ft)</pre>	* 16.54	* Hydr. Depth (ft)	*	3. 08	*	13.84	*		
4. 43 *									
* Conv. Total (cfs)	*500553.8	* Conv. (cfs)	*	3895. 7	*2	208011. 0			
*288647.1 *									
* Length Wtd. (ft)	* 823. 07	* Wetted Per. (ft)	*	42. 38	*	81. 97	*		
1027.70	* 150 10	* Chaon (16/00 ft)	*	0.07	*	0.27	*		
* Min Ch El (ft) 0.09 *	* 159. 10	* Shear (Ib/sq ft)		0. 06		0. 26			
* Al pha	* 4.42	* Stream Power (lb/ft s)	*	0. 03	*	0. 85	*		
0. 06 *	4. 42	Stream Fower (1b/1t s)		0.03		0. 65			
* Frctn Loss (ft)	* 0. 26	* Cum Volume (acre-ft)	*	599.00	*	326, 51	*		
820. 62 *	0. 20	odiii voi diiie (dei e i t)		377.00		320. 31			
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	*	102. 45	*	22. 71	*		
145. 22 *	2.00	2 2 2.1. (2.2. 2.2.)							
*******************************									

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT P			**	******	**:	****	* * ;	*****	**
*****									
* E.G. Elev (ft)	*	178. 36	*	Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	*	0.06	*	Wt. n-Val.	*	0. 100	*	0.045	*
0.100 * * W.S. Elev (ft)	*	178. 29	*	Reach Len. (ft)	*	600.00	*	1120. 00	*
600.00 * * Crit W.S. (ft)	*	172. 88	*	Flow Area (sq ft)	*	304.00	*	1322. 00	
*11588. 07   * ` ´				( 1 /					
* E.G. Slope (ft/ft) *11588.07 *	*0	. 000269	*	Area (sq ft)	*	383. 45	*	1322. 00	
* Q Total (cfs)	*1	5000.00	*	Flow (cfs)	*	171. 66	*	4570. 54	
*10257.80 * * Top Width (ft)	*	1941. 57	*	Top Width (ft)	*	188. 65	*	80. 18	*
1672.73 * * Vel Total (ft/s)	*	1. 14	*	Avg. Vel. (ft/s)	*	0. 56	*	3. 46	*
0.89 * ` ´				9 , ,					
* Max Chl Dpth (ft) 6.93 *	*	19. 19	*	Hydr. Depth (ft)	*	3. 59	*	16. 49	*
* Conv. Total (cfs)	*9	14478. 4	*	Conv. (cfs)	*	10465. 3	* 2	278643. 9	
*625369.1 * * Length Wtd. (ft)	*	771. 64	*	Wetted Per. (ft)	*	86. 21	*	81. 97	*
1674.24 * * Min Ch El (ft)	*	159. 10	*	Shear (Ib/sq ft)	*	0. 06	*	0. 27	*
0. 12 * ` ´				` ' '					
* Al pha	*	3. 25	*	Stream Power (Ib/ft s)	*	0. 03	*	0. 94	*
* Frctn Loss (ft)	*	0. 23	*	Cum Volume (acre-ft)	*	1047. 20	*	401. 54	*
1450. 41 *									
* C & E Loss (ft) 157.82 *	*	0.00	*	Cum SA (acres)	*	200. 78	*	22. 59	*
	****	*****	* *	******	**:	*****	* * :	*****	* *

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water šurface.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# CROSS SECTION OUTPUT Profile #0.2%

*********  * E.G. Elev (ft)
Right OB *  * Vel Head (ft)
* Vel Head (ft)
* Vel Head (ft)
* W. S. El ev (ft)
600.00 *  * Crit W.S. (ft)
* Crit W.S. (ft)
*18519. 29 *  * E. G. Slope (ft/ft) *0.000212 * Area (sq ft) * 2904. 19 * 1648. 85  *18519. 29 *  * Q Total (cfs) *25700. 00 * Flow (cfs) * 492. 98 * 5862. 21  *19344. 81 *
* E.G. Slope (ft/ft) *0.000212 * Area (sq ft) * 2904.19 * 1648.85 *18519.29 * * 2 Total (cfs) *25700.00 * Flow (cfs) * 492.98 * 5862.21 *19344.81 *
*18519. 29 ' * ' * ' *25700. 00 * Flow (cfs) * 492. 98 * 5862. 21 *19344. 81 *
* 0 Total (cfs)
*19344. 81 *
* Top Width (ft)
1743. 57 *
* Vel Total (ft/s)
Page 24

LATSTITING - SAIN LOWIN											
1.04 * * Max Chl Dpth (ft) 10.62 *	*	23. 27	*	Hydr. Depth (ft)	*	4. 52	*	20. 56	*		
* Conv. Total (cfs) *1328829.0 *	*1	765378. 0		* Conv. (cfs)	,	33863.8	*	402685.3			
* Length Wtd. (ft) 1745.22 *	*	729. 02	*	Wetted Per. (ft)	*	187. 06	*	81. 97	*		
* Min Ch El (ft)	*	159. 10	*	Shear (Ib/sq ft)	*	0.06	*	0. 27	*		
0.14 * * Al pha 0.15 *	*	2. 48	*	Stream Power (lb/ft s)	*	0. 03	*	0. 95	*		
* Frctn Loss (ft) 2500.70 *	*	0. 17	*	Cum Volume (acre-ft)	*	2584. 90	*	521. 51	*		
* C & E Loss (ft) 193.73 *	*	0.00	*	Cum SA (acres)	*	428. 42	*	23. 82	*		
173. /3 ************************************	***	*****	* *	******	**	*****	* * *	*****	:*		
0000000000											

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1 RS: 300

I NPUT

Description: XS 300

INSERTED CROSS-SECTION TO EVALUATE IMPACT OF PROP. SITE (5/21/01)

Station Elev		Data	num=						
Sta	El ev	Sta	El ev	Sta		*******		Sta ******	El ev
0 49. 18 18 91. 8 17 183. 6 17 183. 6 17 183. 6 17 183. 6 17 183. 6 17 183. 6 17 183. 6 17 183. 6 18	181.3 80.55 79.47 79.26 77.63 77.63 77.63 77.594 74.27 174.8 75.15 75.54 175.8 76.12 76.56 76.93 77.41 78.95 79.62 80.05 80.07 77.75	9. 84 55. 74 98. 36 137. 7 186. 88 222. 94 252. 45 281. 96 298. 35 321. 3 357. 36 393. 43 426. 21 455. 72	181. 29 180. 2 179. 57 179. 13 178. 29 177. 54 176. 86 175. 86 174. 79 175. 33 175. 53 175. 69 175. 9 176. 33 176. 69 176. 91	22. 95 59. 01 104. 91 147. 53 190. 16 226. 22 259. 01 285. 23 304. 91 324. 58 363. 92 399. 98 432. 77 459 495. 06 527. 85 560. 63 599. 97 639. 32 688. 5 727. 84 786. 85 839. 31 872. 09 931. 11 970. 45 996. 68	180. 94 180. 11 179. 39 178. 8 178. 13 177. 28 176. 41 175. 68 175. 02 175. 35 175. 75 175. 79 176. 65 177. 23 177. 83 179. 31 179. 78 180. 17 179. 85 179. 28 178. 03 176. 46 175. 63	29. 51 68. 85 108. 19 160. 65 196. 71 229. 5 265. 56 288. 51	180. 64 180 179. 57 178. 8 178. 14 177. 18 176. 27 174. 8 174. 8 175. 01 175. 46 175. 68 175. 72 176. 04 176. 69 176. 82 177. 38 178. 12 179. 4 179. 9 180. 19 179. 85 178. 89 177. 73 176. 39 175. 87	**************************************	******* 180. 6 179. 94 179. 27 178. 62 177. 96 177. 22 176. 11 174. 26 175. 26 175. 44 175. 71 175. 87 176. 59 176. 79 177. 55 178. 46 179. 58 179. 58 179. 73 178. 7 176. 61

Existing - 34R LOMR 176. 91 1026. 19 178. 17 1081. 94 1013.07 176.69 1016.35 177. 12 1036. 02 177. 2 1049. 14 177.51 179. 13 1104.9 1062.25 177.57 1075.37 178. 4 1098. 34 179.32 179. 61 1121. 3 180. 3 1167. 23 179. 59 1209. 88 178. 99 1262. 36 179. 81 1127. 86 179. 98 1173. 79 179. 49 1229. 56 179. 02 1268. 93 180. 09 1131. 14 179. 99 1183. 63 179. 28 1232. 84 178. 93 1282. 05 1111.46 180.07 1137.7 180.2 179. 85 1193. 47 179. 32 1242. 68 178. 67 1291. 89 1150.83 179.62 179. 13 1203.31 1245.96 178.77 178. 76 1331. 26 180. 09 1364. 06 180. 61 1449. 35 1295. 17 179. 12 1344. 38 179. 92 1380. 46 179. 22 1350. 94 180. 12 1423. 11 178.71 1305.01 179.55 180. 57 1360. 78 180. 45 1439. 51 1357.5 180.58 180. 61 1449. 35
181. 29 1492
181. 18 1554. 33
180. 41 1616. 66
179. 27 1659. 31
179. 33 1711. 8
179. 02 1744. 6
178. 95 1780. 69
178. 73 1810. 21
178. 61 1849. 58
178. 77 1898. 76
178. 61 1924. 91
178. 03 1957. 6
178. 83 1996. 83
178. 1 2029. 52
177. 85 2068. 75
177. 78 2107. 97 1432. 95 1459. 2 180. 95 1465. 76 180.64 180.94 180. 64 1459. 2 181. 34 1498. 56 181. 02 1570. 73 180. 62 1629. 78 179. 39 1665. 87 179. 33 1721. 64 178. 97 1751. 16 178. 92 1790. 53 178. 83 1816. 77 178. 85 1865. 98 180. 45 1439. 51 181. 08 1485. 44 181. 24 1521. 53 180. 49 1610. 1 179. 88 1646. 19 179. 28 1701. 95 178. 98 1741. 32 1478.88 181. 48 1505. 12 180. 91 1580. 57 181. 2 1514.96 180.57 180. 91 1580. 57 180. 38 1636. 34 179. 28 1682. 27 179. 26 1724. 92 179. 18 1757. 72 178. 94 1793. 81 178. 67 1826. 61 1587. 14 1639. 62 1698. 67 1731. 48 180. 11 179. 56 179. 08 179.02 179. 02 1770. 85 178. 87 1803. 65 1767.56 178.85 1800.37 178.79 178. 56 1843. 02 178. 59 1892. 22 178. 68 1918. 38 178. 81 1872. 54 1836.46 178.76 178. 85 1865. 98 178. 62 1905. 3 178. 88 1934. 72 177. 94 1964. 14 178. 49 2003. 37 178. 15 2045. 86 177. 73 2078. 55 1879. 1 178. 63 1911. 84 178. 95 1944. 53 178.54 1915. 11 1947. 8 1977. 22 179.09 178. 91 1954. 33 178. 59 1990. 29 178. 14 2022. 98 177. 82 2062. 21 178. 46 1970. 68 178. 3 2009. 9 177. 78 2049. 13 177. 77 2081. 82 178.67 178.31 2016. 44 177.89 2055.67 177.71 177. 22 2134. 12 176. 75 2163. 54 176. 25 2202. 77 177. 8 2098. 17 177. 78 2107. 97 177. 7 2127. 59 2088.36 177.26 177. 7 2127. 59 177. 14 2153. 74 176. 27 2196. 23 177. 1 2245. 27 177. 06 2291. 04 177. 3 2333. 56 177. 36 2379. 35 177. 51 2408. 79 177. 49 2431. 69 177. 13 2143. 93 176. 2 2179. 89 2147. 2 2189. 7 2137.39 177. 21 176.33 176. 09 2170.08 176. 09 2189. 7 176. 88 2235. 46 177. 15 2277. 96 177. 13 2327. 02 177. 27 2366. 27 177. 6 2405. 52 177. 63 2428. 42 177. 2 2448. 04 175. 62 2474. 21 171. 32 2516. 73 161 45 2563 176.38 176. 2 2179. 89 176. 9 2222. 39 177. 06 2271. 42 177. 22 2317. 21 177. 3 2356. 46 177. 38 2398. 98 177. 53 2425. 15 177. 2 2444. 77 176. 25 2202. 77 177. 15 2251. 81 177. 28 2304. 12 177. 27 2340. 1 177. 39 2385. 9 177. 61 2415. 33 177. 1 2434. 96 2219. 12 2268. 15 2307. 4 2346. 65 177.03 177. 16 177. 09 177. 15 177. 51 2395.71 2421.88 176.91 177. 01 2454. 58 174. 96 2484. 02 170. 05 2520 176.48 2457.85 2441.5 176. 4 176. 48 2457. 85 174. 3 2493. 83 168. 27 2526. 54 162. 76 2598. 5 170. 41 2624. 67 171. 37 2647. 56 170. 31 2699. 9 169. 68 2735. 88 168. 87 2794. 88 2441.3 2464.4 2500.38 2529.81 2605.04 2627.94 2654.11 177. 2 2444. 77 175. 8 2467. 67 171. 96 2504. 81 161. 99 2533. 08 167. 81 2608. 31 170. 96 2660. 65 173.12 174. 96 2484. 02 170. 05 2520 158. 7 2595. 23 170. 29 2618. 13 171. 43 2641. 02 170. 64 2686. 81 169. 92 2729. 34 168. 86 2781. 76 163.64 161.45 2563 163.53 161. 45 2563 169. 47 2611. 58 171. 3 2637. 75 170. 77 2673. 73 169. 93 2722. 79 169. 34 2775. 21 170.23 171.02 170. 24 2706. 44 170.05 2716. 25 169.63 2745.7 169. 41 2755.53 168.74 168. 72 2837. 5 168. 78 2870. 28 168. 64 2909. 63 168.63 2821.11 168. 36 2840. 78 2798.16 168.77 2811. 27 168.42 168. 21 2853. 89 168. 68 2893. 24 168. 58 2860. 45 168. 59 2899. 79 168. 75 2880. 12 168. 84 2919. 46 2847.33 168.62 2883.4 168.93 168. 84 2919. 46 169. 13 2978. 48 169. 3 3024. 38 169. 29 3073. 56 168. 82 3129. 29 168. 88 3191. 59 169. 01 3237. 49 169. 26 3286. 67 168. 59 2899. 79 168. 98 2958. 81 169. 17 3011. 26 169. 4 3044. 05 169. 01 3106. 34 168. 73 3155. 52 169. 01 3217. 82 168. 64 2909. 63 169. 17 2962. 09 169. 3 3017. 82 169. 46 3070. 28 169. 04 3122. 74 168. 78 3162. 08 168. 88 2939. 14 169. 15 3004. 71 169. 39 3040. 77 169. 19 3103. 07 2932. 58 2991. 59 169. 2 169. 22 169. 2 168. 77 3030.94 3096. 51 3135.85 168.8 3145.69 168.94 168. 78 3162. 08 169. 14 3227. 65 169. 31 3280. 11 169. 27 3319. 45 169. 77 3385. 03 170. 15 3450. 6 170. 3 3506. 33 171. 99 3548. 96 171. 57 3575. 18 173. 11 3607. 97 3207. 98 169.01 3198.15 169.01 3207. 98 3263. 72 3296. 5 3362. 07 3414. 53 3493. 22 3535. 84 3565. 35 169. 2 3276. 83 169. 2 3303. 06 169. 58 3375. 19 169. 13 3250.6 169.33 169. 20 3260. 67 169. 3 3332. 57 169. 82 3394. 86 170. 12 3453. 88 170. 38 3516. 17 172. 41 3552. 23 171. 41 3578. 46 3289.95 169. 23 169. 55 169.37 169.97 3352.24 169. 55 169. 92 170. 1 171. 24 172. 55 171. 98 3398.14 170.05 3434.2 170.2 3460. 43 3526 3558. 79 170.86 172. 54 171. 39 3588.3 3601.41 172.99 3611.25 173.16 173. 52 3637. 48 174. 27 3670. 26 3624.36 173.52 3630.92 173.68 3640.76 173.59 3650.59 173.96 3666.98 3660.43 174.09 174. 23 3673. 54 174.42 3676.82 174.39 175. 31 3709. 61 175. 97 3745. 67 174.75 3696.49 175.04 3703.05 175.39 3712.89 3686.66 175.52 175. 8 3739. 11 175.84 3732.56 175. 8 3755. 51 3726 176.07

```
Existing - 34R LOMR
                             176. 89 3768. 62
 3762.06
           176. 81 3765. 34
                                               176. 69 3775. 18
                                                                  175. 89 3778. 46
                                                                                    175.62
 3781.74
                                                                  176.61 3804.69
           175.79 3788.29
                             176.34 3794.85
                                                176. 34 3798. 13
                                                                                     176.8
           176. 97
177. 37
178. 77
181. 24
                                                                  177. 24 3830. 91
177. 94 3870. 26
179. 66 3906. 32
182. 21 3968. 62
 3807. 96
3840. 75
                                                177.01 3824.36
                   3814.52
                             177.08
                                      3817.8
                                                                                    177.57
                                     3857. 14
3893. 21
                   3850.59
                             177.62
                                                 177.7
                                                         3863.7
                                                                                    178.34
                                                       3899. 77
3958. 78
                                                179. 28
 3880.09
                   3883.37
                             178.82
                                                                                    179.92
                   3939. 11
                                     3952. 22
                                                182. 11
 3929.27
                              181.5
                                                                                    182.73
 3981.73
           183.27 3991.57
                             183.88 3994.84
                                                183.99 4004.68
                                                                  184.55 4014.52
                                                                                    185.27
           185. 75 4030. 91
                             186. 24 4034. 19
 4024.35
                                                186, 35
Manning's n Values
                             num=
          n Val
                             n Val
     Sťa
                        Sta
                                          Sta
                                                n Val
                      2520
                              . 045 2605. 04
                             Lengths: Left Channel
                                                                    Coeff Contr.
Bank Sta: Left
                   Ri ght
                                                         Ri ght
                                                                                     Expan.
           2520 2605.04
                                        1000
                                                 1840
                                                          1840
                                                                                       . 3
                                                                            . 1
                                    2
Ineffective Flow
                       num=
            Sta R
   Sta L
                       El ev
                             Permanent
       0
             1903
                        185
                                   F
                                   F
    3643 4034.19
                        185
Blocked Obstructions
                                         1
                            num=
   Sta L Sta R
                    El ev
  737. 32 1355. 9 180. 14
CROSS SECTION OUTPUT Profile #1%
* E.G. Elev (ft)
                               179. 25
                                         * Element
                                                                        Left OB *
                                                                                     Channel *
Right OB *
  Vel Head (ft)
                                         * Wt. n-Val.
                                  0.09
                                                                          0.100
                                                                                       0.045
  0. 100
* W.S. Elev (ft)
                                179.16
                                         * Reach Len. (ft)
                                                                      * 1000.00
                                                                                  * 1840.00
1840.00 *
                                                                      * 1279.67
                                                                                  * 1502.11
* Crit W.S. (ft)
                                172.30
                                         * Flow Area (sq ft)
9735. 22
* E.G. Slope (ft/ft)
                            *0.000313
                                         * Area (sq ft)
                                                                       2598.30
                                                                                  * 1502.11
*10456.17
 Q Total (cfs)
                            *17700.00
                                         * Flow (cfs)
                                                                         546. 17
                                                                                  * 5783.96
*11369.87
* Top Width (ft)
                            * 2661.90
                                         * Top Width (ft)
                                                                       1291. 35
                                                                                      85.04
1285. 52
 Vel Total (ft/s)
                                  1.41
                                         * Avg. Vel. (ft/s)
                                                                           0.43
                                                                                        3.85
   1. 17
 Max Chl Dpth (ft)
                                         * Hydr. Depth (ft)
                                                                           2.07
                                 20.46
                                                                                       17. 66
9.38 *
* Conv. Total (cfs)
*643003.7 *
                            *1000993.0
                                         * Conv. (cfs)
                                                                        30888.0
                                                                                   *327101.7
* Length Wtd. (ft)
                            * 1707.12
                                         * Wetted Per. (ft)
                                                                         618. 10
                                                                                      88. 70
1038.81
 Min Ch El (ft)
                                158.70
                                         * Shear (lb/sq ft)
                                                                           0.04
                                                                                        0.33
   0.18
 Al pha
                                  2.86
                                         * Stream Power (lb/ft s) *
                                                                           0.02
                                                                                        1.27
   0. 21
 Frctn Loss (ft)
                                  0.76
                                        * Cum Volume (acre-ft)
                                                                     * 1347.38
                                                                                     397.38
1570. 13
* C & E Loss (ft)
                                  0.03 * Cum SA (acres)
                                                                         241.87
                                                                                       20.46
 141. 30
*****
```

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
Page 27

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

## CROSS SECTION OUTPUT Profile #Floodway

*****************************	*****	*********	* *	*****	* * :	*****	* *
* E.G. Elev (ft)	* 179.82	* Element	*	Left OB	*	Channel	*
Right OB *  * Vel Head (ft)  0.100 *	* 0.10	* Wt. n-Val.	*	0. 100	*	0. 045	*
* W. S. Elev (ft) 1840.00 *	* 179.71	* Reach Len. (ft)	*	1000.00	*	1840. 00	*
* Cri t W.S. (ft) 8693.12 *	* 172. 28	* Flow Area (sq ft)	*	629. 31	*	1549. 36	*
* E.G. Slope (ft/ft) 8693.12 *	*0.000328	* Area (sq ft)	*	629. 31	*	1549. 36	*
* Q Total (cfs) *11039.70 *	*17700.00	* Flow (cfs)	*	421. 53	*	6238. 78	
* Top Width (ft) 837.96 *	* 1080.00	* Top Width (ft)	*	157. 00	*	85. 04	*
* Vel Total (ft/s) 1.27 *	* 1.63	* Avg. Vel. (ft/s)	*	0. 67	*	4. 03	*
* Max Chl Dpth (ft) 10.37 *	* 21.01	* Hydr. Depth (ft)	*	4. 01	*	18. 22	*
* Conv. Total (cfs) *609477.2 *	*977177.8	* Conv. (cfs)	*	23271.5	*;	344429. 1	
* Length Wtd. (ft) 848.20 *	* 1702.10	* Wetted Per. (ft)	*	160. 29	*	88. 70	*
* Min Ch El (ft) 0.21 *	* 158.70	* Shear (Ib/sq ft)	*	0. 08	*	0. 36	*
* Al pha 0. 27 *	* 2.54	* Stream Power (Ib/ft s)	*	0. 05	*	1. 44	*
* Frctn Loss (ft) 926.33 *	* 0.79	* Cum Volume (acre-ft)	*	364. 73	*	408. 13	*
* C & E Loss (ft) 51.74 *	* 0.03	* Cum SA (acres)	*	34. 27	*	20. 17	*
******	*****	********	**	*****	* * :	*****	* *

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

## CROSS SECTION OUTPUT Profile #10%

^^^^^		^^^^^	^ ^ ^ ^		` ^ ^	^^^^	^ ^
*****							
* E.G. Elev (ft)	* 175.46	* Element	*	Left OB	*	Channel	*
Right OB * ` ´							
* Vel Head (ft)	* 0.08	* Wt. n-Val.	*	0. 100	*	0. 045	*
0. 100 *							
* W.S. Elev (ft)	* 175. 38	* Reach Len. (ft)	*	1000. 00	*	1840. 00	*
1840. 00 *							
* Crit W.S. (ft)	* 168. 44	* Flow Area (sq ft)	*	135. 84	*	1180. 58	*
5810. 71 *							
* E.G. Slope (ft/ft)	*0. 000315	* Area (sq ft)	*	181. 27	*	1180. 58	*
5868. 08 *		# <b>F</b> I			.1.		
* Q Total (cfs)	* 8780.00	* Flow (cfs)	*	69. 09	*	3884. 20	*
4826. 71 *	. 1000 70	* T W 111 (C)		4.0.44	.1.	0= 04	
* Top Width (ft)	* 1328.79	* Top Width (ft) Page 28	*	140. 41	*	85. 04	*

```
1103. 34 *
                          1.23 * Avg. Vel. (ft/s)
                                                          0.51 * 3.29 *
 Vel Total (ft/s)
  0.83
 Max Chl Dpth (ft)
                         16.67 * Hydr. Depth (ft)
                                                          2.72 *
                                                                   13.88
5. 60 *
* Conv. Total (cfs)
*272072. 9 *
                      *494912.7 * Conv. (cfs)
                                                         3894.5
                                                                *218945.4
* Length Wtd. (ft)
                      * 1770.84 * Wetted Per. (ft)
                                                         50.68
                                                                   88.70
1038. 81
 Min Ch El (ft)
                      * 158.70 * Shear (lb/sq ft)
                                                          0.05
                                                                    0.26
  0. 11
                          3.41 * Stream Power (lb/ft s) *
* Al pha
                                                          0.03
                                                                    0.86
  0.09
* Frctn Loss (ft)
                          0.76 * Cum Volume (acre-ft)
                                                         596.88
                                                                   297.07
730.58
* C & E Loss (ft)
                          0.02 * Cum SA (acres)
                                                        101. 20 *
                                                                   20.59 *
126. 42 *
```

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT									
******	*****	*******	**	*****	* * ;	* * * * * * * * *	* *		
* E.G. Elev (ft)	* 178. 12	* Element	*	Left OB	*	Channel	*		
Right OB *  * Vel Head (ft)  0.100 *	* 0.09	* Wt. n-Val.	*	0. 100	*	0. 045	*		
* W. S. Elev (ft) 1840.00 *	* 178.03	* Reach Len. (ft)	*	1000.00	*	1840. 00	*		
* Crit W.S. (ft) 8569.02 *	* 171.87	* Flow Area (sq ft)	*	652. 74	*	1406. 57	*		
* E.G. Slope (ft/ft) 9027.11 *	*0.000331	* Area (sq ft)	*	1406. 51	*	1406. 57	*		
* Q Total (cfs) 9453.80 *	*15000.00	* Flow (cfs)	*	214. 54	*	5331. 66	*		
* Top Width (ft) 1260.18 *	* 2241.16	* Top Width (ft)	*	895. 95	*	85. 04	*		
* Vel Total (ft/s) 1.10 *	* 1.41	* Avg. Vel. (ft/s)	*	0. 33	*	3. 79	*		
* Max Chl Dpth (ft) 8.26 *	* 19.33	* Hydr. Depth (ft)	*	1. 33	*	16. 54	*		
* Conv. Total (cfs) *519823.6 *	*824785. 1	* Conv. (cfs)	*	11796. 6	* 2	293165. 0			
* Length Wtd. (ft) 1038.81 *	* 1724.42	* Wetted Per. (ft)	*	490. 72	*	88. 70	*		
* Min Ch El (ft) 0.17 *	* 158.70	* Shear (Ib/sq ft)	*	0. 03	*	0. 33	*		
* Al pha 0. 19 *	* 2. 95	* Stream Power (Ib/ft s)	*	0. 01	*	1. 24	*		
* Frctn Loss (ft) 1308.43 *	* 0.80	* Cum Volume (acre-ft)	*	1034. 87	*	366. 46	*		
* C & E Loss (ft) 137.62 *	* 0.02	* Cum SA (acres)	*	193. 31	*	20. 46	*		
137.02	*****	*****	**	*****	**	*****	**		
****									

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

## CROSS SECTION OUTPUT Profile #0.2%

TOTTTE #U. 2%		**	****	* * :	*****	* *
* 182. 25	* Element	*	Left OB	*	Channel	*
* 0.08	* Wt. n-Val.	*	0. 100	*	0. 045	*
* 182. 17	* Reach Len. (ft)	*	1000.00	*	1840. 00	*
* 173.33	* Flow Area (sq ft)	*	3139. 20	*	1758. 41	
*0. 000263	* Area (sq ft)	*	8930. 33	*	1758. 41	
*25700.00	* Flow (cfs)	*	2233. 05	*	6891.09	
* 3956.14	* Top Width (ft)	*	2520. 00	*	85. 04	*
* 1.45	* Avg. Vel. (ft/s)	*	0. 71	*	3. 92	*
* 23.47	* Hydr. Depth (ft)	*	5. 09	*	20. 68	*
*1586197. 0	* Conv. (cfs)		*137823.5	,	*425315. 9	
* 1643.44	* Wetted Per. (ft)	*	618. 10	*	88. 70	*
* 158.70	* Shear (Ib/sq ft)	*	0.08	*	0. 32	*
* 2.50	* Stream Power (Ib/ft s)	*	0.06	*	1. 27	*
* 0.61	* Cum Volume (acre-ft)	*	2503. 39	*	477. 71	*
* 0.02	* Cum SA (acres)	*	403. 25	*	21. 69	*
*****	******	**	****	* * :	*****	* *
	**********  * 182. 25  * 0. 08  * 182. 17  * 173. 33  *0. 000263  *25700. 00  * 3956. 14  * 1. 45  * 23. 47  *1586197. 0  * 1643. 44  * 158. 70  * 2. 50  * 0. 61  * 0. 02	**************************************	**************************************	**************************************	* 182. 25 * El ement	* 182. 25 * El ement

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth

with the lowest, valid, energy was used.

### CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1 RS: 285

I NPUT

Description: XS 285

INSERTED CROSS-SECTION TO EVALUATE IMPACT OF PROP. SITE

(5/21/01)

Station Elevation Data num= 480

Sta Elev Sta El ev Sta El ev Sta El ev Sta El ev Page 30

Existing - 34R LOMR 181. 21 180. 55 180. 01 36.08 181.45 13.12 16. 4 181.28 32.8 180.96 180.75 0 59. 04 91. 84 121. 36 167. 28 65. 6 98. 4 131. 2 180. 13 179. 46 179. 37 42. 64 75. 44 108. 24 180. 53 180. 04 52.48 180.47 179.95 72.16 179. 61 179. 51 82 101.68 179.47 179. 63 178. 78 179. 65 178. 87 144. 32 180. 4 179.01 118.08 154.16 157.44 178.8 170.56 178.88 178.63 196. 8 232. 89 291. 93 178. 4 177. 57 203. 37 249. 29 213. 21 272. 25 183.68 178.68 177. 99 178.08 216.49 177.92 275. 53 177. 25 176. 61 175. 23 226.33 177.75 176.61 298. 49 175. 97 285.37 176.36 175.45 311.61 318.17 174.77 291. 93 328. 01 354. 25 373. 93 403. 45 436. 25 472. 33 511. 69 547. 77 587. 13 623. 22 6731. 46 176. 36 174. 64 174. 48 175. 09 175. 3 175. 47 175. 25 173. 73 174. 82 175. 24 175. 32 175. 76 331. 29 357. 53 380. 49 410. 01 324. 73 347. 69 370. 65 396. 89 341. 13 367. 37 390. 33 429. 69 174. 43 174. 69 334. 57 364. 09 173. 98 173.92 174.87 174.87 387. 05 423. 13 455. 93 492. 01 175. 15 175. 28 175. 6 175. 64 175. 08 175. 48 175. 7 175. 72 175. 2 175. 5 462. 49 498. 57 432. 97 469. 05 442. 81 485. 45 175. 49 175.49 175. 81 176. 56 518. 25 554. 33 508.41 175.81 175.87 175. 78 524.81 534.65 176.06 176.18 176.14 176.52 564.17 567.45 176.49 541.21 176. 14 176. 95 177. 24 178. 38 179. 66 180. 11 176. 73 176. 73 177. 12 177. 55 176. 84 574. 01 593. 69 603.54 176. 84 610. 1 176.77 603. 54 639. 62 705. 22 764. 26 800. 34 842. 98 888. 9 176. 64 177. 42 178. 91 179. 91 180. 17 629. 78 688. 82 646. 18 711. 78 616.66 177. 17 177.44 178. 41 179. 91 180. 09 656.02 179.28 731. 46 787. 22 826. 58 869. 22 179. 55 180. 01 757. 7 793. 78 179.99 721. 62 780. 66 770.82 806. 9 852. 82 180.18 179. 99 179. 75 820.02 180. 13 836. 42 180.03 180.08 179.86 859.38 179.82 179.83 875.78 179.7 902.02 179.47 918. 42 954. 5 980. 74 178. 9 179.3 179. 23 934.82 178.47 908.58 924.98 941.38 178.31 177. 87 964. 34 177. 13 987. 31 176. 66 1029. 95 176. 49 1066. 03 177. 32 1105. 39 177. 88 1151. 31 178. 31 1200. 51 179. 91 1243. 13 180. 38 1279. 18 179. 85 1321. 78 177. 81 1348 178. 78 1393. 87 180. 06 1456. 13 180. 54 1495. 46 181. 12 1541. 33 181. 35 1590. 49 181. 09 1619. 98 180. 76 1669. 13 178. 02 177. 25 177. 87 177. 13 177. 57 967. 62 177. 01 993. 87 177. 35 970. 9 176. 98 1006. 99 964.34 947.94 177.26 177. 01 993. 87 176. 48 1036. 51 176. 57 1072. 59 177. 3 1111. 95 177. 88 1157. 87 178. 45 1210. 35 180. 15 1249. 69 180. 33 1295. 57 179. 47 1328. 33 177. 84 1354. 55 179. 34 1397. 15 180. 14 1469. 24 180. 65 1502. 01 181. 08 1547. 89 181. 44 1600. 32 181. 2 1639. 64 180. 46 1675. 69 977.46 176.79 177. 25 980. 74 176. 8 1023. 39 176. 38 1062. 75 177. 16 1098. 83 177. 61 1148. 03 178. 23 1184. 11 179. 28 1239. 86 180. 37 1266. 07 176. 98 1006. 99 176. 42 1046. 35 176. 94 1075. 87 177. 36 1118. 51 178. 09 1167. 71 178. 83 1216. 91 180. 34 1256. 24 180. 1 1302. 12 1013. 55 1052. 91 1088. 99 1128. 35 1170. 99 176. 19 177. 06 177. 59 178. 26 178.97 1226.75 180.44 1259.52 180.17 180. 37 1266. 07 179. 96 1315. 23 177. 94 1344. 72 178. 63 1374. 21 179. 99 1436. 47 180. 48 1488. 9 180. 89 1538. 06 179. 01 1334. 89 178. 02 1361. 1 179. 36 1416. 81 180. 38 1472. 52 178. 1 178. 37 1308.67 1338. 17 1367. 66 1429. 92 1475. 8 1521. 67 179.72 180.33 180. 68 1518. 4 181. 18 1559. 91 181. 26 1603. 6 180. 79 1646. 2 180.91 181.38 1573. 19 181. 41 1582. 64 181.55 181. 16 1613. 43 180. 8 1662. 58 180. 48 1692. 07 180. 09 1724. 84 179. 98 1773. 99 179. 92 1810. 04 179. 74 1865. 75 179. 79 1888. 69 181. 01 1928. 01 180. 4 1973. 89 181. 71 2016. 49 179. 22 2042. 71 180. 04 2072. 22 178. 36 2101. 72 178. 29 2137. 78 177. 99 2164 178. 25 2200. 06 178. 23 2229. 56 178. 16 2265. 62 181. 09 1619. 98
180. 76 1669. 13
180. 43 1695. 35
179. 92 1731. 39
179. 95 1780. 55
179. 89 1819. 87
179. 25 1869. 03
180. 34 1898. 52
180. 8 1937. 84
181. 06 1980. 44
181. 5 2023. 04
179. 58 2045. 99
179. 85 2082. 05
178. 19 2108. 27
178. 3 2144. 33
177. 93 2170. 56
178. 18 2203. 34
178. 12 2236. 12
178. 1 2272. 18 1610.15 181. 16 1613. 43 180.74 180. 46 1675. 69 180. 29 1701. 9 179. 83 1744. 5 180.44 1678.96 1652.75 180.54 180. 44 1678. 96 180. 26 1708. 46 179. 97 1747. 78 179. 9 1796. 93 179. 91 1846. 09 179. 3 1878. 86 180. 93 1911. 62 180. 41 1954. 22 181. 21 1993. 55 179. 53 2032. 88 180. 02 2062. 38 1682. 24 180.16 1718. 29 180.04 1754. 33 1803. 49 1855. 92 1882. 13 179. 86 1787. 1 179. 95 1826. 43 179. 21 1872. 3 180. 77 1905. 07 179.83 179. 96 179. 75 180. 92 180. 77 1905. 07 180. 68 1947. 67 181. 32 1990. 27 180. 38 2029. 6 179. 61 2055. 83 178. 9 2085. 33 178. 19 2118. 11 178. 22 2150. 89 178. 22 2177. 11 178. 24 2209. 89 178. 08 2245. 95 178. 14 2278 73 1921.46 180.29 1960.78 181.25 2013.21 179.23 179. 53 2032. 88 180. 02 2062. 38 178. 53 2088. 61 178. 39 2124. 66 177. 93 2154. 17 178. 32 2183. 67 178. 23 2219. 73 178. 31 2252. 51 2036. 16 2068. 94 180.09 178.37 2000. 74 2091. 88 2131. 22 2160. 72 2193. 5 178.57 177.89 178.23 178. 13 2226.28 178.11 178. 1 2272. 18 177. 97 2308. 24 178. 14 2278. 73 177. 87 2314. 79 178. 32 2288. 57 178. 18 2318. 07 2259.06 178. 16 2265. 62 178.47 178. 28 2301. 68 2295.12 178.02 177. 86 2334. 46 178. 14 2341. 02 178. 01 2367. 24 178. 14 2370. 52 178. 18 2350. 85 178. 12 2377. 07 177.96 2327. 9 2324.63 177.98 178.06 2363.96 2357.41 177.94

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Existing - 34R LOMR
                                                                         177. 85 2403. 3 177. 77 2409. 85
177. 72 2445. 91 177. 35 2452. 47
176. 46 2478. 69 176. 21 2481. 97
175. 16 2511. 47 174. 88 2514. 75
174. 35 2540. 98 174. 11 2547. 53
                                                 178 2400.02
  2383.63
                 178. 09 2386. 91
                                                                                                                                   178.01
                 178. 09 2386. 91
177. 74 2422. 97
177. 1 2468. 86
176. 07 2501. 64
174. 77 2531. 14
173. 41 2586. 87
  2416.41
                                              177. 87
                                                            2432.8
                                                                                                                                    177. 3
                                              176. 52 2475. 42
175. 52 2508. 2
174. 4 2534. 42
173. 1 2590. 15
                                                                          176. 46 2478. 69
175. 16 2511. 47
174. 35 2540. 98
173. 08 2599. 98
  2459.03
                                                                                                                                   176. 21
  2488. 53
2518. 03
                                                                                                                                    174.72
                                                                                                                                    174.09
  2577.04
                                                                                                       173. 19 2606. 54
                                                                                                                                    172.9
                  172. 8 2622. 93
173. 17 2655. 71
                                                                                                       172. 91 2642. 6
173. 39 2672. 1
  2616.37
                                              172.94 2636.04
                                                                          172.88 2639.32
                                                                                                                                    173.09
                                             172. 94 2636. 04
173. 12 2658. 99
173. 79 2681. 93
173. 81 2711. 44
173. 76 2737. 66
172. 9 2763. 88
171. 06 2799. 94
170. 31 2819. 61
169. 87 2862. 23
                                                                          173. 33 2662. 26
  2649.15
                                                                                                                                    173.45
                  173.69 2678.66
                                                                                                       173.83 2691.77
  2675.38
                                                                           173. 7 2685. 21
                                                                                                                                    174.23
                 173. 09 2078. 66
174. 21 2704. 88
173. 92 2731. 1
173. 35 2760. 61
171. 38 2790. 11
170. 26 2816. 33
169. 9 2849. 11
                                                                          173. 7 2885. 21
173. 8 2717. 99
173. 93 2740. 94
172. 55 2767. 16
170. 47 2803. 22
170. 21 2829. 45
170. 15 2868. 78
                                                                                                       174. 02 2721. 27
173. 71 2750. 77
172. 38 2777
170. 18 2806. 5
  2695.05
                                                                                                                                    174.07
  2724.55
                                                                                                                                    173.49
  2754.05
                                                                                                                                    171.59
  2780.27
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  2809. 78
                                                                                                       170. 32 2839. 28
170. 35 2875. 34
                                                                                                                                    170.19
  2845.84
                                                                                                                                   170.06
  2878. 62
                                                                                                      169. 72 2914. 67
169. 17 2950. 73
                  170.04 2895.01
                                              169.68 2901.56
                                                                          169. 83 2908. 12
                                                                                                                                   169.36
                 170. 04 2895. 01
169. 26 2931. 06
169. 02 2957. 29
167. 82 2993. 35
169. 59 3024. 36
170. 24 3057. 13
167. 57 3076. 79
159. 76 3093. 17
161. 34 3157. 2
                                              169. 46 2937. 62
                                                                          169. 37 2944. 18
  2917.95
                                                                                                                                   169, 21
                                                                          168. 17 2970. 4
                                              168. 61 2963. 85
167. 49 2996. 63
                                                                                                       168. 02 2976. 96
  2954.01
                                                                                                                                   168.05
                                                                                                      168. 02 2976. 96
167. 54 3006. 46
170. 36 3040. 74
169. 14 3070. 23
162. 08 3086. 62
159. 65 3155. 44
165. 02 3167. 03
 2986. 79
3013. 15
3047. 29
3073. 51
3089. 9
                                                                          167. 43 2999. 9
                                                                                                                                   168.35
                                               170 3030.91
                                                                          170. 16 3034. 19
                                                                                                                                   170.25
                                                                         169. 56 3066. 96
163. 4 3083. 34
158. 2 3152. 16
162. 66 3163. 75
                                              169. 96 3063. 68
166. 09 3081. 19
159. 71 3124
161. 36 3160. 48
                                                                                                                                    168.54
                                                                                                                                    160.38
                                                                                                                                    159.93
  3156.75
                                                                                                                                    166.97
                                                                                                       168. 41 3193. 25
                                                                                                                                   167.97
  3170.31
                  168.72 3173.58
                                              169. 3 3180. 14
                                                                          168. 72 3186. 69
                                              168. 14 3209. 63
169. 3 3232. 57
                                                                          167. 94 3212. 91
169. 4 3239. 12
                  167.97 3203.08
  3196.52
                                                                                                       168. 12 3216. 18
                                                                                                                                    168.49
                                                                                                       169. 19 3245. 68
  3222.74
                  169. 1 3226. 02
                                                                                                                                    169.23
                                              169. 3 3232. 57
168. 7 3278. 45
168. 83 3307. 94
171. 15 3337. 43
179. 01 3357. 09
181. 97 3376. 76
184. 86 3402. 97
                                                                                                      169. 19 3245. 68
168. 76 3291. 56
169. 15 3321. 05
175. 26 3343. 99
180. 61 3363. 65
183. 68 3383. 31
185. 9 3412. 8
                 168. 92 3271. 89
168. 63 3304. 66
170. 29 3330. 88
176. 83 3353. 82
                                                                          168. 84 3285
169. 04 3317. 77
173. 98 3340. 71
179. 87 3360. 37
  3258. 79
3298. 11
                                                                                                                                   168.81
                                                                                                                                   169.42
  3327. 6
3347. 26
                                                                                                                                   176.11
                                                                                                                                    181.12
                 181. 56 3373. 48
184. 53 3396. 42
                                                                          182. 89 3380. 03
   3370.2
                                                                                                                                    184.07
  3389.86
                                                                          185. 63 3406. 25
                                                                                                                                   186.17
                                                                          187. 44 3455. 4 188. 07 3465. 24 188. 31
  3422.63
                 186, 46, 3429, 19
                                              186. 96 3439. 02
Manning's n Values
                                              num=
n Val
                   . 1 3076. 79 . 045 3167. 03 . 1
Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. 3076.79 3167.03 220 295 320 .1
Ineffective Flow num= 2
                                                                                                                                     Expan.
                                                                                                                                     . 3
     Sta L Sta R
                                   Elev Permanent
                                185
185
                                            F
                    2069
                                                     F
       3399 3465. 24
Blocked Obstructions num=
                                                             1
Sta L Sta R Elev
   807. 14 1460. 71 180. 1
CROSS SECTION OUTPUT Profile #1%
                                                          * E.G. Elev (ft)
Right OB *
                                         * 178.46 * Element
                                                                                                                 Left OB *
                                                                                                                                     Channel *
* Vel Head (ft)
0.100 *
* W.S. Elev (ft)
                                          * 0.34
                                                                * Wt. n-Val.
                                                                                                                   0.100
                                                                                                                                       0.045
                                         * 178. 12
                                                              * Reach Len. (ft)
                                                                                                                 220.00
                                                                                                                                     295.00
320.00 *
* Crit W.S. (ft)
                              * 171.92 * Flow Area (sq ft)
                                                                                                          * 3937.86
                                                                                                                                * 1628.21
1583. 36 *
* E.G. Slope (ft/ft) *0.000763 * Area (sq ft)
                                                                                                            * 4864.07 * 1628.21
                                                                   Page 32
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1502 2/ *		EXI	5ι	TING - 34K LOWK					
1583. 36  * * Q Total (cfs) 2708. 51  *	*1	7700. 00	*	Flow (cfs)	*	5053. 99	*	9937. 50	*
* Top Width (ft) 184.12 *	*	1547. 03	*	Top Width (ft)	*	1272. 67	*	90. 24	*
* Vel Total (ft/s) 1.71 *	*	2. 48	*	Avg. Vel. (ft/s)	*	1. 28	*	6. 10	*
* Max Chl Dpth (ft) 8.60 *	*	19. 92	*	Hydr. Depth (ft)	*	4. 91	*	18. 04	*
* Conv. Total (cfs) 98036.5 *	*6	40664. 2	*	Conv. (cfs)	*1	182932. 8	*3	59694.8	*
* Length Wtd. (ft) 186.15 *	*	279. 08	*	Wetted Per. (ft)	*	803. 22	*	94. 09	*
* Min Ch El (ft) 0.41 *	*	158. 20	*	Shear (Ib/sq ft)	*	0. 23	*	0. 82	*
* Al pha 0. 69 *	*	3. 56	*	Stream Power (Ib/ft s)	*	0. 30	*	5. 03	*
* Frctn Loss (ft) 1315.85 *	*	0. 21	*	Cum Volume (acre-ft)	*	1261. 73	*	331. 27	*
* C & E Loss (ft) 110.26 *	*	0. 01	*	Cum SA (acres)	*	212. 44	*	16. 76	*
******	***	*****	* * :	* * * * * * * * * * * * * * * * * * * *	***	*****	***	*****	* *

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Warning: Divided flow computed for this cross-section. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

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^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	^ ^ ^	^ ^ ^ ^ ^ ^ ^ ^ ^ ^	^ ^	^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	^ ^	^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	^ ^ ′		^ ^
*****									
* E.G. Elev (ft)	*	179. 00	*	Element	*	Left OB	*	Channel	*
Right OB *	*	0.20	*	Wt n Vol	*	0 100	*	0.045	*
* Vel Head (ft) 0.100 *		0. 38		Wt. n-Val.		0. 100		0. 045	
* W.S. Elev (ft)	*	178. 62	*	Reach Len. (ft)	*	220.00	*	295.00	*
320.00 *									
* Crit W.S. (ft)	*	171. 93	*	Flow Area (sq ft)	*	3290. 90	*	1673. 20	*
1010. 10 *	40	000770		A ( SI)		0000 00		4.70.00	*
* E.G. Slope (ft/ft)	^0.	. 000778	^	Area (sq ft)	^	3290. 90	^	1673. 20	^
1010. 10 *	*1	7700. 00	*	Flow (ofc)	*	5389. 89	* 1	10500. 80	*
* Q Total (cfs) 1809.31 *	1	7700.00		Flow (cfs)		5389.89		10500. 80	
* Top Width (ft)	*	605. 00	*	Top Width (ft)	*	412. 79	*	90. 24	*
101. 97 *		003.00		rop wrath (it)		412.77		70. 24	
* Vel Total (ft/s)	*	2. 96	*	Avg. Vel. (ft/s)	*	1. 64	*	6. 28	*
1. 79 *		2. 70		7.trg. 131. (1.t7.3)				0. 20	
<pre>* Max Chl Dpth (ft)</pre>	*	20. 42	*	Hydr. Depth (ft)	*	7. 97	*	18. 54	*
9. 91 * ' ` ` ´									
* Conv. Total (cfs)	*6	34476. 6	*	Conv. (cfs)	*	193206. 9	* 3	376413. 1	*
64856.7 *				45.3					
* Length Wtd. (ft)	*	276. 79	*	Wetted Per. (ft)	*	419. 03	*	94. 09	*
112.45 *	*	150 00	4		*	0.00	*	0.07	*
* Min Ch El (ft)	^	158. 20	^	Shear (Ib/sq ft)	^	0. 38	^	0. 86	^
0. 44 * * Al pha	*	2. 79	*	Stream Power (lb/ft s)	*	0. 62	*	5. 42	*
0. 78 *		2. 19		Stream Fower (10/11 S)		0. 62		5. 42	
* Frctn Loss (ft)	*	0. 21	*	Cum Volume (acre-ft)	*	319. 74	*	340. 07	*
721. 39 *		0.21		cam vorame (acre rr)		317.74		340.07	
* C & E Loss (ft)	*	0.00	*	Cum SA (acres)	*	27. 75	*	16. 47	*
31.89 *		0.00		22 27. (22. 22)					
******	***	*****	* * :	******	* *	*****	* * *	*****	* *
******									

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

*******	***	******	* *	* * * * * * * * * * * * * * * * * * * *	* * :	*****	* * >	*****	* *
*****									
* E.G. Elev (ft)	*	174. 68	*	Element	*	Left OB	*	Channel	*
Right OB *									
* Vel Head (ft)	*	0. 27	*	Wt. n-Val.	*	0. 100	*	0. 045	*
0. 100_ *									
* W.S. Elev (ft)	*	174. 41	*	Reach Len. (ft)	*	220. 00	*	295. 00	*
320.00 *	4	4// 70	4	FI (	4	1/01 00	4	1000 07	*
* Cri t W. S. (ft)	^	166. 72	^	Flow Area (sq ft)	^	1691. 20	^	1292. 87	^
922.97 * * F.C. Slope (ft/ft)	* (	0. 000666	*	Aroa (sa ft)	*	1698. 89	*	1292. 87	*
* E.G. Slope (ft/ft) 922.97 *	(	. 000000		Area (sq ft)		1090. 09		1292.07	
* Q Total (cfs)	*	8780.00	*	Flow (cfs)	*	1376. 79	*	6322. 14	*
1081.07 *		0700.00		1100 (013)		1370.77		0022. 14	
* Top Width (ft)	*	826. 30	*	Top Width (ft)	*	564. 57	*	90. 24	*
171. 49 *									
* Vel Total (ft/s)	*	2. 25	*	Avg. Vel. (ft/s)	*	0. 81	*	4. 89	*
1. 17 * ` ` `									
<pre>* Max Chl Dpth (ft)</pre>	*	16. 21	*	Hydr. Depth (ft)	*	3. 10	*	14. 33	*
5. 38 *									
* Conv. Total (cfs)	* 3	340126. 1	*	Conv. (cfs)	*	53335.3	* 2	244911. 5	*
41879.3 *	4	007.70	4	Western Deve (CL)	*	E44 07	4	04.00	*
* Length Wtd. (ft)	*	287. 79	^	Wetted Per. (ft)	^	546. 97	*	94. 09	^
172.97 * * Min Ch El (ft)	*	158. 20	*	Shoor (lh/sq ft)	*	0. 13	*	0. 57	*
0.22 *		136. 20		Shear (Ib/sq ft)		0. 13		0.57	
* Al pha	*	3. 46	*	Stream Power (lb/ft s)	*	0. 10	*	2. 80	*
0. 26 *		3. 40		Stream rower (16/11/3)		0. 10		2.00	
* Frctn Loss (ft)	*	0. 18	*	Cum Volume (acre-ft)	*	575. 30	*	244.83	*
587. 15 *		0		(ac. c . t)		0,0.00			
* C & E Loss (ft)	*	0. 01	*	Cum SA (acres)	*	93. 10	*	16. 89	*
99. 49 * ` ´				,					
********************									

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

## CROSS SECTION OUTPUT Profile #2%

\*\*\*\*\*

*************************									
*****									
* E.G. Elev (ft)	* 177.30	* Element	*	Left OB	*	Channel	*		
Right OB *									
* Vel Head (ft)	* 0.33	* Wt. n-Val.	*	0. 100	*	0. 045	*		
0. 100_ *									
* W.S. Elev (ft)	* 176. 98	* Reach Len. (ft)	*	220. 00	*	295. 00	*		
320.00 *	* 171 10	* Flaw Area (az £+)	*	210/ 22	*	1504 //	*		
* Crit W.S. (ft) 1374.08 *	* 171.13	* Flow Area (sq ft)		3186. 23		1524. 66			
* E.G. Slope (ft/ft)	*0. 000765	* Area (sq ft)	*	3637. 82	*	1524. 66	*		
1374. 08 *	0.000703	Area (sq rt)		3037.02		1324.00			
* Q Total (cfs)	*15000.00	* Flow (cfs)	*	3913. 41	*	8917. 19	*		
2169. 41 *		(6.6)		07.01.1		• • • • • • • • • • • • • • • • • • • •			
* Top Width (ft)	* 1241.40	* Top Width (ft)	*	970. 49	*	90. 24	*		
180. 67 * ` ´									
* Vel Total (ft/s)	* 2.47	* Avg. Vel. (ft/s)	*	1. 23	*	5. 85	*		
1. 58 *									

```
Existing - 34R LOMR
* Max Chl Dpth (ft)
                           18. 78
                                 * Hydr. Depth (ft)
                                                              5. 18 *
                                                                       16. 90
  7. 61
* Conv. Total (cfs)
                       *542297.6 * Conv. (cfs)
                                                         *141482.0
                                                                   *322384.7
78430.9
                          280.89 * Wetted Per. (ft)
                                                            616. 78
* Length Wtd. (ft)
                                                                       94.09
182. 51
* Min Ch El (ft)
                          158. 20
                                 * Shear (lb/sq ft)
                                                              0.25
                                                                        0.77
  0.36
                            3.47
 Al pha
                                 * Stream Power (lb/ft s) *
                                                              0.30
                                                                        4.53
  0.57
* Frctn Loss (ft)
                            0. 21
                                 * Cum Volume (acre-ft)
                                                            976.97
                                                                       304.55
1088. 75
* C & E Loss (ft)
                            0.01 * Cum SA (acres)
                                                            171.89
                                                                        16.76
***********************************
*****
```

Warning: Divided flow computed for this cross-section. Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT									
****									
* E.G. Elev (ft)	* 181.62	* Element	* Left OB	* Channel *					
Right OB *  * Vel Head (ft)  0.100 *	* 0.30	* Wt. n-Val.	* 0. 100	* 0.045 *					
* W. S. Elev (ft) 320.00 *	* 181.32	* Reach Len. (ft)	* 220.00	* 295.00 *					
* Cri t W. S. (ft) 2191.49 *	* 173.49	* Flow Area (sq ft)	* 7117.96	* 1917.00 *					
* E.G. Slope (ft/ft)	*0.000634	* Area (sq ft)	*11406. 21	* 1917.00 *					
2191.49 * * 0 Total (cfs)	*25700.00	* Flow (cfs)	* 9794.29	*11888. 61 *					
* Top Width (ft)	* 3292.26	* Top Width (ft)	* 3002.37	* 90. 24 *					
* Vel Total (ft/s)	* 2.29	* Avg. Vel. (ft/s)	* 1.38	* 6. 20 *					
1.83 * * Max Chl Dpth (ft) 10.98 *	* 23.12	* Hydr. Depth (ft)	* 7.06	* 21. 24 *					
* Conv. Total (cfs) *159552.8 *	*1020762.0	* Conv. (cfs)	*389013.4	*472196. 2					
* Length Wtd. (ft)	* 272. 21	* Wetted Per. (ft)	* 1009.10	* 94.09 *					
* Min Ch El (ft)	* 158. 20	* Shear (Ib/sq ft)	* 0. 28	* 0.81 *					
* Al pha	* 3.63	* Stream Power (lb/ft s)	* 0.38	* 5.00 *					
0.79 * * Frctn Loss (ft) 1922.98 *	* 0.17	* Cum Volume (acre-ft)	* 2269.96	* 400.08 *					
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 339.86	* 17.99 *					
137.00	*****	******	****	*****					
*****									

Warning: Divided flow computed for this cross-section. Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RI VER: RI VER-1 REACH: Reach-1 RS: 280.55

Description: XS 280.55 (LETTERED CROSS-SECTION V)
Station Elevation Data num= 480

```
Existing - 34R LOMR
181. 39 2092. 39 181. 68 210
181. 11 2131. 71 180. 19 213
179. 73 2167. 76 180. 05 217
179. 12 2207. 08 178. 25 221
177. 92 2230. 02 178. 14 223
178. 03 2269. 35 178. 07 227
                            181. 24 2082. 56
181. 28 2125. 16
178. 99 2157. 93
179. 91 2200. 53
177. 64 2226. 75
177. 96 2259. 52
                                                                                                                         181. 68 2108. 77
180. 19 2134. 99
                                                                                                                                                                       181. 43 2115. 33
179. 34 2138. 27
            2076
                                                                                                                                                                                                                      181. 17
   2121.88
                                                                                                                                                                                                                       178.97
                                                                                                                                                                        179. 34 2138. 27
180. 15 2187. 42
177. 89 2216. 92
178. 19 2243. 13
178. 16 2289. 01
177. 96 2315. 23
177. 88 2338. 17
177. 98 23410. 26
                                                                                                                         180. 05 2177. 59
178. 25 2210. 36
178. 14 2236. 58
178. 07 2279. 18
   2144.82
                                                                                                                                                                                                                        180.02
   2190. 7
2220. 19
                                                                                                                                                                                                                        177.58
                                                                                                                                                                                                                        178.03
   2256.24
                                                                                                                                                                                                                          178. 1
                                                                                                                         178. 06 2311. 95
178 2331. 61
                            178. 01 2302. 12
177. 81 2325. 06
                                                                           178. 11 2308. 67
177. 98 2328. 34
                                                                                                                                                                                                                        178.01
   2295.57
   2318.51
                                                                                                                                                                                                                        178.05
                                                                          177. 96 2328. 34
178. 06 2361. 11
177. 65 2397. 16
177. 15 2439. 76
176. 58 2472. 53
175. 49 2498. 74
175. 15 2524. 96
173. 95 2570. 84
                            177. 81 2354. 55
                                                                                                                         178.04 2364.38
   2344.72
                                                                                                                                                                                                                        177.89
                            177. 81 2354. 55
177. 8 2393. 88
177. 46 2433. 2
176. 63 2465. 97
175. 53 2495. 47
175. 3 2518. 41
174. 28 2564. 29

    178. 04
    2364. 38
    177. 94
    2384. 05

    177. 65
    2403. 71
    177. 88
    2410. 26

    176. 89
    2443. 03
    176. 97
    2452. 87

    176. 16
    2479. 08
    176. 06
    2485. 64

    175. 61
    2502. 02
    175. 38
    2505. 3

    174. 79
    2534. 79
    174. 74
    2544. 62

    174. 01
    2580. 67
    173. 68
    2587. 23

    173. 28
    2613. 44
    173. 14
    2620. 23

     2390.6
                                                                                                                                                                                                                        177.66
  2423. 37
2459. 42
2492. 19
                                                                                                                                                                                                                        176.48
                                                                                                                                                                                                                        175.83
                                                                                                                                                                                                                       175. 3
174. 32
   2511. 85
   2551. 18
2590. 5
                                                                                                                                                                                                                      173. 74
                            174. 28 2564. 29
173. 56 2600. 33
172. 73 2639. 66
172. 49 2675. 71
172. 56 2715. 03
172. 07 2757. 63
171. 54 2803. 51
170. 57 2836. 28
169. 69 2875. 61
169. 64 2918. 21

      174. 01
      2580. 67
      173. 68
      2587. 23

      173. 28
      2613. 44
      173. 14
      2620

      172. 74
      2652. 77
      172. 6
      2659. 32

      172. 35
      2692. 09
      172. 3
      2698. 65

      172. 89
      2724. 86
      172. 89
      2734. 69

      172. 27
      2774. 02
      172. 04
      2790. 41

      171. 25
      2816. 62
      170. 72
      2823. 18

      170. 32
      2849. 39
      169. 9
      2862. 5

      169. 43
      2888. 72
      169. 55
      2898. 55

      169. 88
      2931. 32
      169. 75
      2941. 15

      169
      68
      2960. 81
      169. 88
      2970. 64

                                                                          173. 34 2606. 89
172. 62 2649. 49
                                                                                                                                                                                                                      173. 13
                                                                        172. 62 2649. 49

172. 53 2682. 26

172. 48 2721. 59

172. 24 2770. 74

171. 36 2810. 07

170. 36 2842. 84

169. 63 2882. 16

169. 71 2924. 77

169. 73 2954. 26

170. 27 2990. 31

170 3032. 91

169. 96 3065. 68

166. 09 3083. 19

158 3157. 44

167. 88 3173. 82

167. 97 3209. 87

167. 2 3245. 92

167. 89 3285. 24

167. 35 3314. 74
   2633.11
                                                                                                                                                                                                                      172.67
   2665. 88
                                                                                                                                                                                                                       172.36
   2708.48
                                                                                                                                                                                                                       172.44
  2747. 8
2796. 96
2829. 73
2865. 78
                                                                                                                                                                                                                       171.57
                                                                                                                                                                                                                        170.68
                                                                                                                                                                                                                        169.87
                                                                                                                                                                                                                        169.38
   2911.66
                                                                                                                                                                                                                       169.73
   2944.43
                             169. 6 2950. 98
                                                                                                                         169. 68 2960. 81
                                                                                                                                                                         169.88 2970.64
                                                                                                                                                                                                                        170.26
   2973.92
                             170. 17 2980. 48
                                                                                                                         170. 33 2996. 86
                                                                                                                                                                        170. 43 3003. 42
                                                                                                                                                                                                                        170.38
                                                                                                                                                                        170. 36 3042. 74
  3013. 25
3049. 29
3075. 51
                             170. 18 3026. 36
                                                                                                                       170. 16 3036. 19
169. 56 3068. 96
163. 4 3085. 34
159. 93 3160. 72
168. 34 3177. 1
167. 65 3216. 43
167. 47 3252. 47
167. 94 3291. 8
167. 78 3318. 02
167. 64 3357. 34
170. 46 3383. 56
177. 3 3403. 22
184. 17 3422. 88
185. 73 3458. 93
185. 98 3481. 87
186. 06 3511. 36
                                                                                                                         170. 16 3036. 19
                                                                                                                                                                                                                        170.25
                                                                                                                                                                       170. 36 3042. 74
169. 14 3072. 23
162. 08 3088. 62
162. 03 3163. 99
168. 63 3180. 38
167. 34 3222. 98
167. 65 3259. 03
                            170. 24 3059. 13
167. 57 3078. 79
159. 76 3129
166. 99 3170. 55
                                                                                                                                                                                                                        168.54
                                                                                                                                                                                                                        160.38
   3091. 9
3167. 11
                                                                                                                                                                                                                        164.46
                                                                                                                                                                                                                        168.68
                            168. 56 3196. 76
167. 1 3239. 37
   3186.93
                                                                                                                                                                                                                        167.17
                                                                                                                                                                                                                       168.16
   3232.81
                            168. 19 3275. 41
                                                                                                                                                                       168. 14 3298. 35
      3262.3
                                                                                                                                                                                                                        167.99
                                                                          167. 89 3285. 24
167. 35 3314. 74
167. 86 3344. 23
169. 48 3380. 28
176. 04 3396. 67
183. 68 3419. 6
186. 06 3455. 65
185. 99 3475. 32
                            167. 23 3311. 46
167. 81 3337. 68
                                                                                                                                                                       168 3324.57
167.87 3370.45
   3308.18
                                                                                                                                                                                                                        168.08
     3334. 4
                                                                                                                                                                                                                       168.42
                                                                                                                                                                       171. 61 3386. 83
179. 53 3406. 5
184. 7 3429. 44
185. 72 3465. 48
186. 41 3488. 42
  3373. 73
3390. 11
3409. 77
3442. 54
                            168. 78
                                                          3377
                                                                                                                                                                                                                       173.02
                            174. 63 3393. 39
183. 21 3413. 05
185. 92 3449. 1
                                                                                                                                                                                                                       180. 92
185. 29
                                                                                                                                                                                                                        185.84
   3468.76
                            185. 97 3472. 04
                                                                                                                                                                                                                        186.23
   3494. 98
                            186. 19 3501. 53
                                                                            185.89 3508.09
                                                                                                                          186.06 3511.36 185.98 3517.92
                                                                                                                                                                                                                       185.97
Manning's n Values
Sta n Val Sta
                                                                           num=
                                                                        num= 3
n Val Sta
                                                                                                                        n Val
                            . 1 3083. 19 . 045 3167. 11
                                                                                                                        . 1
Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr.

3083.19 3167.11 1140 1140 1140 .1

Ineffective Flow num= 2
Sta L Sta R Elev Permanent
                                                                                                                                                                                                                         Expan.
                                                                                                                                                                                                                         . 3
                                                    185
185
                                                                           F
F
                                1674
                                                                       r
num=
            3409 3517.92
Blocked Obstructions
                                                                                                   1
    Sta L Sta R El ev
      922. 45 1342. 86180. 2296
CROSS SECTION OUTPUT Profile #1%
                                                                                               *****
 * Left OB * Channel *
                                                                                                               Page 37
```

	EXI	String - 34k LOWK					
Right OB *  * Vel Head (ft)  0.100 *	* 0.30	* Wt. n-Val.	*	0. 100	*	0. 045	*
* W. S. Elev (ft) 1140.00 *	* 177. 95	* Reach Len. (ft)	*	1140. 00	*	1140. 00	*
* Crit W.S. (ft) 2210.54 *	* 171.78	* Flow Area (sq ft)	*	3861. 77	*	1535. 16	*
* E.G. Slope (ft/ft) 2210.54 *	*0.000707	* Area (sq ft)	*	4895. 27	*	1535. 16	*
* Q Total (cfs) 3909.75 *	*17700.00	* Flow (cfs)	*	4664. 93	*	9125. 33	*
* Top Width (ft) 231.46 *	* 1586.14	* Top Width (ft)	*	1270. 77	*	83. 92	*
* Vel Total (ft/s) 1.77 *	* 2.33	* Avg. Vel. (ft/s)	*	1. 21	*	5. 94	*
* Max Chl Dpth (ft) 9.55 *	* 19.95	* Hydr. Depth (ft)	*	5. 10	*	18. 29	*
* Conv. Total (cfs) *146993.6 *	*665461.5	* Conv. (cfs)	*	175385. 8	* (	343082. 2	
* Length Wtd. (ft) 233.50 *	* 1140.00	* Wetted Per. (ft)	*	758. 72	*	87. 19	*
* Min Ch El (ft) 0.42 *	* 158.00	* Shear (Ib/sq ft)	*	0. 22	*	0. 78	*
* Al pha 0. 74 *	* 3.56	* Stream Power (Ib/ft s)	*	0. 27	*	4. 62	*
* Frctn Loss (ft) 1301.92 *	* 1.10	* Cum Volume (acre-ft)	*	1237. 08	*	320. 56	*
* C & E Loss (ft) 108.74 *	* 0.03	* Cum SA (acres)	*	206. 02	*	16. 17	*
	*****	* * * * * * * * * * * * * * * * * * * *	**	*****	**	*****	**
*****							

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT **********************************			********	t <b>*</b>
* E.G. Elev (ft)	* 178.78	* Element	* Left OB * Channel	*
Right OB *  * Vel Head (ft)	* 0.37	* Wt. n-Val.	* 0.100 * 0.045	*
* W.S. Elev (ft)	* 178.42	* Reach Len. (ft)	* 1140.00 * 1140.00	*
* Crit W.S. (ft)	* 171. 95	* Flow Area (sq ft)	* 2948. 28 * 1574. 65	*
1560.31 * * E.G. Slope (ft/ft)	*0. 000771	* Area (sq ft)	* 2948. 28 * 1574. 65	*
* 0 Total (cfs)	*17700.00	* Flow (cfs)	* 4796.61 * 9938.80	*
2964.59 * * Top Width (ft)	* 600.00	* Top Width (ft)	* 369. 19 * 83. 92	*
146.89 * * Vel_Total (ft/s)	* 2.91	* Avg. Vel. (ft/s)	* 1.63 * 6.31	*
1.90 * * Max Chl Dpth (ft) 10.62 *	* 20.42	* Hydr. Depth (ft)	* 7.99 * 18.76	*

```
Existing - 34R LOMR
                    *637419.1 * Conv. (cfs)
* Conv. Total (cfs)
                                                  *172737.3 *357919.8
*106761.9
* Length Wtd. (ft)
                    * 1140.00 * Wetted Per. (ft)
                                                     376.56
                                                               87. 19
157. ў0
* Min Ch El (ft)
                    * 158.00 * Shear (lb/sq ft)
                                                      0.38
                                                                0.87
  0.48
 Al pha
                        2.80 * Stream Power (lb/ft s) *
                                                                5.49
                                                      0.61
  0.90
* Frctn Loss (ft)
                        1.09 * Cum Volume (acre-ft)
                                                     303.98
                                                              329.08
711. 95
C & E Loss (ft)
                        0.02 * Cum SA (acres)
                                                      25.78 *
                                                               15.88
 30. 97
```

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

### CROSS SECTION OUTPUT Profile #10%

*****									
* E.G. Elev (ft)	*	174. 49	*	Element	*	Left OB	*	Channel	*
Right OB * ` ´									
* Vel Head (ft)	*	0. 24	*	Wt. n-Val.	*	0. 100	*	0.045	*
0. 100 * ` ´									
* W.S. Elev (ft)	*	174. 24	*	Reach Len. (ft)	*	1140.00	*	1140.00	*
1140.00 *				• •					
* Crit W.S. (ft)	*	166. 65	*	Flow Area (sq ft)	*	1605. 28	*	1224. 47	*
1371.76 *				• • •					
* E.G. Slope (ft/ft)	*0	. 000617	*	Area (sq ft)	*	1616. 85	*	1224. 47	*
1371. 76 *				• •					
* Q Total (cfs)	*	8780. 00	*	Flow (cfs)	*	1237. 09	*	5845. 91	*
1697. 01 * ` ´									
* Top Width (ft)	*	864. 43	*	Top Width (ft)	*	558. 30	*	83. 92	*
222. 21 *				•					
* Vel Total (ft/s)	*	2. 09	*	Avg. Vel. (ft/s)	*	0. 77	*	4. 77	*
1. 24 *									
<pre>* Max Chl Dpth (ft)</pre>	*	16. 24	*	Hydr. Depth (ft)	*	3. 03	*	14. 59	*
6. 17 *									
* Conv. Total (cfs)	*3	53483. 9	*	Conv. (cfs)	*	49805. 2	* 2	235356. 9	*
68321.8 *									
* Length Wtd. (ft)	*	1140. 00	*	Wetted Per. (ft)	*	532. 05	*	87. 19	*
223. 54 *									
* Min Ch El (ft)	*	158. 00	*	Shear (lb/sq ft)	*	0. 12	*	0. 54	*
0. 24 *				- (11.45)					
* Al pha	*	3. 56	*	Stream Power (lb/ft s)	*	0. 09	*	2. 58	*
0. 29 *									
* Frctn Loss (ft)	*	0. 90	*	Cum Volume (acre-ft)	*	566. 93	*	236. 31	*
578. 72 *				0 01 (	.1.		.1.	4 / 00	
* C & E Loss (ft)	*	0. 01	*	Cum SA (acres)	*	90. 27	*	16. 30	*
98.05 *	دان بای بای		الديات		. باد باد		. باد باد		JL JL
******	* * *	****	× ×	*****	× × :	****	* * :		* *

Warning: Divided flow computed for this cross-section.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #2%

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* E.G. Elev (ft)	* 177.09	* Element	*	Left OB	*	Channel	*
Right OB *  * Vel Head (ft)	* 0.30	* Wt. n-Val.	*	0. 100	*	0.045	*
* W.S. Elev (ft)	* 176. 79	* Reach Len. (ft)	*	1140. 00	*	1140. 00	*
* Crit W.S. (ft)	* 171.01	* Flow Area (sq ft)	*	3091. 22	*	1438. 15	*
1944.91 * * E.G. Slope (ft/ft) 1944.91 *	*0.000720	* Area (sq ft)	*	3590. 64	*	1438. 15	*
* Q Total (cfs) 3217.18 *	*15000.00	* Flow (cfs)	*	3527. 90	*	8254. 92	*
* Top Width (ft) 228.23 *	* 1338.78	* Top Width (ft)	*	1026. 63	*	83. 92	*
* Vel Total (ft/s) 1.65 *	* 2.32	* Avg. Vel. (ft/s)	*	1. 14	*	5. 74	*
* Max Chl Dpth (ft) 8.52 *	* 18. 79	* Hydr. Depth (ft)	*	4. 86	*	17. 14	*
* Conv. Total (cfs) *119926.2 *	*559151.5	* Conv. (cfs)	*	131508. 6	*;	307716. 7	
* Length Wtd. (ft) 230.08 *	* 1140.00	* Wetted Per. (ft)	*	638. 10	*	87. 19	*
* Min Ch El (ft) 0.38 *	* 158.00	* Shear (Ib/sq ft)	*	0. 22	*	0. 74	*
* Al pha	* 3.54	* Stream Power (lb/ft s)	*	0. 25	*	4. 25	*
0.63 * * Frctn Loss (ft) 1076.56 *	* 1.11	* Cum Volume (acre-ft)	*	958. 72	*	294. 52	*
* C & E Loss (ft) 105.69 *	* 0.03	* Cum SA (acres)	*	166. 85	*	16. 17	*
	*****	******	**	*****	**:	*****	**
*****							

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth

with the lowest, valid, energy was used.

## CROSS SECTION OUTPUT Profile #0.2%

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	*****		*****
*****			
* E.G. Elev (ft) Right OB *	* 181.44	* Element	* Left OB * Channel *
* Vel Head (ft) 0.100 *	* 0. 26	* Wt. n-Val.	* 0.100 * 0.045 *
* W.S. Elev (ft)	* 181.18	* Reach Len. (ft)	* 1140.00 * 1140.00 *
* Crit W.S. (ft)	* 173.73	* Flow Area (sq ft)	* 6884.72 * 1806.53 *
2973.55 * * E.G. Slope (ft/ft)	*0.000589	* Area (sq ft)	*10871.50 * 1806.53 *
* Q Total (cfs)	*25700.00	* Flow (cfs)	* 9068.40 *10926.00 *
5705.60 * * Top Width (ft) 239.76 *	* 3171.94	* Top Width (ft)	* 2848. 26 * 83. 92 *
* Vel Total (ft/s) 1.92 *	* 2. 20	* Avg. Vel. (ft/s)	* 1.32 * 6.05 *

```
Existing - 34R LOMR
* Max Chl Dpth (ft)
                           23.18 * Hydr. Depth (ft)
                                                             5.80 *
                                                                       21.53 *
 12.40
* Conv. Total (cfs) *234996.1 *
                       *1058504.0 * Conv. (cfs)
                                                          *373499.4 *450008.2
                       * 1140.00 * Wetted Per. (ft)
                                                         * 1189.65
 Length Wtd. (ft)
                                                                       87.19
242. 43
* Min Ch El (ft)
                          158.00 * Shear (lb/sq ft)
                                                             0. 21
                                                                        0.76
  0.45
 Al pha
                            3.50
                                 * Stream Power (lb/ft s) *
                                                              0.28
                                                                        4.61
  0.87
* Frctn Loss (ft)
                            0.96
                                 * Cum Volume (acre-ft)
                                                         * 2213.71
                                                                      387.47
1904.01
* C & E Loss (ft)
                            0.05 * Cum SA (acres)
                                                            325.09
                                                                       17.40
************************************
*****
```

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections. Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: RIVER-1

RS: 270 REACH: Reach-1

I NPUT

Description: XS 270

THIS CROSS SECTION IS THE INSERTED CROSS SECTION TO

**REPRESENT** 

FILL PLACED SINCE THE EFFECTIVE FIS WAS

COMPLETED

THERE IS AN ENCR. IN THE NAT. RUN TO REFLECT EFFECTIVE FLOW

C+-+: Fl -		D-4-		110					
Station Ele			num=	413					
Sta	El ev	Sta	El ev	Sta	ELev	Sta	Elev	Sta	Elev
******	****	*****	*****	*****	*****	*****	*****	*****	*****
0 1	79. 56	13. 12	179. 24	19. 68	179. 24	32.8	178. 98	36. 08	178. 79
42.64 1	78. 63	52. 48	178. 7	62. 32	178. 52	68. 88	178. 54	72. 16	178. 34
	78. 43	82	178. 32	88. 56	178. 04	91. 83	177. 83	95. 11	178. 01
101. 67 1	77. 89	108. 23	177. 62	124.63	177. 42	127. 91	177. 27	134. 47	177. 12
141.03 1	77. 16	147. 59	177. 11	157. 43	176. 69	170. 55	176. 47	173.83	176. 55
177. 11 1	76. 39	180. 39	176. 57	193. 51	176. 45	200.07	176. 1	209. 91	176. 18
216. 47 1	76.06	219. 75	175. 79	223.03	176	232. 87	175. 65	236. 15	175. 43
242. 71 1	75. 63	249. 27	175. 23	252. 55	175. 5	259. 11	175. 53	265. 67	175. 37
268. 94 1	75. 43	275. 5	175. 24	278. 78	175. 36	282. 06	175. 33	288. 62	175. 07
295. 18 1	75. 01	301. 74	175. 12	308. 3	174. 79	311. 58	174. 89	314.86	174. 6
318. 14 1	74. 58	324. 7	174. 26	331. 26	174. 32	337.82	174.03	344. 38	173.44
350. 94 1	73. 18	354. 22	172. 81	360. 78	172. 74	364.06	172. 55	370. 62	173. 27
373. 9 1	73. 31	380. 46	173. 54	387. 02	173.86	390. 3	173. 87	393. 58	173. 65
396.86 1	73.86	400. 14	174. 23	403.42	174. 44	409. 98	174. 45	413. 26	174. 58
423. 1	174.6	432. 94	174. 56	449. 33	174. 68	465. 73	174. 77	475. 57	174. 72
478.85 1	74. 79	482. 13	174. 71	488. 69	175. 02	495. 25	175	501.81	175. 11
511. 65 1	75. 07	518. 21	175. 15	521. 49	175. 31	531. 33	175. 42	534. 61	175. 53
541. 17 1	75. 35	551.01	175. 23	560.85	175. 23	567. 41	175. 46	570.69	175. 68
577. 25	175. 9	593.65	176. 12	596. 93	176. 28	613. 33	176. 29	623. 17	176. 37
				Pag	je 41				
				_	•				

Existing - 34R LOMR 176.57 649.4 176. 69 177. 25 629.73 176.6 633 642. 84 176.77 659.24 176.89 176. 57 176. 94 177. 52 177. 88 178. 77 179. 93 642. 84 678. 92 715 747. 8 777. 32 810. 12 665.8 692.04 176.82 669.08 176.88 685.48 177.15 177. 29 177. 58 178. 66 179. 79 708. 44 741. 24 770. 76 177. 35 178. 79 179. 5 177. 28 178. 28 179. 36 179. 87 724. 84 757. 64 728. 12 701.88 177.52 760. 92 787. 16 734.68 178.85 767. 48 797 780.6 179.56 806.84 819.96 179.94 826.51 179.93 842. 91 882. 27 852. 75 895. 39 862.59 833.07 180. 1 180.17 849.47 180.31 180.27 180.39 869. 15 911. 79 180.37 180.47 888.83 180.41 180.45 898.67 180.56 921. 63 970. 83 180.59 180. 44 934. 75
180. 28 980. 67
179. 99 1039. 7
179. 58 1082. 34
179. 18 1124. 98
178. 62 1174. 18
179. 35 1220. 09
180. 32 1285. 69
179. 79 1331. 61
180. 02 1393. 88
180. 33 1433. 18
180. 32 1482. 3
179. 17 1537. 97
178. 17 1583. 82
177. 95 1619. 85
179. 11 1662. 42
179. 93 1691. 89 180.44 934.75 180.44 947.87 180.3 954.43 180.32 180. 3 954. 43 180. 13 997. 07 179. 73 1059. 38 179. 25 1102. 02 178. 92 1144. 66 178. 75 1193. 86 179. 84 1243. 05 964. 27 1010. 19 1065. 94 1105. 3 990. 51 1046. 26 180. 17 179. 75 180. 26 179. 97 180.16 1016. 74 1072. 5 1111. 86 1170. 9 1213. 53 179.48 179. 75 1046. 26 179. 47 1088. 9 178. 95 1138. 1 178. 59 1187. 3 179. 43 1229. 93 180. 32 1302. 09 179. 63 1348. 01 180. 05 1400. 43 179. 46 179. 11 178. 88 178. 91 179. 19 178. 98 178. 87 1161. 06 1200. 42 180. 11 178. 91 1213. 53 180. 12 1262. 73 179. 81 1325. 05 179. 73 1387. 33 180. 37 1423. 35 180. 44 1472. 48 179. 5 1531. 42 178. 21 1570. 72 177. 81 1613. 3 180. 03 1311. 93 179. 67 1354. 57 180. 16 1410. 26 1246.33 179.96 179.52 1318.49 1374.23 180.2 180. 05 1400. 43 180. 51 1446. 28 180. 26 1501. 95 178. 99 1544. 52 177. 61 1590. 37 178. 12 1629. 67 180. 41 1452. 83 180. 02 1505. 23 1416.81 180.51 1465.93 180.02 178. 92 1551. 07 177. 43 1596. 92 178. 45 1632. 95 1524. 88 1567. 45 178.61 177.47 1603.47 178.47 1639.49 178.84 1646.04 179.63 1668.97 179.69 1675.52 179.89 179. 93 1691. 89 179.76 1701.72 179.86 1711.54 1682.07 179.87 1688.62 179.86 179. 93 1691. 89 179. 96 1734. 47 180. 16 1786. 86 180. 35 1822. 89 180. 13 1852. 36 180. 24 1891. 66 180. 27 1930. 96 180. 14 1970. 26 180. 42 2009. 55 179. 77 1731. 19 180. 35 1777. 04 180. 1 1741. 02 180. 26 1793. 41 1721.37 180. 14 1754. 11 180.13 1770. 49 180. 22 1806. 51 180.22 180. 35 1777. 04 180. 15 1816. 34 180. 25 1845. 81 180. 15 1885. 11 180. 19 1917. 86 179. 97 1966. 98 180. 32 2003 180. 62 2039. 03 180. 26 1793. 41 180. 17 1826. 16 180. 27 1855. 64 180. 12 1894. 93 180. 21 1940. 78 180. 3 1980. 08 180. 36 2016. 1 180. 22 1806. 51 180. 31 1835. 99 180. 19 1862. 18 180. 2 1911. 31 179. 66 1947. 33 180. 22 1989. 9 180. 48 2022. 65 1809. 79 1839. 26 1872. 01 1914. 58 180.13 180.27 180. 26 179. 51 1960.43 180.32 1996.45 180.46 180. 36 2016. 1 180. 75 2052. 13 180. 91 2104. 53 182. 79 2199 202. 8 2404 201. 4 2639 182. 8 2857. 77 180. 75 2890. 55 180. 97 2058. 68 180. 7 2114. 35 202. 8 2259 2029.2 180.74 2045.58 180.92 2081. 6 2127. 45 2344 2075. 05 2117. 63 181. 03 180. 57 180. 92 2091. 43 180. 54 2198. 5 180.71 202.8 182.8 2344 201.4 2639 200.4 2789 180.86 2880.71 202. 8 2404 180. 6 2729 180. 87 2861. 05 180. 74 2897. 1 2259 2569 182.8 182.8 2344 2569 200. 4 2789 180. 86 2877. 44 180. 71 2916 77 180 57 180. 4 2729 2867. 6 180.93 180.65 2900. 38 2965. 94 2916. 77 2969. 22 180. 64 2926. 61 180. 51 2979. 06 180. 62 2949. 55 180. 42 2988. 89 180. 68 2943 180.67 180. 49 2985. 61 180. 31 3038.06 179. 98 3083. 96 179. 79 3116. 74 179. 63 3152. 8 179. 6 3188. 77 178. 07 3234. 47 170. 53 3257. 31 167. 97 3280. 16 168. 61 3309. 54 168. 06 3338. 91 167. 27 3387. 87 168. 22 3427. 04 168. 18 3459. 68 168. 78 3498. 84 169. 05 3538. 01 169. 06 3557. 6 165. 02 3621. 5 180.57 180. 49 2985. 61 180.46 180. 51 2979. 06 180. 23 3021. 67 179. 99 3080. 68 179. 87 3110. 18 179. 58 3142. 96 179. 47 3178. 98 178. 61 3224. 67 172. 62 3254. 05 167. 97 3276. 9 168. 78 3303. 01 168. 09 3335. 65 166. 93 3374. 82 180. 42 2988. 89 180. 23 3054. 45 179. 9 3087. 23 179. 78 3123. 29 179. 58 3159. 35 179. 58 3201. 83 175. 7 3240. 99 169. 6 3263. 84 168. 21 3286. 69 3002 180.39 3015.12 180.18 3067. 57 3097. 07 3074. 12 3106. 9 180.08 179.97 179.84 179.69 179. 84 3106. 9 179. 69 3136. 41 179. 56 3169. 19 179. 1 3218. 15 173. 33 3247. 52 168. 05 3270. 37 168. 37 3296. 48 168. 35 3325. 86 3133. 13 3162. 63 3208. 35 3244. 26 179. 5 179. 32 173. 86 168. 38 3267.11 168.26 3289. 95 168. 58 3316. 06 168.33 3319.33 167.88 3345.44 167.84 168. 09 3335. 65 166. 93 3374. 82 168. 17 3420. 51 168. 08 3449. 89 168. 6 3489. 05 168. 93 3531. 48 169. 39 3554. 33 167. 56 3577. 18 167. 12 167. 91 168. 21 168. 57 3368. 29 3413. 98 3443. 36 3485. 79 3528. 22 3551. 07 3573. 92 3358.5 167. 73 3400. 93 168. 36 3430. 3 167.95 3407.45 168.23 168. 47 3469. 47 168. 86 3505. 37 169. 07 3541. 28 168. 98 3564. 12 157. 7 3668. 57 3436.83 168.48 3476 3515. 17 3547. 8 168.73 169. 3 169. 14 169.49 162.54 3570.65 168.82 165.02 3621.5 177. 72 3681. 63 192. 46 3701. 21 203. 66 3737. 11 205. 04 3756. 7 181. 75 3684. 89 165.77 3675.1 172.07 3678.36 184.89 3671.83 189. 63 3694. 68 187.54 198.65 3704.47 3688.15 3691.42 201.51 203. 18 3720. 79 205. 21 3753. 43 3707.74 202.89 3711 204.34 3740.38 204.4 204.86 3750.17 205.34 3759.96 3746.9 204.92

3766. 49 205. 03 3773. 02 204. 97 3779. 54 205. 15 Manning's n Values num= Sta n Val Sta n Val Sta n Val 0 . 1 3570.65 . 045 3675. 1 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 3570. 65 3675. 1 . 3 515 515 . 1 Ineffective Flow num= Sta R Elev Permanent Sta L 180 F 0 3179 3739 3779.54 F 180 Blocked Obstructions num= 1 Sta L Sta R Elev 1509. 55 1675. 03 179. 84 CROSS SECTION OUTPUT Profile #1% . \* \*\*\*\*\* \* E.G. Elev (ft) \* 177.12 \* Element \* Left OB \* Channel \* Right OB \*
\* Vel Head (ft) 0.60 \* Wt. n-Val. 0.100 \* 0.045 0.100 \* \* W.S. Elev (ft) \* 176.52 \* Reach Len. (ft) 515.00 515.00 515.00 \* \* Crit W.S. (ft) \* 171.46 \* Flow Area (sq ft) \* 2653.07 \* 1569.80 5. 72 E.G. Slope (ft/ft) \*0.001500 \* Area (sq ft) \* 3313.63 \* 1569.80 5.72 Q Total (cfs) \*17700.00 \* Flow (cfs) \* 5996.77 \*11699.69 3. 53 \* Top Width (ft) Top Width (ft) 898. 81 791. 80 \* 104.45 2.57 \* Vel Total (ft/s) 4. 19 \* Avg. Vel. (ft/s) 2. 26 7. 45 0.62 Max Chl Dpth (ft) 18.82 \* Hydr. Depth (ft) 7.81 15.03 2. 23 \* Conv. Total (cfs) 91. 2 \* \*457063.9 \* Conv. (cfs) \*154853.6 \*302119.1 Length Wtd. (ft) 515.00 \* Wetted Per. (ft) 340.79 111. 56 5. 14 \* \* Min Ch El (ft) 157. 70 \* Shear (lb/sq ft) 0.73 1. 32 0. 10 \* 2.19 \* Stream Power (lb/ft s) \* 9.82 Al pha 1.65 0.06 \* Frctn Loss (ft) 0.70 \* Cum Volume (acre-ft) \* 1129.67 \* 279.93 1272. 92 \* C & E Loss (ft) 0.07 \* Cum SA (acres) \* 179.03 \* 13.71 \* 105. 67 \* Warning: Divided flow computed for this cross-section.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

\*\*\*\*\* \* Left OB \* Channel \* Right OB \*

* Vel Head (ft)		isting - 34R LOMR * Wt. n-Val.	*	0. 100	*	0. 045	*
0.100 * * W.S. Elev (ft) 515.00 *	* 177. 16	* Reach Len. (ft)	*	515. 00	*	515.00	*
* Crit W.S. (ft) 7.48 *	* 171.45	* Flow Area (sq ft)	*	2870. 94	*	1636. 57	*
* E.G. Slope (ft/ft) 7.48 *	*0. 001254	* Area (sq ft)	*	2870. 94	*	1636. 57	*
* 0 Total (cfs) 4.62 *	*17700.00	* Flow (cfs)	*	6227. 21	*1	1468. 17	*
* Top Width (ft) 2.90 *	* 449.00	* Top Width (ft)	*	341. 65	*	104. 45	*
* Vel Total (ft/s) 0.62 *	* 3. 92	* Avg. Vel. (ft/s)	*	2. 17	*	7. 01	*
* Max Chl Dpth (ft) 2.58 *	* 19.46	* Hydr. Depth (ft)	*	8. 40	*	15. 67	*
* Conv. Total (cfs) 130.6 *	*499812.4	* Conv. (cfs)	* *	175843. 9	*3	23837. 9	*
* Length Wtd. (ft) 5.87 *	* 515.00	* Wetted Per. (ft)	*	343. 06	*	111. 56	*
* Min Ch El (ft) 0.10 *	* 157.70	* Shear (Ib/sq ft)	*	0. 66	*	1. 15	*
* Al pha 0. 06 *	* 2.18	* Stream Power (lb/ft s)	*	1. 42	*	8. 05	*
* Frctn Loss (ft) 691.43 *	* 0.57	* Cum Volume (acre-ft)	*	227. 83	*	287. 06	*
* C & E Loss (ft) 29.01 *	* 0.06	* Cum SA (acres)	*	16. 47	*	13. 41	*
= 7. 0.	*****	*******	**:	*****	***	*****	**

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #10%									
****									
* E.G. Elev (ft) Right OB *	* 173.58	* Element	*	Left OB	*	Channel	*		
* Vel Head (ft) 0.100 *	* 0.35	* Wt. n-Val.	*	0. 100	*	0.045	*		
* W. S. Elev (ft) 515.00 *	* 173. 23	* Reach Len. (ft)	*	515.00	*	515. 00	*		
* Crit W.S. (ft) 0.39 *	* 167.38	* Flow Area (sq ft)	*	1555. 07	*	1225. 56	*		
* E.G. Slope (ft/ft) 0.39 *	*0.001095	* Area (sq ft)	*	1562. 81	*	1225. 56	*		
* Q Total (cfs) 0.08 *	* 8780.00	* Flow (cfs)	*	2163. 27	*	6616. 65	*		
* Top Width (ft) 0.67 *	* 451.48	* Top Width (ft)	*	346. 36	*	104. 45	*		
* Vel Total (ft/s) 0.21 *	* 3.16	* Avg. Vel. (ft/s)	*	1. 39	*	5. 40	*		
* Max Chl Dpth (ft) 0.58 *	* 15.53	* Hydr. Depth (ft)	*	4. 77	*	11. 73	*		
* Conv. Total (cfs) 2.5 *	*265370.3	* Conv. (cfs)	*	65383.5	* *	199984. 3	*		
* Length Wtd. (ft) 1.34 *	* 515.00	* Wetted Per. (ft)	*	326. 71	*	111. 56	*		
* Min Ch El (ft) 0.02 *	* 157.70	* Shear (Ib/sq ft)	*	0. 33	*	0. 75	*		
* Al pha 0.00 *	* 2. 25	* Stream Power (lb/ft s)	*	0. 45	*	4. 05	*		
0.00		D 44							

```
Existing - 34R LOMR
                            0.52 * Cum Volume (acre-ft) * 525.32 * 204.25 *
* Frctn Loss (ft)
560.77
 C & E Loss (ft)
                            0.03 * Cum SA (acres)
                                                             78. 43 *
                                                                       13.83
  95. 13
             *****************
Warning: Divided flow computed for this cross-section.
        Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
CROSS SECTION OUTPUT Profile #2%
                               ,
*************************
* E.G. Elev (ft)
                       * 175.95
                                 * Element
                                                                       Channel *
                                                            Left OB *
Right OB *
 Vel Head (ft)
                            0.56
                                  * Wt. n-Val.
                                                             0.100
                                                                        0.045
 0. 100
* W.S. Elev (ft)
                          175. 39
                                  * Reach Len. (ft)
                                                            515.00
                                                                      515.00
515.00
                          170. 78
* Crit W.S. (ft)
                                  * Flow Area (sq ft)
                                                          * 2270.43
                                                                    * 1451.30
  3. 18
 E.G. Slope (ft/ft)
                                  * Area (sq ft)
                                                          * 2512.41
                       *0.001513
                                                                    * 1451.30
  3. 18
 0 Total (cfs)
                        *15000.00
                                  * Flow (cfs)
                                                          * 4688.64
                                                                    *10309.74
  1. 62
 Top Width (ft)
                                  * Top Width (ft)
                       * 731.14
                                                            624.78
                                                                       104.45
  1. 91
* Vel Total (ft/s)
                            4.03
                                  * Avg. Vel. (ft/s)
                                                              2.07
                                                                         7. 10
  0. 51
 Max Chl Dpth (ft)
                                  * Hydr. Depth (ft)
                                                              6.78
                       * 17.69
                                                                        13.89
 1.66 * Conv. Total (cfs)
                       *385661.9
                                  * Conv. (cfs)
                                                          *120548.6
                                                                    *265071.7
  41.6
 Length Wtd. (ft)
                          515.00
                                  * Wetted Per. (ft)
                                                            336.14
                                                                       111.56
  3. 83
 Min Ch El (ft)
                                 * Shear (Ib/sq ft)
                          157. 70
                                                              0.64
                                                                         1.23
  0.08
                            2.22
                                  * Stream Power (lb/ft s) *
 Al pha
                                                              1.32
                                                                         8.73
  0.04
* Frctn Loss (ft)
                            0.71
                                  * Cum Volume (acre-ft)
                                                            878.86
                                                                       256.71
1051. 07
* C & E Loss (ft)
                            0.06 * Cum SA (acres)
                                                            145. 24
                                                                        13.71
102. 67
Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
CROSS SECTION OUTPUT Profile #0.2%
                                * E.G. Elev (ft)
                          180.44 * Element
                                                            Left OB *
                                                                       Channel *
Right OB '
 Vel Head (ft)
                            0.72
                                  * Wt. n-Val.
                                                             0.100
                                                                        0.045
 0.100
* W.S. Elev (ft)
                                                            515.00
                          179. 72
                                  * Reach Len. (ft)
                                                                       515.00
515.00 *
 Crit W.S. (ft)
                                                                    * 1904.07
                          173.05
                                  * Flow Area (sq ft)
                                                          * 3781.05
 17. 36
* E.G. Slope (ft/ft)
                       *0.001466
                                  * Area (sq ft)
                                                          * 6647.14
                                                                    * 1904.07
                                    Page 45
```

17 2/ *		LAI	31	Trig - 54K LOWK					
17. 36 * * Q Total (cfs) 15. 19 *	*2570	0. 00	*	Flow (cfs)	*	9728. 57	*1	5956. 24	*
* Top Width (ft) 4.88 *	* 159	2. 99	*	Top Width (ft)	*	1483. 65	*	104. 45	*
* Vel Total (ft/s) 0.88 *	*	4. 51	*	Avg. Vel. (ft/s)	*	2. 57	*	8. 38	*
* Max Chl Dpth (ft) 3.55 *	* 2	2. 02	*	Hydr. Depth (ft)	*	9. 65	*	18. 23	*
* Conv. Total (cfs) 396.9 *	*6712	92. 0	*	Conv. (cfs)	*2	254113. 2	*4	16782. 0	*
* Length Wtd. (ft) 9.10 *	* 51	5. 00	*	Wetted Per. (ft)	*	393. 08	*	111. 56	*
* Min Ch El (ft) 0.17 *	* 15	7. 70	*	Shear (Ib/sq ft)	*	0. 88	*	1. 56	*
* Al pha 0. 15 *	*	2. 27	*	Stream Power (Ib/ft s)	*	2. 26	*	13. 09	*
* Frctn Loss (ft) 1864.88 *	*	0. 65	*	Cum Volume (acre-ft)	*	1984. 47	*	338. 92	*
* C & E Loss (ft) 134.85 *	*	0. 10	*	Cum SA (acres)	*	268. 40	*	14. 94	*
********	*****	****	**	*****	* * 1	*****	***	*****	* *
*****									

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1 RS: 264

I NPUT

Description: XS 264 (LETTERED CROSS-SECTION U)
THIS SECTION IS THE FIRST
SECTION U/S OF THE DIVIDED FLOW INSERTED

AN INEFFECTIVE FLOW

ENCROACHMENT AT 500' FROM LEFT CHANNEL BANK FOR THE

NATURAL RUN.

INEFFECTIVE FLOW AREA DUE TO FILL PLACED IN FLOODPLAIN Station Flor

Station E	levation	Data	num=	489					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
0	180. 25	3. 28	180. 24	13. 12	180	19. 68	179. 94	29. 51	179. 65
39. 35	179. 7	49. 19	179. 48	62. 31	179. 52	68. 87	179. 23	72. 15	179. 18
81. 98	179. 21	91. 82	178. 97	98. 38	179. 04	104. 94	178. 84	108. 22	178.83
114. 78	178. 64	131. 17	178. 53	141. 01	178. 39	147. 57	178. 13	157. 41	178. 04
160. 69	178. 12	170. 53	177. 78	180. 36	177. 66	186. 92	177. 81	196. 76	177. 64
203. 32	177. 64	209.88	177. 41	216. 44	177. 45	223	177. 2	226. 28	177. 19
232. 83	176. 94	239. 39	177. 03	249. 23	176. 44	255. 79	176. 43	262. 35	176. 31
275. 47	176. 15	285. 3	175. 9	291. 86	175. 63	298. 42	175. 6	304. 98	175. 45
311. 54	175. 43	314. 82	175. 56	318. 1	175. 49	324. 66	175. 17	331. 21	175. 01
334. 49	175. 11	341. 05	174. 95	347. 61	174. 89	350. 89	174. 94	360.73	174.84
367. 29	174. 7	373.85	174. 67	400.08	174. 65	406. 64	174. 57	413. 2	174. 76
419. 76	174. 7	429. 59	174. 48	439. 43	174. 77	445. 99	174. 72	462. 39	174. 8
475. 51	174. 75	482.06	174. 84	491. 9	174. 68	501. 74	174. 8	505.02	174. 6
508. 3	174. 01	514. 86	174. 13	518. 14	174. 47	521. 42	174. 64	527. 97	174. 52
537. 81	174. 81	541.09	174. 73	550. 93	174. 75	564. 05	174. 54	570. 61	174. 64
580. 44	174. 6	587	174. 64	590. 28	174. 51	596. 84	174. 47	613. 24	174. 62
				Pac	ne 46				

Existing - 34R LOMR 619. 8 659. 15 685. 38 711. 62 744. 41 174. 94 175. 53 623.08 629.63 175. 21 639.47 174.89 175.38 646.03 175.41 175.55 665.71 668.99 175.08 175.61 675.54 175.52 682.1 174. 62 171. 92 173. 86 688. 66 714. 9 750. 97 787. 04 173. 36 172. 13 174. 25 174. 35 691. 94 721. 46 754. 25 793. 6 173. 13 172. 15 174. 22 174. 52 698. 5 734. 57 760. 81 705. 06 741. 13 172 171.71 172. 67 174. 35 174. 5 173. 54 174. 23 770.65 773.92 174.36 800.16 174.7 806.72 810 859. 19 891. 98 816. 56 865. 75 905. 1 174. 92 174. 99 175. 52 174. 74 175. 22 819.84 829. 67 878. 86 174.72 174.93 839.51 174.99 174. 99 869. 02
175. 52 914. 94
175. 69 954. 29
175. 93 987. 08
176. 5 1029. 71
177. 03 1075. 62
177. 41 1114. 98
177. 8 1160. 89
178. 04 1200. 24
178. 6 1249. 43
179. 39 1285. 5
180. 19 1318. 3
180. 41 1367. 49
180. 57 1446. 19
180. 72 1478. 98
180. 52 1511. 78
180. 34 1557. 69
179. 69 1623. 28 175.06 869.02 175.15 175.33 885.42 921.49 175.66 924. 77 175.31 175. 54 921. 49 175. 98 957. 57 176. 16 1000. 2 176. 71 1036. 27 177. 26 1078. 9 177. 28 1121. 53 177. 77 1167. 45 178. 01 1210. 08 178. 78 1255. 99 179. 55 1292. 06 180. 14 1331. 41 180. 37 1380. 6 180. 66 1459. 31 175.54 175. 66 924. 77
175. 94 964. 13
176. 25 1006. 76
176. 67 1039. 55
177. 19 1085. 46
177. 41 1124. 81
177. 92 1170. 72
178. 27 1226. 47
179 1259. 27
179. 61 1295. 34
180. 31 1341. 25
180. 4 1393. 72
180. 62 1462. 59 175.62 944. 45 977. 24 1023. 15 1059. 23 928. 05 970. 68 175. 74 175. 92 175. 7 176. 39 175. 92 977. 24 176. 4 1023. 15 177. 01 1059. 23 177. 16 1101. 86 177. 73 1154. 33 178. 01 1190. 4 178. 3 1239. 59 179. 26 1278. 94 180. 05 1315. 02 180. 35 1360. 93 180. 61 1416. 68 1016. 59 1052. 67 1092. 02 1144. 49 176. 83 177. 25 177. 33 177. 89 178.36 1180.56 179.02 1229.75 1265.83 179.74 1298. 62 180. 37 1354.37 180.56 180. 66 1459. 31 180. 61 1485. 54 180. 47 1521. 62 180. 25 1580. 64 179. 73 1639. 67 1410. 12 1469. 15 1498. 66 180. 62 1462. 59 180. 65 1495. 38 180. 32 1534. 73 180. 06 1593. 76 1416. 68 1472. 42 1501. 94 180. 61 180. 63 180. 7 180. 55 180. 62 180.39 1547.85 180. 23 1554.41 180.05 179. 69 1623. 28 177. 93 1675. 75 177. 55 1724. 94 177. 09 1757. 73 176. 77 1813. 48 176. 75 1856. 11 176. 78 1885. 62 176. 89 1908. 58 177. 14 1944. 65 177. 49 2000. 4 178. 07 2052. 87 178. 22 2095. 5 178. 36 2138. 14 178. 34 2180. 77 178. 36 2220. 12 177. 67 2266. 03 177. 12 2311. 94 176. 14 2344. 74 175. 5 2393. 93 175. 32 2426. 72 175. 2 2472. 63 174. 65 2518. 55 179. 73 1639. 67
177. 75 1688. 86
177. 42 1728. 21
176. 98 1767. 57
176. 84 1823. 32
176. 67 1859. 39
176. 78 1892. 18
176. 88 1915. 14
177. 2 1954. 49
177. 54 2006. 96
178. 24 2059. 43
178. 32 2098. 78
178. 32 2144. 69
178. 47 2187. 33
178. 28 2236. 52
177. 67 2269. 31
176. 6 2315. 22
175. 83 2361. 13
175. 51 2400. 49
175. 37 2433. 28
174. 98 2475. 91
174. 4 2525. 1 179. 43 1649. 51 177. 94 1692. 14 177. 31 1738. 05 179.89 179.69 1623.28 1603.6 1610.16 178.86 179. 89 1610. 16 178. 52 1669. 19 177. 79 1711. 82 177. 19 1754. 45 176. 54 1810. 2 176. 69 1846. 27 176. 88 1879. 07 176. 6 1905. 3 177. 15 1941. 37 177. 55 1993. 84 1659. 35 1701. 98 177.83 177. 31 1738. 05
176. 94 1780. 68
176. 68 1833. 15
176. 78 1872. 51
176. 69 1895. 46
177. 03 1928. 26
177. 13 1970. 89
177. 46 2029. 92
178. 25 2069. 27
178. 23 2108. 62
178. 41 2151. 25
178. 41 2197. 16
178. 14 2239. 8
177. 5 2285. 71
176. 5 2325. 06
175. 8 2374. 25
175. 42 2407. 05 177.19 1701. 98 1744. 61 1790. 52 1842. 99 1875. 79 1898. 74 1931. 53 176.82 176. 82 176. 73 176. 79 176. 76 177. 07 1990.56 177.78 177. 55 1993. 84 177. 79 2046. 31 178. 28 2085. 67 178. 29 2134. 86 178. 32 2167. 65 178. 35 2216. 84 178. 07 2262. 75 177. 3 2302. 1 176. 37 2338. 18 2039. 75 2072. 55 2118. 46 178.18 178.33 178.44 2157. 81 2203. 72 2252. 91 2295. 55 178.42 178. 2 177. 29 176. 36 2328.34 175.6 175. 42 2407. 05 175. 28 2439. 84 175. 01 2482. 47 175.6 2387.37 2380.81 175.51 175. 6 2387. 37 175. 46 2420. 16 175. 15 2462. 8 174. 73 2508. 71 173. 55 2538. 22 173. 14 2577. 57 175. 67 2603. 81 176. 81 2639. 88 2416. 88 2449. 68 175.3 174.82 174. 98 2475. 91 174. 4 2525. 1 173. 59 2551. 34 173. 5 2587. 41 176. 64 2616. 93 176. 68 2649. 72 175. 88 2689. 07 175. 68 2734. 98 175. 62 2774. 34 175. 45 2807. 13 178. 52 2856. 32 178. 47 2895. 68 177. 8 2918. 63 173. 8 2951. 42 170. 8 2974. 38 168. 86 3000. 62 175. 2 2472. 63 174. 65 2518. 55 173. 42 2544. 78 173. 32 2580. 85 176. 15 2610. 37 176. 79 2643. 16 176. 52 2679. 24 175. 45 2721. 87 175. 68 2761. 22 175. 18 2800. 57 178. 49 2843. 2 178. 46 2882. 56 2447. 08 2492. 31 2534. 94 2567. 74 2600. 53 173. 74 2528. 38 173. 39 2561. 18 174. 02 2593. 97 176. 82 2626. 77 173. 51 173. 37 174. 89 176. 76 176. 82 2626. 77
176. 64 2653
175. 65 2695. 63
175. 65 2741. 54
175. 8 2816. 97
178. 24 2859. 6
178. 44 2902. 23
177. 07 2925. 19
173. 54 2954. 7
169. 65 2977. 66
168. 65 3010. 45 2630.04 176.73 2662. 84 2705. 47 175.76 175.85 2761. 27 2761. 22 2800. 57 2843. 2 2882. 56 2915. 35 2938. 31 2744. 82 2790. 73 2826. 81 175.67 177.01 177.97 2862. 88 2908. 79 2928. 47 178. 46 178. 29 174. 15 178.54 175. 26 173. 3 2957.98 172.89 2961.26 172. 27 2967.82 169.56 169.55 2997.34 2984.22 169.81 2990.78 168.86 3000.62 168.65 3010.45 168.46 168. 32 3026. 85 167. 77 3076. 04 168. 03 3108. 84 168. 34 3036. 69 167. 74 3082. 6 168. 01 3115. 39 3017. 01 168.49 3020.29 168.63 3046.53 168.18 168.33 3062.92 168.02 3089.16 3056.37 168.03 167.83 3102.28 168. 16 3118. 67 3095.72 168.14

```
Existing - 34R LOMR
 3125.23
            167. 76 3135. 07
                                167. 71 3141. 63
                                                   167. 46 3144. 91
                                                                       167. 49 3151. 47
                                                                                           167.83
            167. 93 3167. 86
                                168. 13 3174. 42
                                                                                           167.34
 3161.31
                                                   167. 76 3180. 98
                                                                       167. 61 3187. 54
                                                                       167. 94 3220. 33
167. 44 3253. 13
166. 91 3295. 76
167 3341. 67
                                167. 66 3203. 94
167. 6 3240. 01
167. 12 3282. 64
167. 25 3322
                                                   167. 51 3213. 78
167. 36 3246. 57
166. 87 3285. 92
167. 2 3335. 11
            167. 33 3197. 38
167. 9 3226. 89
 3190.82
                                                                                           167.98
                                                                                           167. 15
167. 38
 3223.61
 3266. 25
3302. 32
3348. 23
            167. 01
167. 19
                     3276.08
                                                                                           167.14
                    3315.44
                                166. 73 3361. 35
165. 9 3394. 14
                                                                       166.67 3381.03
            166.88 3354.79
                                                    166.77 3374.47
                                                                                           166.34
                                                                       166.65 3403.98
  3384.3
               166 3390.86
                                                    166. 17 3397. 42
                                                                                           166.71
 3410.54
            167.06
                                                    167. 16 3426. 94
                      3417.1
                                   167 3423.66
                                                                       167.08 3436.77
                                                                                           167.49
           3449. 89
167. 32 3476. 13
167. 08 3525. 32
167. 18 3574. 51
167. 58 3607. 3
168. 48 3640 1
168 72
 3443.33
                                167. 22 3456. 45
167. 49 3489. 24
                                                    167. 23 3459. 73
                                                                       167.44 3463.01
                                                                                           167.49
                                                                       167. 44 3463. 01
167. 27 3508. 92
167 3558. 11
167. 31 3590. 91
168. 28 3626. 98
168. 6 3653. 21
168. 59 3679. 45
                                                    167. 33 3499. 08
 3466.29
                                                                                           167.44
                                167. 43 3541. 72
167. 28 3581. 07
                                                    167. 3 3548. 27
167. 2 3587. 63
 3515.48
                                                                                           167.26
 3564.67
                                                                                           167.49
 3597. 46
                                                   168 3617 14
168 49 3646 66
                                168.06 3610.58
168.58 3643.38
                                                                                           168.13
 3633. 54
                                                                                           168.61
                    3672.89
 3666.33
            168. 72
                                168.66 3676.17
                                                    168.77 3676.58
                                                                                           167.29
 3682.73
            164, 44 3686, 01
                                161. 31
                                            3690
                                                       160
                                                                3720
                                                                        157. 5
                                                                                   3745
                                                                                              160
                                                       169 3757.31
            160.82
                                163.96 3754.88
                                                                       173.44 3761.43
 3748.32
                      3751.6
                                                                                           180.53
                                189. 21 3771. 27
 3764.71
            185.66 3767.99
                                                   190.06 3781.11
                                                                       191.88
Manning's n Values
                                num=
      Sťa n Val
                         Sta
                                n Val
                                             Sta
                                                    n Val
                . 1 3676. 58
                              . 045 3754. 88
                                                             Ri ght
Bank Sta: Left
                        Lengths: Left Channel
                                                                         Coeff Contr.
                    Ri ght
                                                                                            Expan.
        3676. 58 3754. 88
                                                 1300 1Ŏ00
                                                                          . 1
                                                                                             . 3
Ineffective Flow
            Sta R
                        Elev Permanent
   Sta L
                      180
                                F
            3176. 1
     3790 3781.11
                                      F
                         180
Blocked Obstructions
                                            1
                              num=
   Sta L Sta R Elev
 2326. 42 2605. 17 176. 19
CROSS SECTION OUTPUT Profile #1%
                                        * E.G. Elev (ft)
                             * 176.36 * Element
                                                                           * Left OB * Channel *
Right OB *
  Vel Head (ft)
                                    0.38
                                            * Wt. n-Val.
                                                                                0.100
                                                                                             0.045
  0.100 *
* W.S. Elev (ft)
                              * 175.98
                                            * Reach Len. (ft)
                                                                           * 1330.00
                                                                                         * 1300.00
1000.00 *
  Crit W.S. (ft)
                              * 170.99
                                            * Flow Area (sq ft)
                                                                           * 4302.67
                                                                                         * 1235.45
  13.44
* E.G. Slope (ft/ft) *0.001202
                                            * Area (sq ft)
                                                                           * 6921.54
                                                                                         * 1235.45
  13. 44
 0 Total (cfs)
9.79 *
                              *17700.00
                                                                           * 9296.63
                                                                                         * 8393.59
                                            * Flow (cfs)
 Top Width (ft)
                                            * Top Width (ft)
                                                                           * 1582.10
                              * 1664.30
                                                                                             78.30
   3. 91 *
 Vel Total (ft/s)
                                    3. 19
                                            * Avg. Vel. (ft/s)
                                                                                 2. 16
                                                                                              6.79
   0.73
  Max Chl Dpth (ft)
                                   18.48
                                            * Hydr. Depth (ft)
                                                                                 8.60
                                                                                             15.78
 3. 44 *
Conv. Total (cfs)
282. 3 *
                              *510630.5
                                                                           *268200.1
                                            * Conv. (cfs)
                                                                                        *242148.1
  Length Wtd. (ft)
                              * 1314.74
                                            * Wetted Per. (ft)
                                                                              500.78
                                                                                             85.43
   8.00 *
* Min Ch El (ft)
                             * 157.50
                                           * Shear (lb/sq ft)
                                                                                 0.64
                                                                                              1.08
   0. 13
```

```
Existing - 34R LOMR
                          2.39 * Stream Power (lb/ft s) * 1.39 * 7.37 *
* Al pha
  0.09
* Frctn Loss (ft)
                          0.81 * Cum Volume (acre-ft) * 1069.16 *
                                                                 263. 35
1272. 80
* C & E Loss (ft)
                          0.11 * Cum SA (acres)
                                                     * 165.00 *
105. 64 *
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
       Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
* E.G. Elev (ft)
                     * 177.05 * Element
                                                     * Left OB *
                                                                Channel *
Right OB '
 Vel Head (ft)
                        0. 32
                               * Wt. n-Val.
                                                        0.100 *
                                                                  0.045
 0.100
* W.S. Elev (ft)
                     * 176.73
                               * Reach Len. (ft)
                                                     * 1330.00
                                                              * 1300.00
1000.00 *
 Crit W.S. (ft)
                     * 170.99
                               * Flow Area (sq ft)
                                                     * 4679.99
                                                               * 1294.49
 16. 51
 E.G. Slope (ft/ft)
                     *0.000962
                               * Area (sq ft)
                                                     * 5301.66
                                                               * 1294.49
 16. 51
                      *17700.00
                               * Flow (cfs)
                                                     * 9569.99
                                                              * 8118.45
 Q Total (cfs)
 11. 56
 Top Width (ft)
                      * 652.90
                               * Top Width (ft)
                                                       570.48
                                                                  78.30
  4. 12
 Vel Total (ft/s)
                         2.95
                               * Avg. Vel. (ft/s)
                                                         2.04
                                                                   6.27
  0.70 *
 Max Chl Dpth (ft)
                     * 19. 23
                               * Hydr. Depth (ft)
                                                         9.35
                                                                  16. 53
  4.01
 Conv. Total (cfs)
                     *570645.0
                               * Conv. (cfs)
                                                     *308534.8
                                                              *261737.3
 372.8
 Length Wtd. (ft)
                     * 1315.17
                               * Wetted Per. (ft)
                                                       500.78
                                                                  85. 43
  8. 81
 Min Ch El (ft)
                        157.50
                               * Shear (lb/sq ft)
                                                         0.56
                                                                   0.91
  0. 11
 Al pha
                          2.33
                               * Stream Power (lb/ft s) *
                                                         1. 15
                                                                   5.71
  0.08
                          0.65
* Frctn Loss (ft)
                               * Cum Volume (acre-ft)
                                                       179.52
                                                                 269.73
691. 29
* C & E Loss (ft)
                          0.09 * Cum SA (acres)
                                                        11.08 *
                                                                  12.33
             ********************
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
       1.4. This may indicate the need for additional cross sections.
       Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
CROSS SECTION OUTPUT Profile #10%
***********************
*****
* Left OB * Channel *
Right OB *
```

* Vel Head (ft)		sting - 34R LOMR * Wt. n-Val.	*	0. 100	*	0. 045	*
0.100 *  * W.S. Elev (ft)	* 172.78	* Reach Len. (ft)	*	1330. 00	*	1300. 00	*
1000.00 * * Crit W.S. (ft) 3.91 *	* 168. 90	* Flow Area (sq ft)	*	2701. 05	*	984. 88	*
* E.G. Slope (ft/ft) 3.91 *	*0.000920	* Area (sq ft)	*	3670. 15	*	984. 88	*
* Q Total (cfs)	* 8780.00	* Flow (cfs)	*	3744. 23	*	5034. 12	*
1.65 * * Top Width (ft) 2.07 *	* 839.81	* Top Width (ft)	*	759. 44	*	78. 30	*
* Vel Total (ft/s)	* 2.38	* Avg. Vel. (ft/s)	*	1. 39	*	5. 11	*
0.42 * * Max Chl Dpth (ft) 1.89 *	* 15. 28	* Hydr. Depth (ft)	*	5. 40	*	12. 58	*
* Conv. Total (cfs) 54.5 *	*289455.3	* Conv. (cfs)	* *	123438. 3	* *	165962. 6	*
* Length Wtd. (ft) 4.31 *	* 1310.52	* Wetted Per. (ft)	*	500. 78	*	85. 43	*
* Min Ch El (ft)	* 157.50	* Shear (Ib/sq ft)	*	0. 31	*	0. 66	*
* Al pha	* 2.79	* Stream Power (lb/ft s)	*	0. 43	*	3. 38	*
* Frctn Loss (ft)	* 0.76	* Cum Volume (acre-ft)	*	494. 39	*	191. 18	*
560.74 * * C & E Loss (ft) 95.12 *	* 0.03	* Cum SA (acres)	*	71. 89	*	12. 75	*
, , , =	*****	*****	**:	*****	**	*****	**
*****							

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.

	*******	*****	*****
* 175.18	* Element	* Left OB	* Channel *
* 0.37	* Wt. n-Val.	* 0. 100	* 0.045 *
* 174.81	* Reach Len. (ft)	* 1330.00	* 1300.00 *
* 170.48	* Flow Area (sq ft)	* 3715.01	* 1143.51 *
*0. 001257	* Area (sq ft)	* 5337. 20	* 1143.51 *
*15000.00	* Flow (cfs)	* 7445.65	* 7548.27 *
* 1215.93	* Top Width (ft)	* 1134.40	* 78.30 *
* 3.08	* Avg. Vel. (ft/s)	* 2.00	* 6.60 *
* 17.31	* Hydr. Depth (ft)	* 7.42	* 14.60 *
*423009.9	* Conv. (cfs)	*209972. 2	*212866.1 *
* 1313.68	* Wetted Per. (ft)	* 500.78	* 85.43 *
	* 175. 18  * 0. 37  * 174. 81  * 170. 48  * 0. 001257  * 15000. 00  * 1215. 93  * 3. 08  * 17. 31  * 423009. 9	* 175.18 * Element  * 0.37 * Wt. n-Val.  * 174.81 * Reach Len. (ft)  * 170.48 * Flow Area (sq ft)  *0.001257 * Area (sq ft)  *15000.00 * Flow (cfs)  * 1215.93 * Top Width (ft)  * 3.08 * Avg. Vel. (ft/s)  * 17.31 * Hydr. Depth (ft)  *423009.9 * Conv. (cfs)	**************************************

```
Existing - 34R LOMR
* Min Ch El (ft)
                  * 157.50 * Shear (lb/sq ft)
                                                 0.58 *
                                                         1.05 *
  0. 11
 Al pha
                      2.52 * Stream Power (lb/ft s) *
                                                 1. 17 *
                                                          6. 94
  0.07
* Frctn Loss (ft)
                      0.87 * Cum Volume (acre-ft)
                                                832. 45 *
                                                        241. 37
1051.00
* C & E Loss (ft)
                      0.10 * Cum SA (acres)
                                                134.84 *
                                                         12.63 *
102.64 *
```

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth Note: with the lowest, valid, energy was used.

### CROSS SECTION OUTPUT Profile #0.2%

*****	******	*****	****	****	× ×
*****					
* E.G. Elev (ft) Right OB *	* 179.70	* Element	* Left OB	* Channel	*
* Vel Head (ft)	* 0.39	* Wt. n-Val.	* 0.100	* 0.045	*
* W.S. Elev (ft)	* 179. 30	* Reach Len. (ft)	* 1330.00	* 1300.00	*
* Crit W.S. (ft)	* 172. 29	* Flow Area (sq ft)	* 5966.17	* 1495.71	*
* E.G. Slope (ft/ft)	*0. 001042	* Area (sq ft)	*15407. 79	* 1495.71	*
29.63 * * 0 Total (cfs)	*25700.00	* Flow (cfs)	*14925. 76	*10748.04	*
* Top Width (ft)	* 3321.91	* Top Width (ft)	* 3237.77	* 78.30	*
5.84 * * Vel Total (ft/s)	* 3.43	* Avg. Vel. (ft/s)	* 2.50	* 7. 19	*
0.88 * * Max Chl Dpth (ft)	* 21.80	* Hydr. Depth (ft)	* 11.92	* 19. 10	*
5.08 * * Conv. Total (cfs)	*796255. 3	* Conv. (cfs)	*462440. 3	*333003.3	*
811.6 * * Length Wtd. (ft)	* 1316. 94	* Wetted Per. (ft)	* 500.78	* 85.43	*
11.84 * * Min Ch El (ft)	* 157.50	* Shear (Ib/sq ft)	* 0.77	* 1.14	*
0. 16 * * Al pha	* 2.14	* Stream Power (lb/ft s)	* 1.94	* 8. 18	*
0.14 * * Frctn Loss (ft)	* 0.69	* Cum Volume (acre-ft)	* 1854.09	* 318.82	*
1864.60 * * C & E Loss (ft)	* 0.12	* Cum SA (acres)	* 240.49	* 13.86	*
134. 79 *		******			* *

\*\*\*\*\*

Warning: Divided flow computed for this cross-section. Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RI VER: RI VER-1

RS: 250.12 REACH: Reach-1

I NPUT

Description: XS 250.12
Broad Run Station 250.12
LOW CHORD ELEVATION REVISED
TO MATCH PROPOSED BRIDGE PLAN

```
Existing - 34R LOMR
                                    173. 96 1977. 97
173. 96 2037. 02
173. 79 2073. 1
174. 12 2119. 03
174. 17 2155. 11
174. 14 2197. 75
                                                         174. 05 1987. 82 173. 94 2004. 22
173. 93 2046. 86 173. 88 2056. 7
174. 01 2079. 66 174. 09 2086. 22
174. 21 2122. 31 174. 12 2125. 59
174. 28 2164. 95 174. 15 2168. 23
174. 26 2201. 03 174. 17 2210. 87
             174 1961. 57
173. 84 2017. 34
 1958. 29
                                                                                                       173.89
 2010. 78
                                                                                                       173.72
             173. 84 2017. 34
173. 82 2066. 54
174. 15 2102. 62
174. 23 2141. 99
174. 21 2187. 91
174. 43 2227. 27
174. 27 2273. 2
 2063.26
                                                                                                       174.02
 2096. 06
2138. 71
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 2184.63
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                                                          174. 35 2240. 4
174. 02 2286. 32
174 2319. 12
                                    174. 29 2233. 84
174. 25 2279. 76
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174. 06 2292. 88
 2220.71
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 2266.64
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                                    173. 95 2312. 56
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 2296.16
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174. 08
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174. 11
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173. 36
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174. 91
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175. 26
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175. 14
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175. 74
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                                    174.47
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173. 33
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173. 29
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172. 76
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172. 77
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172. 79
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159. 39
171. 48
     3600
              171.61
                            3605
                                    171.57
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              170.89
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               159.8
                                    173.08
                                                            172.6
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                            3700
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     3725
              170.49
                                    169.05
                                                          168. 55
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                            3740
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     3760
             167.78
                            3765
                                    167.82
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                           3660 . 045
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                                   Lengths: Left Channel Right
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Bank Sta: Left
                       Ri ght
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                        3695
              3660
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                                            2
Ineffective Flow
                            num=
    Sta L Sta R
                           El ev
                                    Permanent
                3655
3765
                          177.9
                                    F
                          177. 9
     3700
CROSS SECTION OUTPUT Profile #1%
* E.G. Elev (ft)
                              * 175.44 * Element
                                                                                         Left OB *
                                                                                                        Channel *
Right OB *
  Vel Head (ft)
                                         0.03
                                                  * Wt. n-Val.
                                                                                          0.070
                                                                                                          0.045
  0.070 *
0.50 *
                                                                                                         0.50 *
                                                     Page 53
```

* Crit W.S. (ft)	* 160.81	* Flow Area (sq ft)	*	47. 10	*	599. 80	*
44.87 * * E.G. Slope (ft/ft) 403.69 *	*0.000035	* Area (sq ft)	*	4536. 27	*	599. 80	*
* Q Total (cfs) 12.17 *	* 800.00	* Flow (cfs)	*	13. 23	*	774. 60	*
* Top Width (ft) 70.00 *	* 2947.76	* Top Width (ft)	*	2842. 76	*	35.00	*
* Vel Total (ft/s) 0.27 *	* 1.16	* Avg. Vel. (ft/s)	*	0. 28	*	1. 29	*
* Max Chl Dpth (ft) 8.97 *	* 18.41	* Hydr. Depth (ft)	*	9. 42	*	17. 14	*
* Conv. Total (cfs) 2052.0 *	*134906.3	* Conv. (cfs)	*	2231. 3	*1	30623. 1	*
* Length Wtd. (ft) 14.19 *	* 0.50	* Wetted Per. (ft)	*	14. 12	*	35. 41	*
* Min Ch El (ft) 0.01 *	* 157.00	* Shear (Ib/sq ft)	*	0. 01	*	0.04	*
* Al pha 0.00 *	* 1. 21	* Stream Power (lb/ft s)	*	0.00	*	0. 05	*
* Frctn Loss (ft) 1268.01 *	* 0.00	* Cum Volume (acre-ft)	*	894. 24	*	235. 96	*
* C & E Loss (ft) 104.79 *	* 0.02	* Cum SA (acres)	*	97. 45	*	10. 94	*
104.77	*****	******	**	*****	***	*****	**
*****							

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water šurface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

0.50 \*

CROSS SECTION OUTPUT					***	*****	***	*****	**
* E.G. Elev (ft)	*	176. 31	*	Element	*	Left OB	*	Channel	*
Right OB *  * Vel Head (ft)	*	0. 02	*	Wt. n-Val.	*	0. 070	*	0. 045	*
* W.S. Elev (ft)	*	176. 29	*	Reach Len. (ft)	*	0. 50	*	0. 50	*
0.50 * * Crit W.S. (ft) 49.23 *	*	160. 81	*	Flow Area (sq ft)	*	51. 46	*	630. 33	*
* E.G. Slope (ft/ft)	*0.	000030	*	Area (sq ft)	*	51. 46	*	630. 33	*
49. 23 * * Q Total (cfs) 11. 44 *	*	800.00	*	Flow (cfs)	*	12. 12	*	776. 43	*
* Top Width (ft) 5.00 *	*	45.00	*	Top Width (ft)	*	5. 00	*	35. 00	*
* Vel Total (ft/s) 0.23 *	*	1. 09	*	Avg. Vel. (ft/s)	*	0. 24	*	1. 23	*
* Max Chl Dpth (ft) 9.85 *	*	19. 29	*	Hydr. Depth (ft)	*	10. 29	*	18. 01	*
* Conv. Total (cfs) 2090.9 *	*14	16196. 7	*	Conv. (cfs)	*	2215. 7	*1	41890. 1	*
* Length Wtd. (ft) 17.40 *	*	0. 50	*	Wetted Per. (ft)	*	17. 81	*	35. 41	*
* Min Ch El (ft)	*	157. 00	*	Shear (Ib/sq ft) Page 54	*	0. 01	*	0. 03	*

```
0.01
                       1.23 * Stream Power (lb/ft s) *
 Al pha
                                                    0.00 *
                                                            0.04 *
  0.00
 Frctn Loss (ft)
                       0.00 * Cum Volume (acre-ft)
                                                   97.80 *
                                                           241.01
690.54
 C & E Loss (ft)
                       0.02 * Cum SA (acres)
                                                    2. 30 *
                                                            10.64
 28. 87
******************************
*****
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

### CROSS SECTION OUTPUT Profile #10% \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

*****	~ ~ ~	~ ~ ~ ~ ~ ~ ~ ~ ~	~ ~	*****	~ ~ ~	~ ~ ~ ~ ~ ~ ~ ~ ~	~ ~ .		~ ~
*****									
* E.G. Elev (ft) Right OB *	*	172. 23	*	Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.070 *	*	0. 13	*	Wt. n-Val.	*	0. 070	*	0. 045	*
* W. S. Elev (ft) 0.50 *	*	172. 10	*	Reach Len. (ft)	*	0. 50	*	0. 50	*
* Crit W.S. (ft) 28.48 *	*	162. 04	*	Flow Area (sq ft)	*	30. 57	*	483. 79	*
* E.G. Slope (ft/ft) 176.67 *	*0	. 000241	*	Area (sq ft)	*	101. 36	*	483. 79	*
* Q Total (cfs) 15.71 *	*	1450. 00	*	Flow (cfs)	*	17. 29	*	1417. 00	*
* Top Width (ft) 60.16 *	*	242. 11	*	Top Width (ft)	*	146. 95	*	35.00	*
* Vel Total (ft/s) 0.55 *	*	2. 67	*	Avg. Vel. (ft/s)	*	0. 57	*	2. 93	*
* Max Chl Dpth (ft) 6.15 *	*	15. 10	*	Hydr. Depth (ft)	*	6. 35	*	13. 82	*
* Conv. Total (cfs) 1012.3 *	*	93419. 5	*	Conv. (cfs)	*	1114. 1	*	91293. 1	*
* Length Wtd. (ft) 13.14 *	*	0. 50	*	Wetted Per. (ft)	*	13. 59	*	35. 41	*
* Min Ch El (ft) 0.03 *	*	157. 00	*	Shear (Ib/sq ft)	*	0. 03	*	0. 21	*
* Al pha 0. 02 *	*	1. 18	*	Stream Power (Ib/ft s)	*	0. 02	*	0. 60	*
* Frctn Loss (ft) 558.67 *	*	0.00	*	Cum Volume (acre-ft)	*	436. 81	*	169. 27	*
* C & E Loss (ft) 94.40 *	*	0. 05	*	Cum SA (acres)	*	58. 06	*	11. 06	*
74. 4U ******************	***	*****	**:	******	***	*****	* * ;	*****	**

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #2% \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

* E.G. Elev (ft)	* 174. 21	* Element	*	Left OB	*	Channel	*
Right OB *  * Vel Head (ft) O 070 *	* 0.04	* Wt. n-Val.	*	0. 070	*	0. 045	*
* W.S. Elev (ft)	* 174.17	* Reach Len. (ft)	*	0. 50	*	0. 50	*
* Crit W.S. (ft)	* 161.11	* Flow Area (sq ft)	*	40. 87	*	556. 21	*
* E.G. Slope (ft/ft)	*0.000064	* Area (sq ft)	*	1252. 22	*	556. 21	*
316.51 * * * * * * * * * * * * * * * * * * *	* 950.00	* Flow (cfs)	*	14. 12	*	923. 06	*
12.82 * * Top Width (ft) 70.00 *	* 2298.34	* Top Width (ft)	*	2193. 34	*	35. 00	*
70.00 * * Vel Total (ft/s) 0.33 *	* 1.49	* Avg. Vel. (ft/s)	*	0. 35	*	1. 66	*
* Max Chl Dpth (ft)	* 17. 17	* Hydr. Depth (ft)	*	8. 17	*	15. 89	*
* Conv. Total (cfs)	*118548. 7	* Conv. (cfs)	*	1761. 5	*1	15187. 5	*
* Length Wtd. (ft)	* 0.50	* Wetted Per. (ft)	*	14. 12	*	35. 41	*
* Min Ch El (ft)	* 157.00	* Shear (Ib/sq ft)	*	0. 01	*	0. 06	*
* Al pha	* 1. 20	* Stream Power (Ib/ft s)	*	0.00	*	0. 10	*
* Frctn Loss (ft)	* 0.00	* Cum Volume (acre-ft)	*	731. 86	*	216. 01	*
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	*	84. 03	*	10. 94	*
101.80 *	*****	******	* *	*****	***	****	**
****							

Warning: Divided flow computed for this cross-section. Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

## CROSS SECTION OUTPUT Profile #0.2%

\*\*\*\*\*

*******************************								
*****								
* E.G. Elev (ft) Right OB *	* 178.89	* Element	* Left OB *	Channel *				
* Vel Head (ft) 0.070 *	* 0.00	* Wt. n-Val.	* 0.070 *	0. 045 *				
* W.S. Elev (ft) 0.50 *	* 178.89	* Reach Len. (ft)	* 0.50 *	0.50 *				
* Crit W.S. (ft) 647.14 *	* 160.59	* Flow Area (sq ft)	*15271.76 *	721. 52 *				
* E.G. Slope (ft/ft) 647.14 *	*0. 000000	* Area (sq ft)	*15271.76 *	721. 52 *				
* Q Total (cfs) 31.51 *	* 700.00	* Flow (cfs)	* 558.65 *	109. 85 *				
* Top Width (ft) 70.00 *	* 3387.88	* Top Width (ft)	* 3282.88 *	35. 00 *				
* Vel Total (ft/s) 0.05 *	* 0.04	* Avg. Vel. (ft/s)	* 0.04 *	0. 15 *				
* Max Chl Dpth (ft)	* 21.89	* Hydr. Depth (ft) Page 56	* 4.65 *	20. 61 *				

9. 24	*		EXI	· •	Trig on Louin					
* Conv.	Total (cfs)	*1	132586. 0	,	* Conv. (cfs)	,	*903881. 1	*	177729. 6	
	h Wtd. (ft)	*	0. 50	*	Wetted Per. (ft)	*	3292. 52	*	35. 41	*
	h El (ft)	*	157. 00	*	Shear (Ib/sq ft)	*	0.00	*	0.00	*
0.00 * Al pha		*	2. 72	*	Stream Power (Ib/ft s)	*	0.00	*	0.00	*
	Loss (ft)	*	0.00	*	Cum Volume (acre-ft)	*	1385. 73	*	285. 74	*
	Loss (ft)	*	0. 01	*	Cum SA (acres)	*	140. 94	*	12. 17	*
133. 92	*****	***	*****	<b>*</b> * :	******	* * :	*****	***	*****	<b>*</b> *
^ ^ ^ ^ ^ ^ ^ ^	^ ^ ^ ^									

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

### **BRI DGE**

462.51

178.09

178. 21

472.35

178. 2

Page 57

177.96

482.19

178.03

RI VER: RI VER-1 RS: 250.06 REACH: Reach-1 I NPUT Description: Bridge #2 - Runway Distance from Upstream XS = . 5 Deck/Roadway Width 611.5 Weir Coefficient 2.7 Upstream Deck/Roadway Coordinates num= 8 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 0 180 0 456 180 2856 178.6 155 178. 13 169.49 3666 178.13 3666 169.49 3696 178. 13 3696 178. 13 155 5056 177.9 0 Upstream Bridge Cross Section Data Station Elevation Data num= 477 El ev Sta El ev Sta El ev Sta El ev Sta El ev Sta 182.13 182.17 22.96 13.12 182.13 181.91 0 6.56 182 16. 4 26.24 181.91 29.52 182.16 39.36 181.84 181.81 42.64 55.76 182 62.32 182.01 68.88 181.69 75.45 181.7 82.01 181.47 181.54 88. 57 114.81 95.13 181.42 108.25 181.49 121.37 101.69 181.37 181.54 181.32 127.93 181.19 134.49 181.46 141.05 181.34 144.33 181.14 150.89 181.14 154. 17 181. 27 160.73 181. 23 167.29 181 170.57 181.04 177. 13 180.96 180.68 209.93 180. 26 183.69 180.73 196.81 180.27 216.49 213. 21 180. 48 180.15 229.62 180.26 239.46 226.34 236.18 180.13 180. 16 246.02 180.02 259. 14 288. 66 180. 03 179. 57 272. 26 295. 22 179.8 282. 1 265.7 179.91 179.52 285.38 179.47 291.94 179. 6 179.45 179.6 301.78 179.48 305.06 179.59 318.18 179.48 321.46 179.29 179.23 179.39 311.62 337.86 341.14 360.82 179.24 347.7 179.23 354.26 179.3 367.39 178.93 383.79 178.82 410.03 178.67 387.07 178.95 396.91 178.73 178.77 413.31 403.47 178. 51 436.27 429.71 178.6 178.5 439.55 178.38 446.11 178.37 452.67 178.08 465.79 478.91

Existing - 34R LOMR 177. 83 177. 58 177. 23 176. 98 176. 69 492.03 488.75 177.84 498. 59 178.01 505.15 177.91 508.43 177.61 177. 84 177. 56 177. 21 177. 13 176. 86 176. 39 531. 4 554. 36 577. 32 610. 12 639. 64 528. 12 547. 8 574. 04 600. 28 515 524.84 177.59 177.67 534.68 177.33 537. 96 564. 2 587. 16 541. 24 570. 76 593. 72 629. 8 177. 41 177. 01 176. 73 177. 15 176. 79 176. 51 177. 06 177.19 557.64 583.88 176.78 616.68 176.65 626.52 176.51 636.36 176.94 642.92 177.01 176. 3 175. 92 176 175. 92 659.32 649.48 176.56 669.17 176.25 675.73 679.01 175.96 711. 81 685.57 176.03 688.85 176.06 708.53 695.41 175.83 718. 37 175.86 175.61 724.93 175.43 721.65 175.62 731.49 175.33 738.05 175. 61 175. 32 174. 92 174. 72 174. 48 174. 12 175. 66 175. 53 175. 21 174. 71 174. 48 751. 17 797. 09 741. 33 767. 57 813. 5 862. 7 175. 36 174. 83 175. 21 174. 82 744.61 747.89 761.01 175.14 774. 13 820. 06 869. 26 911. 9 947. 98 783.97 803.65 174.85 826. 62 872. 54 918. 46 174. 8 174. 35 174. 02 173. 73 836. 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175.77 3020 3030 175.52 175.83 3005 175.83 175.63 175.48 3045 175.34 3050 3055 3060 175. 26 175.19 175.17 3035

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171. 842951. 912
172. 833053. 353
173. 833225. 801
172. 843317. 097
                                                                                                                                                                                  171.34
                                                                                                     171. 42840. 328
171. 72941. 768
172. 743033. 064
173. 713114. 217
                                                                                                                                                                                  171. 37
                        171. 412911. 336
                                                                                                                                                                                  171.93
                        171. 943002. 632
172. 963083. 784
                                                                                                                                                                                  172. 83
173. 82
3246.089
                        173. 523286. 665
                                                               173. 083296. 809
                                                                                                     172. 873306. 953
                                                                                                                                                                                  172. 95
3327. 241
                        173. 173337. 385
                                                               173. 313347. 529
                                                                                                     173. 543357. 673
                                                                                                                                           173. 713367. 817
                                                                                                                                                                                  173.91
                        174. 353408. 393
174. 443509. 834
                                                              174. 693418. 537
174. 253530. 122
                                                                                                                                           174.833479.402
3388.105
                                                                                                     174. 833469. 258
                                                                                                                                                                                  174.75
  3499. 69
                                                                                                     173. 953540. 266
172. 75 3601. 13
                                                                                                                                           173.68 3550.41
                                                                                                                                                                                  173. 17
171. 99
                        173. 073570. 698
                                                                                                                                           172. 323611. 274
3560.554
                                                              173.013580.842
                                                                                                    1723814. 155
173. 333905. 451
166. 143976. 459
161. 234047. 467
                                                                                                                                                                                 171. 99
172. 83
172. 92
161. 01
165. 32
172. 61
                                                                                                                                           172. 483824. 299
173. 333915. 595
163. 943986. 603
163. 494057. 611
                       171. 833793. 866
173. 023854. 731
170. 963956. 171
156. 844027. 179
                                                              171. 83 3804. 01
173. 083895. 307
168. 953966. 315
159. 874037. 323
3621. 418
3834. 443
3946. 027
3990
4067.755
                        167. 454077. 899
                                                              169. 434088. 043
                                                                                                            1714098.188
                                                                                                                                           172.024108.332
4118.476
                        172. 844148. 908
                                                              173. 214169. 195
                                                                                                     173. 294189. 483
                                                                                                                                           173. 334219. 916
                                                                                                                                                                                  173.46
4240. 204
                        173. 584250. 348
                                                                                                     173.054341.644
                                                                                                                                           173. 014361. 932
                                                               173. 544321. 356
                                                                                                                                                                                  172.89
                        172. 634412. 652
172. 724564. 813
172. 254716. 973
4392.364
                                                              172. 494422. 796
172. 834635. 821
                                                                                                     172. 39 4432. 94
172. 834645. 965
                                                                                                                                           172. 354463. 373
172. 814666. 253
                                                                                                                                                                                  172.47
                                                                                                                                                                                  172.55
4544.524
                                                              172. 034033. 021
172. 114767. 693
171. 924869. 133
174. 775041. 582
4696.685
                                                                                                     171.864777.837
                                                                                                                                           171. 834798. 125
                                                                                                                                                                                  171.83
                                                                                                     172. 824899. 565
175. 655051. 726
4818.413
                        171. 874828. 557
                                                                                                                                           172. 85 4960. 43
                                                                                                                                                                                  173.74
                                                                                                                                           175.83 5061.87
4980.718
                        173. 92 5011. 15
                                                                                                                                                                                  175.83
Manning's n Values
                                                              num=
 0 . 073966. 315 . 0454057. 611 . 07
```

```
Existing - 34R LOMR
                           Coeff Contr. Expan.
Bank Sta: Left Right
      3966. 3154057. 611
                                    . 3
                                 2
Ineffective Flow
                    num=
   Sta L Sta R
                     Elev Permanent
            3985
                     177
                            F
    4035 5061.87
                                F
                      177
Upstream Embankment side slope
                                                    4 horiz. to 1.0 vertical
                                            = 4
                                                     4 horiz. to 1.0 vertical
Downstream Embankment side slope
Maximum allowable submergence for weir flow = Elevation at which weir flow begins =
                                                  177. 4
Energy head used in spillway design
Spillway height used in design
Weir crest shape
                                             = Broad Crested
Number of Bridge Coefficient Sets = 1
Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer
High Flow Method
       Energy Only
Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weigh't component to Momentum
       Class B flow critical depth computations use critical depth inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line
BRIDGE OUTPUT Profile #1%
```

******	*****	*****	*******	****	******	*****	ķ
*****							
* E.G. US. (ft) *Inside BR DS *	*	175. 44	* Element	*I ns	side BR US		
* W. S. US. (ft) 174. 82 *	*	175. 41	* E.G. Elev (ft)	*	175. 42	*	
* 0 Total (cfs) 174.63 *	*	800.00	* W.S. Elev (ft)	*	175. 33	*	
* Q Bridge (cfs) 161.69 *	*	800.00	* Crit W.S. (ft)	*	160. 99	*	
* Q Weir (cfs) 17.79 *	*		* Max Chl Dpth (ft)	*	18. 33	*	
* Weir Sta Lft (ft) 3.48 *	*		* Vel Total (ft/s)	*	2. 37	*	
* Weir Sta Rgt (ft)	*		* Flow Area (sq ft)	*	338. 17	*	
* Weir Submerg	*		* Froude # Chl	*	0. 10	*	
* Weir Max Depth (ft)	*		* Specif Force (cu ft)	*	3952. 68	*	
2601.09 * * Min El Weir Flow (ft)	*	178. 13	* Hydr Depth (ft)	*		*	
* Min El Prs (ft)	*	169. 49	* W.P. Total (ft)	*	80. 03	*	
* Del ta EG (ft)	*	0. 72	* Conv. Total (cfs)	*	31004.0	*	
20029.1 * * Del ta_WS (ft)	*	0. 71	* Top Width (ft)	*		*	
* BR Open Area (sq ft)	*	229. 69	* Frctn Loss (ft)	*	0. 57	*	
0.01 * * BR Open Vel (ft/s)	*	3. 48	* C & E Loss (ft) Page 61	*	0. 03	*	

0 09 *	EX. 50	triig on Louin	
* BR SIuice Coef	*	* Shear Total (lb/sq ft) * 0.18 *	
0. 43 *	*F	. * Dawar Tatal (15/65 a) * 0.40 *	
* BR Sel Method 1 49 *	^Energy only	* Power Total (lb/ft s) * 0.42 *	
1. 17	*****	**********	***
*****			

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth

with the lowest, valid, water surface was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

## BRIDGE OUTPUT Profile #Floodway

BRIDGE UUIPUI PROTIIE #FLOOGWAY										
*****										
* E.G. US. (ft) *Inside BR DS *	*	176. 31	* Element	*In	side BR US					
* W.S. US. (ft)	*	176. 29	* E.G. Elev (ft)	*	176. 29	*				
* Q Total (cfs)	*	800.00	* W.S. Elev (ft)	*	176. 20	*				
175.50 * * Q Bridge (cfs)	*	800.00	* Crit W.S. (ft)	*	160. 99	*				
161.69 * * Q Weir (cfs)	*		* Max Chl Dpth (ft)	*	19. 20	*				
18.66 * * Weir Sta Lft (ft)	*		* Vel Total (ft/s)	*	2. 37	*				
3.48 * * Weir Sta Rgt (ft)	*		* Flow Area (sq ft)	*	338. 17	*				
229.69 * * Weir Submerg	*		* Froude # Chl	*	0. 10	*				
0.14 * * Weir Max Depth (ft)	*		* Specif Force (cu ft)	*	4246. 64	*				
2800.76 * * Min El Weir Flow (ft)	*	178. 14	* Hydr Depth (ft)	*		*				
* Min El Prs (ft)	*	169. 49	* W.P. Total (ft)	*	80. 03	*				
* Delta EG (ft)	*	0. 72	* Conv. Total (cfs)	*	31004.0	*				
20029.1 * * Delta_WS (ft)	*	0. 71	* Top Width (ft)	*		*				
* BR Open Area (sq ft)	*	229. 69	* Frctn Loss (ft)	*	0. 57	*				
0.01 * * BR Open Vel (ft/s)	*	3. 48	* C & E Loss (ft)	*	0. 03	*				
0.09 * * BR Sluice Coef	*		* Shear Total (Ib/sq ft)	) *	0. 18	*				
0.43 * * BR Sel Method 1.49 *	*Ener	gy only	* Power Total (lb/ft s)	*	0. 42	*				
	****	*****	*******	****	*****	*****				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth Note: Page 62

with the lowest, valid, water surface was used.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

#### BRIDGE OUTPUT Profile #10%

\*\*\*\*\*

BRIDGE OUTPUT Profile #		*****	*******	****
*****				
* E.G. US. (ft)	*	172. 23	* Element	IS
*Inside BR DS *  * W.S. US. (ft)  170.20 *	*	172. 10	* E.G. Elev (ft) * 172.18	*
* Q Total (cfs) 169.58 *	*	1450. 00	* W.S. Elev (ft) * 171.88	<b>*</b>
* 0 Bridge (cfs) 163.47 *	*	1450. 00	* Crit W.S. (ft) * 162.39	*
* 0 Weir (cfs) 12.74 *	*		* Max Chl Dpth (ft) * 14.88	<b>*</b>
* Weir Sta Lft (ft) 6.31 *	*		* Vel Total (ft/s)	*
* Weir Sta Rgt (ft) 229.69 *	*		* Flow Area (sq ft)	*
* Weir Submerg O.31 *	*		* Froude # ChI	) *
* Weir Max Depth (ft) 1638.86 *	*		* Specif Force (cu ft) * 2924.08	*
* Min El Weir Flow (ft)	*	178. 13	* Hydr Depth (ft) *	*
* Min El Prs (ft) 53.52 *	*	169. 49	* W.P. Total (ft)	*
* Delta EG (ft) 20029.1 *	*	2. 31	* Conv. Total (cfs) * 31004.0	*
* Del ta WS (ft)	*	2. 29	* Top Width (ft) *	*
* BR Open Area (sq ft) 0.02 *	*	229. 69	* Frctn Loss (ft) * 1.89	*
* BR Open Vel (ft/s) 0.26 *	*	6. 31	* C & E Loss (ft)	*
* BR SIuice Coef 1.40 *	*		* Shear Total (lb/sq ft) * 0.58	*
* BR Sel Method 8.86 *	*Ene	ergy only	* Power Total (lb/ft s) * 2.47	*
******	****	*****	*********	****

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

#### \* E.G. US. (ft) \*Inside BR DS \* 174. 21 \* Element \*Inside BR US 174.17 \* E.G. Elev (ft) \* W. S. US. (ft) 174. 18 173. 33 \* Q Total (cfs) \* W.S. Elev (ft) 950.00 174.06 173. 07 \* Q Bridge (cfs) 950.00 \* Crit W.S. (ft) 161.33 162.12 \* \* 0 Weir (cfs) \* Max Chl Dpth (ft) 17.06 16. 23 \* Weir Sta Lft (ft) \* Vel Total (ft/s) 2.81 4.14 \* Weir Sta Rgt (ft) \* Flow Area (sq ft) 338. 17 229. 69 \* Weir Submerq \* Froude # Chl 0. 12 0. 18 \* Weir Max Depth (ft) \* Specif Force (cu ft) 3547.02

178.13 \* Hydr Depth (ft)

\* W. P. Total (ft)

\* Top Width (ft)

\* Conv. Total (cfs)

80.03

31004.0 \*

0.70 \*

\* BR Open Area (sq ft) \* 229.69 \* Frctn Loss (ft) 0.81 0.01 \* \* BR Open Vel (ft/s) 4.14 \* C & E Loss (ft) 0.04 0.12 \* BR Sluice Coef \* Shear Total (lb/sq ft) \* 0.25 \* 0. 60

169. 49

1.01

0.99

2278. 25

53.52 \*

20029.1 \* \* Delta WS (ft)

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

\*Energy only \* Power Total (lb/ft s) \*

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used. Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth Note: with the lowest, valid, water surface was used.

#### BRIDGE OUTPUT Profile #0.2% \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

BRIDGE OUTPUT Profile #2%

\* Min El Weir Flow (ft)

\* Min El Prs (ft)

\* BR Sel Method

\* Delta EG (ft)

\*

*****			
* E.G. US. (ft) *Inside BR DS *	*	178.89 * Element	*Inside BR US
* W. S. US. (ft) 178.50 *	*	178.89 * E.G. Elev (ft)	* 178.88 *
* Q Total (cfs) 178.47 *	*	700.00 * W.S. Elev (ft)	* 178.85 *
* 0 Bridge (cfs) 161.34 *	*	582.89 * Crit W.S. (ft)	* 160.74 *

		Fxisti	na	- 34R LOMR				
* Q Weir (cfs)	*	2711 3 61		Max Chl Dpth (ft)	*	21. 85	*	
* Weir Sta Lft (ft)	*		*	Vel Total (ft/s)	*	0.82	*	
0.76 * * Weir Sta Rgt (ft)	*		*	Flow Area (sq ft)	*	853. 63	*	
917.51 * * Weir Submerg	*		*	Froude # Chl	*	0. 06	*	
0.05 * * Weir Max Depth (ft)	*		*	Specif Force (cu ft)	*	5244. 87	*	
4361.12 * * Min El Weir Flow (ft)	*	178. 13		Hydr Depth (ft)	*	0. 64	*	
0. 49 *	*				*		*	
* Min El Prs (ft) 1954.44 *		169. 49		W. P. Total (ft)		1414. 93		
* Del ta EG (ft) 23296.5 *	*	0. 41	*	Conv. Total (cfs)	*	32252. 2	*	
* Delta WS (ft) 1874.73 *	*	0. 41	*	Top Width (ft)	*	1334. 17	*	
* BR Open Area (sq ft) 0.00 *	*	229. 69	*	Frctn Loss (ft)	*	0. 38	*	
* BR Open Vel (ft/s)	*	1. 97	*	C & E Loss (ft)	*	0.00	*	
* BR SIuice Coef	*		*	Shear Total (Ib/sq ft)	*	0. 02	*	
0.03 * * BR Sel Method	*Ener	gy onl y	*	Power Total (lb/ft s)	*	0. 01	*	
0. 02   * **********	****	*****	**:	******	***	*****	****	**
*****								

Multiple critical depths were found at this location. The critical depth Note: with the lowest, valid, water surface was used.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

#### CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1 RS: 250

I NPUT

Description: XS 250 Broad Run Station 250

CHANNEL REACH DISTANCE ADJUSTED PER
PROPOSED RUNWAY BRIDGE
THIS IS THE D/S FACE OF RUNWAY 34-R

Station E	l evati on	Data	num=	385					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
*****	*****	*****	*****	*****	*****	*****	*****	*****	****
0	182. 87	3. 28	182. 74	26. 24	182. 47	32.8	182. 49	39. 35	182. 28
45. 91	182. 33	52. 47	182. 59	55. 75	182. 38	68. 87	182. 21	75. 43	182. 31
98. 39	181. 7	104. 95	181. 77	118. 07	181. 41	124. 62	181. 52	141. 02	181. 23
147. 58	180. 98	154. 14	180. 97	163. 98	181. 13	170. 54	181. 02	180. 38	181. 04
186. 94	180. 83	193. 5	180. 91	206. 61	180. 64	219. 73	180. 53	226. 29	180. 39
232. 85	180. 38	242. 69	180. 12	252. 53	180. 02	255. 81	180. 1	268. 93	179. 85
282. 04	179. 68	288. 6	179. 88	295. 16	179. 63	308. 28	179. 45	314. 84	179. 43
321. 4	179. 65	331. 24	179. 47	337. 8	179. 25	344. 36	179. 35	350. 92	179. 18
367. 31	179. 01	377. 15	178. 68	390. 27	178. 82	400. 11	178. 57	406. 67	178. 58
409. 95	178. 45	416. 51	178. 63	426. 35	178. 31	436. 19	178. 48	449. 3	178. 26
462. 42	178. 32	465. 7	178. 23	475. 54	178. 23	482. 1	178. 05	498. 5	178. 05
				Pag	ge 65				

Existing - 34R LOMR 177. 73 177. 36 176. 84 176. 52 176. 42 505. 06 554. 25 177.84 177.5 177.97 511.62 518. 18 537.85 177.71 544.41 177.58 560.81 570.65 583.77 177.15 590.33 177.19 177.38 596. 89 642. 8 678. 88 619. 84 659. 2 691. 99 176. 62 176. 76 176. 15 175. 92 629. 68 665. 76 698. 55 747. 75 176. 53 176. 79 176. 25 175. 78 610 649. 36 685. 43 724. 79 176.64 177 636.24 176. 46 176. 35 176. 15 669. 04 705. 11 176.5 176.1 708.39 734.63 754.31 175.8 767. 42 800. 22 175.52 773.98 175.64 780.54 175.54 783.82 175.36 793.66 175.29 816. 62 859. 25 175.53 175.24 175.36 826.46 175.41 833.02 175.11 839.58 175. 36 826. 46
175. 36 865. 81
175. 19 898. 61
174. 84 947. 8
174. 37 997
174. 03 1039. 63
173. 86 1082. 27
173. 69 1147. 86
173. 22 1193. 77
173. 01 1265. 92
173. 27 1295. 44
173. 3 1338. 08
173. 53 1380. 71
174. 1 1429. 9 175.17 175.11 174.89 846.13 175.16 872.37 875.65 859. 25 892. 05 944. 52 987. 16 1033. 07 1075. 71 1131. 46 175. 11 875. 65 175. 01 921. 57 174. 56 977. 32 174. 27 1010. 11 173. 95 1052. 75 173. 76 1115. 06 173. 54 1164. 26 174. 69 174. 7 174. 34 174. 37 173. 98 173. 62 173. 48 175. 07 174. 78 174. 91 174. 71 882. 21 924. 85 908. 45 967. 48 174. / 1 174. 45 1006. 84 174. 06 1042. 91 173. 96 1108. 5 173. 41 1151. 14 173. 4 1203. 61 1269. 2 983. 88 1023. 23 1065. 87 174. 49 174. 12 173. 86 173. 73 1121.62 173. 73 1131. 46 173. 55 1180. 65 173. 17 1246. 25 173. 26 1288. 88 173. 28 1331. 52 173. 33 1361. 03 173. 35 1420. 07 174. 71 1472. 54 175. 08 1538. 13 174. 69 1597. 16 173. 4 1203. 61 172. 91 1269. 2 173. 06 1305. 28 173. 15 1344. 63 173. 36 1223. 29 173. 07 1275. 76 1170.82 173.02 1242.97 173. 21 1315. 12 173.17 1282.32 173. 39 1351. 19 173. 29 1400. 39 174. 31 1456. 14 175 1508. 61 1318.4 173.48 1354. 47 1403. 67 1465. 98 1525. 01 1570. 93 173. 13 1344. 03 173. 2 1393. 83 174. 31 1443. 02 175. 03 1492. 22 174. 96 1557. 81 173. 64 1610. 28 173.42 174. 1 1429. 9 174. 72 1485. 66 175. 1 1547. 97 174. 44 175. 29 174. 95 1564. 37 174.65 174.09 1607 173.68 1613.56 173.44 173.1 1636.52
173.06 1669.32
173.07 1698.83
172.79 1744.75
172.7 1793.94
172.38 1852.97
172.34 1908.73
172.26 1967.76
171.82 2016.95
171.9 2056.31
171.57 2112.06
171.39 2187.49
171.58 2220.29
171.74 2279.32
171.53 2312.12
171.53 2358.04
171.832424.423
171.782505.575
171.492556.295 1620.12 173.44 1633.24 173. 1 1636. 52 173.31 1643.08 173.07 1649.64 173.19 1652. 92 1682. 43 173. 02 1659. 48 173. 19 1688. 99 172. 98 1672. 59 172. 73 1705. 39 173. 18 1679. 15 173.04 172. 86 1711. 95 172.76 173. 19 1688. 99 172. 91 1731. 63 172. 78 1787. 38 172. 26 1846. 41 172. 49 1898. 89 172. 32 1957. 92 172. 02 2007. 11 172. 73 1705. 39 173. 03 1764. 42 172. 75 1807. 06 172. 31 1866. 09 172. 53 1915. 29 172. 03 1977. 6 171. 81 2026. 79 171. 99 2062. 87 171. 59 2138 3 172. 76 173. 09 172. 52 172. 36 172. 01 171. 93 171. 93 1718. 51 1780. 82 173.01 1770.98 172.43 1813.62 172. 44 1869. 37 172. 34 1941. 52 172. 02 1984. 16 171. 65 2030. 07 1843. 13 1879. 21 1948. 08 2000. 55 171.76 2043.19 171.84 2082.55 2039.91 171.69 171. 76 2043. 19 171. 73 2102. 22 171. 5 2167. 82 171. 61 2213. 73 171. 66 2266. 21 171. 64 2305. 56 171. 38 2341. 64 171. 792404. 135 171. 892495. 431 171. 99 2062. 87 171. 59 2138. 3 171. 43 2194. 05 171. 45 2226. 85 171. 68 2285. 88 171. 58 2315. 4 171. 48 2367. 88 171. 38 2141. 58 171. 56 2200. 61 2089.1 171.48 2151. 42 2203. 89 171.51 171. 45 2233. 41 171. 73 2292. 44 171. 48 2325. 24 171. 54 2374. 43 171.58 2262. 93 2295. 72 2335. 08 171.56 171. 48 171. 67 2387. 55 2485. 287 1722454. 855 171. 752515. 719 172. 032475. 143 171. 552525. 863 171.97 171.57 171. 492556. 295 171. 52607. 015 171. 432738. 888 171. 52566. 439 2536.007 171. 472576. 583 171. 512546. 151 171.47 171. 482667. 879 171. 352759. 176 171. 462627. 303 171. 462749. 031 2586.727 171. 512596. 871 171.42 171. 372728. 744 2688. 167 171.34 171. 42850. 472 171. 842951. 912 172. 833053. 353 173. 833225. 801 172. 843317. 097 171. 34 171. 37 171. 93 172. 83 173. 82 172. 95 171. 37 2820.04 171. 492931. 624 172. 32 3022. 92 173. 363104. 073 171. 42840. 328 171. 72941. 768 172. 743033. 064 173. 713114. 217 2779. 464 2891. 048 171. 412809. 896 171. 412911. 336 2982. 344 3063. 497 171. 943002. 632 172. 963083. 784 3246.089 173. 523286. 665 173.083296.809 172. 873306. 953 173. 91 3327. 241 173. 173337. 385 173. 313347. 529 173. 543357. 673 173. 713367. 817 173. /13367. 817 174. 833479. 402 173. 68 3550. 41 172. 323611. 274 172. 483824. 299 173. 333915. 595 163. 943986. 603 163. 494057. 611 3388.105 174. 353408. 393 174. 693418. 537 174. 833469. 258 174.75 3499.69 174. 443509. 834 174. 253530. 122 173. 013580. 842 173. 953540. 266 172. 75 3601. 13 173. 17 171. 99 173. 073570. 698 3560.554 3621. 418 3834. 443 3946. 027 171. 83 3804. 01 173. 083895. 307 168. 953966. 315 159. 874037. 323 171. 833793. 866 1723814.155 172.83 173. 333905. 451 166. 143976. 459 161. 234047. 467 173. 023854. 731 172.92 170. 963956. 171 156. 844027. 179 161.01 3990 165.32 167. 454077. 899 4067.755 169. 434088. 043 1714098.188 172.024108.332 172.61 4118.476 172. 844148. 908 173. 214169. 195 173. 294189. 483 173. 334219. 916 173.46 173.014361.932 4240.204 173. 584250. 348 173. 544321. 356 173.054341.644 172.89 172.634412.652 172. 494422. 796 172.39 4432.94 172. 354463. 373 4392.364 172.47 4544.524 172. 724564. 813 172. 834635. 821 172. 834645. 965 172. 814666. 253 172.55

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Existing - 34R LOMR
         172. 254716. 973 172. 114767. 693 171. 864777. 837
4696. 685
                                                          171. 834798. 125
                                                                          171.83
                          171. 924869. 133
                                          172. 824899. 565 172. 85 4960. 43
4818. 413
         171. 874828. 557
                                                                          173. 74
                          174. 775041. 582 175. 655051. 726 175. 83 5061. 87
4980. 718
         173. 92 5011. 15
                                                                          175.83
Manning's n Values
                          num=
                     Sta
                                           n Val
  Sťa n Val
                         n Val
                                     Sta
            . 073966. 315
                           . 0454057. 611
                                            . 07
Bank Sta: Left Right 3966.3154057.611
                          Lengths: Left Channel
                                                  Ri ght
                                                            Coeff Contr.
                                                                            Expan.
                                     10
                                            13
                                                     35
                                                                   . 3
                                                                             . 5
                                2
Ineffective Flow
                    num=
           Sta R
                    El ev
                          Permanent
   Sta L
            3985
                     177
                               F
    4035 5061.87
                     177
CROSS SECTION OUTPUT Profile #1%
                   *************
* E.G. Elev (ft)
                            174.72 * Element
                                                                Left OB *
                                                                           Channel *
Right OB *
  Vel Head (ft)
                              0.02
                                    * Wt. n-Val.
                                                                             0.045
* W.S. Elev (ft)
                            174.71
                                    * Reach Len. (ft)
                                                                  10.00
                                                                             13.00
  35.00 *
* Crit W.S. (ft)
                            160.74
                                    * Flow Area (sq ft)
                                                                            795.09
* E.G. Slope (ft/ft)
                         *0.000025
                                    * Area (sq ft)
                                                               6076. 27
                                                                          1257.08
1948. 73
* Q Total (cfs)
                            800.00
                                    * Flow (cfs)
                                                                            800.00
* Top Width (ft) 951.29 *
                         * 3891.49
                                    * Top Width (ft)
                                                               2848. 91
                                                                             91.30
* Vel Total (ft/s)
                              1.01
                                    * Avg. Vel. (ft/s)
                                                                              1.01
                                    * Hydr. Depth (ft)
* Max Chl Dpth (ft)
                             17.87
                                                                             15.90
* Conv. Total (cfs)
                         *161241.3
                                    * Conv. (cfs)
                                                                         *161241.3
                                    * Wetted Per. (ft)
                                                                             52.24
* Length Wtd. (ft)
                             13.00
* Min Ch El (ft)
                            156.84
                                    * Shear (lb/sq ft)
                                                                              0.02
* Al pha
                              1.00
                                    * Stream Power (lb/ft s) *
                                                                              0.02
* Frctn Loss (ft)
                              0.00
                                    * Cum Volume (acre-ft)
                                                                 893.66
                                                                            231.42
1267. 77
* C & E Loss (ft)
                              0.00
                                    * Cum SA (acres)
                                                                 97.17
                                                                             10.93
 104. 70 *
Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth
with the lowest, valid, water surface was used.
CROSS SECTION OUTPUT Profile #Floodway
* E.G. Elev (ft)
                        * 175.59 * Element
                                                                Left OB *
                                                                           Channel *
Right OB *
                        * 0.01 * Wt. n-Val.
                                                                             0.045 *
* Vel Head (ft)
```

* W.S. Elev (ft)	*			ing - 34R LOMR Reach Len. (ft)	*	10. 00	*	13. 00	*
35.00 * * Crit W.S. (ft)	*	160. 74	*	Flow Area (sq ft)	*		*	838. 60	*
* E.G. Slope (ft/ft)	*0	. 000037	*	Area (sq ft)	*		*	838. 60	*
* Q Total (cfs)	*	800.00	*	Flow (cfs)	*		*	800.00	*
* Top Width (ft)	*	50.00	*	Top Width (ft)	*		*	50.00	*
* Vel Total (ft/s)	*	0. 95	*	Avg. Vel. (ft/s)	*		*	0. 95	*
* Max Chl Dpth (ft)	*	18. 74	*	Hydr. Depth (ft)	*		*	16. 77	*
* Conv. Total (cfs)	*1	31533. 3	*	Conv. (cfs)	*		*1	31533. 3	*
* Length Wtd. (ft)	*	13. 00	*	Wetted Per. (ft)	*		*	81. 00	*
* Min Ch El (ft)	*	156. 84	*	Shear (Ib/sq ft)	*		*	0. 02	*
* Al pha	*	1. 00	*	Stream Power (lb/ft s)	*		*	0. 02	*
* Frctn Loss (ft)	*	0.00	*	Cum Volume (acre-ft)	*	97. 80	*	236. 98	*
690.48 * * C & E Loss (ft) 28.87 *	*	0.00	*	Cum SA (acres)	*	2. 30	*	10. 64	*
20. 07 *******************	***	*****	* *	******	***	*****	***	*****	**
*****									

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

# CROSS SECTION OUTPUT Profile #10%

******	*****	*******	***	*****	****	**
* E.G. Elev (ft) Right OB *	* 169. 92	* Element	*	Left OB *	Channel	*
* Vel Head (ft)	* 0.11	* Wt. n-Val.	*	*	0.045	*
* W.S. Elev (ft) 35.00 *	* 169.81	* Reach Len. (ft)	*	10.00 *	13.00	*
* Crit W.S. (ft)	* 161.78	* Flow Area (sq ft)	*	*	550. 24	*
* E.G. Slope (ft/ft) 49.11 *	*0.000276	* Area (sq ft)	*	24.84 *	809. 99	*
* 0 Total (cfs)	* 1450.00	* Flow (cfs)	*	*	1450.00	*
* Top Width (ft) 22.74 *	* 128.52	* Top Width (ft)	*	14. 48 *	91. 30	*
* Vel Total (ft/s)	* 2.64	* Avg. Vel. (ft/s)	*	*	2. 64	*
* Max Chl Dpth (ft)	* 12.97	* Hydr. Depth (ft)	*	*	11.00	*
* Conv. Total (cfs)	* 87303.4	* Conv. (cfs)	*	*	87303. 4	*
* Length Wtd. (ft)	* 13.00	* Wetted Per. (ft)	*	*	52. 24	*
* Min Ch El (ft)	* 156.84	* Shear (Ib/sq ft)	*	*	0. 18	*
* Al pha	* 1.00	* Stream Power (lb/ft s) Page 68	*	*	0. 48	*

*	Ex	disting - 34R LOMR	
* Frctn Loss (ft)	* 0.00	* Cum Volume (acre-ft)	* 436.81 * 164.77 *
558.60 * * C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 58.06 * 11.05 *
	*****	*******	******
*****			
Note: Multiple crit with the lowest, valid		were found at this locati ace was used.	on. The critical depth
CROSS SECTION OUTPUT		********	*******
* E.G. Elev (ft)	* 173. 20	* Element	* Left OB * Channel *
Right OB * * Vel Head (ft)	* 0.03	* Wt. n-Val.	* * 0.045 *
* W.S. Elev (ft)	* 173.18	* Reach Len. (ft)	* 10.00 * 13.00 *
35.00 * * Crit W.S. (ft) *	* 161.00	* Flow Area (sq ft)	* * 718.60 *
* E.G. Slope (ft/ft)	*0. 000049	* Area (sq ft)	* 2276.37 * 1117.40 *
580.63 * * Q Total (cfs)	* 950.00	* Flow (cfs)	*
* Top Width (ft)	* 2722.11	* Top Width (ft)	* 1923. 20 * 91. 30 *
707.61 * * Vel Total (ft/s) *	* 1.32	* Avg. Vel. (ft/s)	* * 1.32 *
* Max Chl Dpth (ft)	* 16.34	* Hydr. Depth (ft)	* * 14.37 *
* Conv. Total (cfs)	*136224.0	* Conv. (cfs)	* *136224.0 *
* Length Wtd. (ft)	* 13.00	* Wetted Per. (ft)	* * 52.24 *
* Min Ch El (ft)	* 156.84	* Shear (Ib/sq ft)	* * 0.04 *
* Al pha *	* 1.00	* Stream Power (Ib/ft s	) *
* Frctn Loss (ft) 1047.14 *	* 0.00	* Cum Volume (acre-ft)	* 731.64 * 211.48 *
* C & E Loss (ft) 101.74 *	* 0.01	* Cum SA (acres)	* 83.85 * 10.93 *
	*****	********	*******
Warning: Divided flow Note: Multiple crit with the lowest, valid	ical depths	were found at this locati	on. The critical depth
			******
********* * E.G. Elev (ft)	* 178.48	* Element	* Left OB * Channel *
Right OB * * Vel_Head (ft)	* 0.00	* Wt. n-Val.	* 0.070 * 0.045 *
0.070 * * W.S. Elev (ft)	* 178.48	* Reach Len. (ft)	* 10.00 * 13.00 *
35.00 * * Crit W.S. (ft)	* 160.54	* Flow Area (sq ft)	*18501.64 * 1601.44 *
5699.50 * * E.G. Slope (ft/ft)	*0. 000000	* Area (sq ft) Page 69	*18501.64 * 1601.44 *

5699. 50 ^									
* Q Total (cfs) 140.22 *	*	700.00	*	Flow (cfs)	*	432. 47	*	127. 32	*
* Top Width (ft)	*	4642. 40	*	Top Width (ft)	*	3546.85	*	91. 30	*
1004.26 *  * Vel Total (ft/s)	*	0. 03	*	Avg. Vel. (ft/s)	*	0. 02	*	0. 08	*
0.02 * * Max Chl Dpth (ft) 5.68 *	*	21. 64	*	Hydr. Depth (ft)	*	5. 22	*	17. 54	*
* Conv. Total (cfs)	*1	917480. 0	,	* Conv. (cfs)	;	*1184633.	0	*348749.	2
*384097.9 * * Length Wtd. (ft) 1007.57 *	*	14. 28	*	Wetted Per. (ft)	*	3547. 99	*	94. 55	*
* Min Ch El (ft)	*	156. 84	*	Shear (Ib/sq ft)	*	0.00	*	0.00	*
* Al pha	*	2. 19	*	Stream Power (lb/ft s)	*	0.00	*	0.00	*
* Frctn Loss (ft)	*	0.00	*	Cum Volume (acre-ft)	*	1379. 92	*	280. 77	*
1852.62 * * C & E Loss (ft)	*	0.00	*	Cum SA (acres)	*	126. 42	*	11. 26	*
126. 19 * *********************************	***	*****	*:	*******	**:	*****	***	*****	**
*****									

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

5600 50

RIVER: RIVER-1

REACH: Reach-1 RS: 246

I NPUT

Description: XS 246

CHANNEL REACH DISTANCE ADJUSTED PER PROPOSED RUNWAY **BRI DGE** 

THIS IS THE CROSS SECTION BETWEEN THE RUNWAYS Station Elevation Data num= 390 Sta El ev Sta Elev Sta El ev Sta El ev Sta El ev 182. 87 182. 32 181. 75 3. 28 52. 49 182. 74 182. 57 182. 47 182. 21 182. 48 182. 31 181. 21 0 26. 25 32.81 39.37 182.27 45.93 98.42 68.89 75.46 181. 7 104.98 137.79 118.1 181.4 124.67 181.5 141.07 181.22 147.63 180.94 164.03 181.1 180.96 154.19 170.59 180.44 181.01 181 187 180.79 193.56 180.87 203.4 180.77 206.68 180.63 213.24 180.62 226.37 180.39 236.21 180. 29 242. 77 180.09 262.45 179.99 269.01 179.82 179.68 179.86 295. 26 282.14 288.7 179.61 311.66 179.38 321.51 179.57 179. 19 178. 75 178. 25 344.47 179.14 179.41 337.91 179.36 331.35 351.03 367.43 178.98 374 178.7 390.4 400.24 178.52 406.8 178.58 410.08 178.44 178. 62 178. 16 177. 79 413. 36 465. 85 436. 33 482. 26 178. 44 177. 99 426.49 178.27 446.17 459. 29 178.26 177.68 178.02 511.78 472.42 178.2 498.66 518.35 538.03 177.63 544.59 177.4 547.87 177.53 554.43 177.51 560.99 177. 26 177.29 567.56 177.31 583.96 177.13 590.52 597.08 177 176.5 610.2 176.83 613.48 176.71 629.89 636.45 176.54 176.42 643.01 656.13 176.64 662.69 176.53 665.98 176.6 669.26 176.41 679.1 176.28 685.66 176.36 692.22 176.05 698.78 176. 17 705.34 175.99 708.62 176.09 Page 70

Existing - 34R LOMR 725. 03 757. 83 800. 48 856. 25 892. 34 944. 83 731.59 175.7 744.71 175. 71 175. 37 175. 82 175. 28 175.86 734. 87 175.86 751.27 175. 49 175. 36 175. 07 174. 88 767. 68 810. 32 175.76 777.52 784.08 790.64 175.62 175. 45 175. 25 175. 11 826. 73 869. 38 908. 74 957. 95 833. 29 875. 94 921. 87 964. 52 175. 36 175. 16 174. 94 174. 41 175. 11 174. 99 175.06 846.41 866. 1 898. 9 951. 39 174. 87 174. 74 889.06 928. 43 174.85 174.67 174.46 174.51 977.64 174.28 980. 92 1020. 29 1062. 94 174. 4 1007. 16 173. 92 1043. 25 173. 73 1079. 34 174. 32 174. 12 1017.01 997.32 174. 13 174.26 987.48 174.13 1026.85 174. 11 173.95 1033.41 1049.81 173.75 173.84 1099.02 173.94 1069.5 173.77 1076.06 173.88 173. 84 1099. 02 173. 43 1144. 95 173. 38 1207. 29 173. 04 1240. 09 173. 19 1292. 58 173. 14 1328. 67 173. 14 1371. 32 173. 73 1423. 81 175. 11 1499. 27 174. 72 1555. 04 1069. 5 1121. 99 1167. 92 1220. 41 1263. 06 1305. 71 1341. 79 173. 94 173. 66 173. 35 173. 37 172. 91 172. 95 173. 07 173. 73 1079. 34 173. 55 1135. 11 173. 28 1187. 6 173. 18 1233. 53 173. 02 1286. 02 173. 09 1322. 11 173. 07 1361. 48 173. 88 173. 46 173. 28 173. 24 172. 93 173. 27 173. 03 173. 77 173. 68 173. 53 173. 17 172. 86 173. 15 173. 23 1112. 15 1148. 23 1125. 27 1177. 76 1213. 85 1249. 93 1299. 14 1335. 23 1226. 97 1279. 46 1312. 27 1348. 35 173. 23 1348. 35 173. 49 1400. 84 174. 52 1463. 18 175. 07 1541. 91 174. 39 1574. 72 173. 29 1617. 37 173. 15 1666. 58 172. 72 1719. 07 172. 97 1755. 16 172. 45 1797. 81 173. 07 1361. 48 173. 43 1407. 41 174. 63 1489. 42 174. 97 1548. 48 174. 45 1581. 28 173. 14 1620. 65 172. 94 1679. 7 172. 68 1725. 63 172. 81 1765 172. 5 1807. 65 173. 21 1391 174. 4 1446. 77 175. 2 1522. 23 174. 31 175. 09 1384.44 1443.49 174.78 1505.83 175. 2 1522. 23 174. 46 1568. 16 173. 63 1607. 53 172. 92 1653. 46 172. 85 1699. 39 173. 01 1751. 88 172. 8 1784. 68 1505. 83 1561. 6 1600. 97 1640. 33 1692. 83 1745. 32 174. 14 1587. 84 173. 26 1637. 05 174.18 173.07 173. 04 1682. 98 172. 78 1738. 75 172. 86 1771. 56 172. 89 172. 77 172. 65 172. 35 1778.12 172. 26 1814. 21 172. 1 1847. 02 1827.33 172. 24 1833. 89 172 1840.46 172.05 1856.86 172.21 172 1840. 46 172. 19 1892. 95 171. 77 1938. 88 171. 74 1981. 52 171. 54 2027. 45 171. 38 2066. 82 171. 51 2102. 91 171. 22 2148. 84 171. 4 2204. 61 172. 1 1876. 54 171. 88 1932. 31 172 1896. 23 171. 55 1948. 72 172. 12 1909. 35 171. 93 1955. 28 1869.98 172.03 1912. 63 171.8 171. 55 1948. 72 171. 78 1991. 37 171. 39 2034. 02 171. 42 2073. 38 171. 29 2109. 47 171. 36 2155. 4 171. 29 2211. 17 171. 36 2286. 63 171. 93 1955. 28 171. 63 2001. 21 171. 65 2040. 58 171. 26 2079. 95 171. 45 2129. 16 171. 24 2175. 09 171. 4 2230. 86 171. 2 2293. 19 171. 15 2352. 24 171. 612421. 056 171. 842481 583 171. 88 1932. 31 171. 84 1968. 4 171. 47 2017. 61 171. 58 2056. 98 171. 35 2096. 35 171. 19 2142. 28 171. 28 2191. 49 1965. 12 2007. 77 2047. 14 2089. 79 171.68 171. 68 171. 49 171. 28 171. 35 171. 22 2132. 44 2184. 93 2240.7 171.56 2280.07 171.24 171. 32 2253. 82 171. 32 2253. 82 171. 17 2312. 87 171. 59 2388. 33 171. 862441. 232 171. 52511. 846 171. 22612. 723 171. 062743. 864 2306. 31 2378. 49 171. 31 2322. 72 171. 492400. 881 171. 2 2335. 84 171. 522410. 969 171.47 171.81 171. 812421. 056 171. 842481. 583 171. 232572. 373 171. 072703. 513 171. 09 2804. 39 171. 122925. 443 171. 832975. 882 171. 882461. 407 171. 382521. 934 171. 162622. 811 171. 082753. 952 171. 092885. 092 2431. 144 2491. 671 2592. 548 2723. 688 171. 872471. 495 171. 292542. 109 171. 18 2673. 25 171. 032794. 303 171.69 171. 17 171. 1 171. 07 2814. 478 171. 092844. 741 171. 062905. 268 171.33 2935.531 171. 492945. 619 171. 612955. 707 171. 682965. 794 171.83 2985.97 171. 863026. 321 172. 693036. 408 172. 833056. 584 172. 833066. 672 172.97 173. 78 3117. 11 172. 993288. 602 173. 833228. 075 172. 833339. 041 3107.022 173.833217.988 173. 713268. 426 173.11 3278. 514 172. 833328. 953 173. 13369. 304 173.7 172. 833339. 041 174. 773439. 918 173. 793560. 971 172. 13621. 497 172. 083782. 901 172. 83 3833. 34 173. 293893. 866 3276. 514 3389. 479 3500. 444 3581. 146 3712. 287 3803. 076 174. 62 3429. 83 174. 313550. 883 174. 123419. 742 174. 763530. 708 174. 833490. 356 173. 643571. 058 174.83 173. 45 171. 83 172. 22 173. 16 171. 833671. 936 172. 253792. 989 172. 973843. 427 172. 513611. 409 171. 963762. 725 172. 493823. 252 173. 153601. 322 171. 963722. 374 172. 263813. 164 173. 12 3873. 69 170. 493954. 392 3853.515 173. 223883. 778 173. 333903. 954 173.11 165. 943974. 568 163. 353984. 656 3944.305 168.58 3964.48 161. 1 168. 58 3964. 48 156. 84014. 919 165. 274075. 445 172. 934125. 884 1744246. 937 174. 024367. 989 173. 394519. 306 3994. 743 159. 834025. 006 168. 744085. 533 160. 134035. 094 170. 344095. 621 159.83 161. 35 171. 87 4012 4045. 182 4105. 708 4176. 322 4307. 463 4438. 604 163. 52 4055. 27 172. 444115. 796 173. 194135. 972 174. 534257. 024 173. 94418. 428 173. 694529. 393 173. 374156. 147 174. 534287. 288 173. 474428. 516 173. 724579. 832 173.66 173. 85 4186. 41 174. 094317. 551 173. 314448. 691 174.28 173. 36 173. 7 173. 784670. 622 173. 154771. 499 4640.358 173. 774751. 323 173. 234761. 411 173.13 173. 14821. 938 173. 264932. 903 4781.586 173.074791.674 173. 114801. 762 172. 854842. 113 172.68 172. 94912. 727 173.85 4872.376 172. 834882. 464 173. 464963. 166 4973.253 174.064993.429 174. 415013. 604 174. 835023. 692 175. 25 5033. 78 175.75

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ing's n Values num=
Sta n Val Sta n Val
Manning's n Values
                                     Sta n Val
**********
            . 07 3964. 48
                           . 045 4055. 27
                                                  Right Coeff Contr.
                          Lengths: Left Channel
Bank Sta: Left
                 Ri ght
                                                                           Expan.
       3964.48 4055.27
                                            10
                                                     35
                                                                    . 3
                                                                             . 5
                                2
Ineffective Flow
                    num=
           Sta R
                    El ev
                          Permanent
   Sta L
      0
           3972
                     180
                               F
    4052 5033.78
                     180
CROSS SECTION OUTPUT Profile #1%
* E.G. Elev (ft)
Right OB *
                            174.72 * Element
                                                                Left OB *
                                                                           Channel *
* Vel Head (ft)
                              0.01 * Wt. n-Val.
                                                                            0.045
* W.S. Elev (ft)
                                   * Reach Len. (ft)
                            174.71
                                                                  5.00
                                                                            10.00
  35.00 *
* Crit W.S. (ft)
                            161.57
                                    * Flow Area (sq ft)
                                                                        * 1114.41
* E.G. Slope (ft/ft)
                                                              6467. 22
                                                                        * 1219.42
                         *0.000015
                                    * Area (sq ft)
1246. 26 *
* Q Total (cfs)
                            800.00
                                    * Flow (cfs)
                                                                           800.00
* Top Width (ft)
                         * 3899.97
                                    * Top Width (ft)
                                                              2856. 58
                                                                            90.79
 952.60
* Vel Total (ft/s)
                              0.72
                                    * Avg. Vel. (ft/s)
                                                                             0.72
                                    * Hydr. Depth (ft)
* Max Chl Dpth (ft)
                             17. 91
                                                                            13.93
                                    * Conv. (cfs)
                                                                        *208928.9
* Conv. Total (cfs)
                         *208928.9
* Length Wtd. (ft)
                             10.00
                                    * Wetted Per. (ft)
                                                                            82.37
* Min Ch El (ft)
                            156.80
                                    * Shear (lb/sq ft)
                                                                             0.01
                              1.00
                                    * Stream Power (lb/ft s) *
* Al pha
                                                                             0.01
* Frctn Loss (ft)
                              0.00
                                    * Cum Volume (acre-ft)
                                                                892. 22
                                                                           231.05
1266. 49 *
* C & E Loss (ft)
                              0.01
                                    * Cum SA (acres)
                                                                 96.51
                                                                            10.90
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
        Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
CROSS SECTION OUTPUT Profile #Floodway
* E.G. Elev (ft)
                        * 175.59 * Element
                                                                           Channel *
                                                                Left OB *
Right OB *
 Vel Head (ft)
                              0.01
                                    * Wt. n-Val.
                                                                            0.045
* W.S. Elev (ft)
                         * 175.58
                                    * Reach Len. (ft)
                                                                  5.00 *
                                                                            10.00 *
                                      Page 72
```

2F 00 *		LAI	31	ing - 34K LOWK					
35.00 * * Crit W.S. (ft) *	*	161. 57	*	Flow Area (sq ft)	*		*	1183. 98	*
* E.G. Slope (ft/ft)	*0	. 000017	*	Area (sq ft)	*		*	1183. 98	*
* Q Total (cfs)	*	800.00	*	Flow (cfs)	*		*	800.00	*
* Top Width (ft)	*	80.00	*	Top Width (ft)	*		*	80.00	*
* Vel Total (ft/s)	*	0. 68	*	Avg. Vel. (ft/s)	*		*	0. 68	*
* Max Chl Dpth (ft)	*	18. 78	*	Hydr. Depth (ft)	*		*	14. 80	*
* Conv. Total (cfs)	*1	96812. 7	*	Conv. (cfs)	*		*	196812. 7	*
* Length Wtd. (ft)	*	10.00	*	Wetted Per. (ft)	*		*	104. 82	*
* Min Ch El (ft)	*	156. 80	*	Shear (Ib/sq ft)	*		*	0. 01	*
* Al pha *	*	1. 00	*	Stream Power (lb/ft s)	*		*	0. 01	*
* Frctn Loss (ft) 690.48 *	*	0.00	*	Cum Volume (acre-ft)	*	97. 80	*	236. 67	*
* C & E Loss (ft) 28.87 *	*	0. 01	*	Cum SA (acres)	*	2. 30	*	10. 62	*
*****	* * *	*****	* *	******	* * * *	*****	* *	*****	* *
*****									

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Pro		********	***	*****	***	*****	**
* E.G. Elev (ft)	* 169.89	* Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft) *	* 0.06	* Wt. n-Val.	*		*	0. 045	*
* W.S. Elev (ft)	* 169.83	* Reach Len. (ft)	*	5. 00	*	10.00	*
35.00 * * Crit W.S. (ft)	* 162.57	* Flow Area (sq ft)	*		*	723. 93	*
* E.G. Slope (ft/ft)	*0.000203	* Area (sq ft)	*	30. 05	*	776. 28	*
60.73 * * Q Total (cfs)	* 1450.00	* Flow (cfs)	*		*	1450. 00	*
* Top Width (ft)	* 134.52	* Top Width (ft)	*	16. 69	*	90. 79	*
27.05 * * Vel Total (ft/s)	* 2.00	* Avg. Vel. (ft/s)	*		*	2. 00	*
* Max Chl Dpth (ft)	* 13.03	* Hydr. Depth (ft)	*		*	9. 05	*
* Conv. Total (cfs)	*101800.5	* Conv. (cfs)	*		*1	01800. 5	*
* Length Wtd. (ft)	* 10.00	* Wetted Per. (ft)	*		*	82. 37	*
* Min Ch El (ft)	* 156.80	* Shear (Ib/sq ft)	*		*	0. 11	*
* Al pha *	* 1.00	* Stream Power (lb/ft s)	*		*	0. 22	*

```
Existing - 34R LOMR
* Frctn Loss (ft)
                             0.00 * Cum Volume (acre-ft) * 436.80 * 164.54 *
558. 56
 C & E Loss (ft)
94.38 *
                             0.05 * Cum SA (acres)
                                                               58.05 *
                                                                         11.03
             ******************
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
        1.4. This may indicate the need for additional cross sections.
        Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
CROSS SECTION OUTPUT Profile #2%
                                *****
* E.G. Elev (ft)
                        * 173. 20
                                  * Element
                                                             Left OB *
                                                                        Channel *
Right OB *
 Vel Head (ft)
                             0.01
                                   * Wt. n-Val.
                                                                          0.045
* W.S. Elev (ft)
                           173.18
                                   * Reach Len. (ft)
                                                                5.00
                                                                          10.00
  35.00
 Crit W.S. (ft)
                           161.84
                                   * Flow Area (sq ft)
                                                                         992.20
* E.G. Slope (ft/ft)
                        *0.000030
                                   * Area (sq ft)
                                                            2639. 10
                                                                      * 1080.73
234. 23 *
                                   * Flow (cfs)
* Q Total (cfs)
                           950.00
                                                                         950.00
* Top Width (ft) 219.37 *
                        * 2341.40
                                   * Top Width (ft)
                                                            2031. 24
                                                                          90.79
* Vel Total (ft/s)
                                   * Avg. Vel. (ft/s)
                             0.96
                                                                           0.96
                                   * Hydr. Depth (ft)
                                                                          12.40
* Max Chl Dpth (ft)
                            16. 38
                        *172156.2
                                   * Conv. (cfs)
                                                                      *172156.2
* Conv. Total (cfs)
                                  * Wetted Per. (ft)
* Length Wtd. (ft)
                            10.00
                                                                          82.37
* Min Ch El (ft)
                           156.80
                                  * Shear (lb/sq ft)
                                                                           0.02
* Al pha
                             1.00
                                   * Stream Power (lb/ft s) *
                                                                           0.02
                             0.00
* Frctn Loss (ft)
                                   * Cum Volume (acre-ft)
                                                              731.08
                                                                         211.15
1046.82
* C & E Loss (ft)
                             0.01
                                  * Cum SA (acres)
                                                               83.39
                                                                          10. 90
101.36 *
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
              This may indicate the need for additional cross sections.
        Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
CROSS SECTION OUTPUT Profile #0.2%
* E.G. Elev (ft)
                       * 178.48 * Element
                                                              Left OB *
                                                                         Channel *
Right OB *
* Vel Head (ft)
                             0.00
                                  * Wt. n-Val.
                                                                          0.045 *
```

* W.S. Elev (ft)	*	Exi 178. 47	st *	ing - 34R LOMR Reach Len. (ft)	*	5. 00	*	10. 00	*
35.00 * * Crit W.S. (ft)	*	161. 39	*	Flow Area (sq ft)	*		*	1415. 49	*
* E.G. Slope (ft/ft)	*0	. 000005	*	Area (sq ft)	* *	18889. 58	*	1561. 11	*
4917.20 * * Q Total (cfs)	*	700. 00	*	Flow (cfs)	*		*	700.00	*
* Top Width (ft)	*	4616. 67	*	Top Width (ft)	*	3547. 37	*	90. 79	*
978.51 * * Vel Total (ft/s)	*	0. 49	*	Avg. Vel. (ft/s)	*		*	0. 49	*
* Max Chl Dpth (ft)	*	21. 67	*	Hydr. Depth (ft)	*		*	17. 69	*
* Conv. Total (cfs)	*3	11242. 8	*	Conv. (cfs)	*		*	311242. 8	*
* Length Wtd. (ft)	*	9. 75	*	Wetted Per. (ft)	*		*	82. 37	*
* Min Ch El (ft)	*	156. 80	*	Shear (Ib/sq ft)	*		*	0. 01	*
* Al pha	*	1. 00	*	Stream Power (lb/ft s)	*		*	0.00	*
* Frctn Loss (ft)	*	0.00	*	Cum Volume (acre-ft)	*	1375. 63	*	280. 30	*
1848.35 * * C & E Loss (ft) 125.39 *	*	0.00		Cum SA (acres)	*	125. 61	*	11. 23	*
******	***	****	* *	******	* * :	*****	* *	*****	**

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

#### CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1 RS: 245

I NPUT

Description: XS 245 LOW CHORD ELEVATION REVISED TO MATCH PROPOSED BRIDGE

**PLAN** 

THIS IS THE U/S FACE OF THE SMALL RUNWAY Station Elevation Data num-

Station E	revation	Data	Hulli=	309					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
*****	*****	*****	*****	*****	*****	****			
0	182. 87	3. 28	182. 74	26. 25	182. 47	32. 81	182. 48	39. 37	182. 27
45. 93	182. 32	52. 49	182. 57	68. 89	182. 21	75. 46	182. 31	98. 42	181. 7
104. 98	181. 75	118. 1	181. 4	124. 67	181. 5	137. 79	181. 21	141. 07	181. 22
147. 63	180. 96	154. 19	180. 94	164.03	181. 1	170. 59	181	180. 44	181. 01
187	180. 79	193. 56	180. 87	203.4	180. 77	206. 68	180. 63	213. 24	180. 62
226. 37	180. 39	236. 21	180. 29	242.77	180. 09	262.45	179. 99	269. 01	179.82
282. 14	179. 68	288. 7	179. 86	295. 26	179. 61	311. 66	179. 38	321. 51	179. 57
331. 35	179. 41	337. 91	179. 19	344.47	179. 36	351.03	179. 14	367.43	178. 98
374	178. 7	390. 4	178. 75	400. 24	178. 52	406.8	178. 58	410.08	178. 44
413. 36	178. 62	426. 49	178. 25	436.33	178. 44	446. 17	178. 27	459. 29	178. 26
465.85	178. 16	472. 42	178. 2	482. 26	177. 99	498. 66	178. 02	511. 78	177. 68
				Pag	ge 75				

Existing - 34R LOMR 177. 63 177. 31 176. 71 176. 6 176. 17 175. 86 518. 35 560. 99 177. 79 177. 29 538.03 544. 59 177.4 547.87 177.53 554.43 177.51 538. 03 567. 56 613. 48 665. 98 698. 78 734. 87 177. 26 177. 13 176. 5 583.96 590.52 597.08 177 610. 2 656. 13 692. 22 731. 59 629. 89 669. 26 705. 34 744. 71 636. 45 679. 1 708. 62 751. 27 176. 54 176. 28 176.42 176.83 643.01 176. 64 176. 05 175. 7 176. 41 175. 99 175. 71 685. 66 725. 03 757. 83 176.36 176. 09 175.86 175.82 175.76 800.48 767.68 175.49 777.52 175.62 784.08 175.37 790.64 175.28 175.45 810.32 175.36 826.73 175.36 833.29 175.06 846.41 175.11 856.25 175.25 175.07 175. 16 174. 94 869.38 875.94 174.87 889.06 174.99 892.34 175.11 866.1 174. 99 892. 34 174. 85 944. 83 174. 28 980. 92 174. 26 1020. 29 173. 75 1062. 94 173. 66 1121. 99 173. 35 1167. 92 908. 74 957. 95 997. 32 1033. 41 1079. 34 1135. 11 898. 9 951. 39 987. 48 1026. 85 174. 74 174. 51 928. 43 977. 64 174. 67 174. 32 174.88 921.87 174. 88 174. 46 174. 13 174. 11 173. 73 173. 55 964. 52 1007. 16 1043. 25 1099. 02 1144. 95 174.41 174. 41 174. 4 173. 92 173. 84 173. 43 174. 13 1017. 01 173. 95 1049. 81 173. 88 1112. 15 173. 46 1148. 23 174. 12 173. 94 173. 68 173. 53 1076. 06 1125. 27 1207. 29 1240. 09 1187.6 173. 28 1213. 85 173. 37 1220. 41 1177.76 173. 28 173.17 173. 24 1249. 93 172. 93 1299. 14 173. 27 1335. 23 172. 91 1263. 06 172. 95 1305. 71 173. 18 1233. 53 173. 02 1286. 02 173. 04 1240. 09 173. 19 1292. 58 1226.97 172.86 1279. 46 173.15 173. 19 1292. 58 173. 14 1328. 67 173. 14 1371. 32 173. 73 1423. 81 175. 11 1499. 27 174. 72 1555. 04 174. 14 1587. 84 173. 02 1286. 02 173. 09 1322. 11 173. 07 1361. 48 173. 43 1407. 41 174. 63 1489. 42 174. 97 1548. 48 173. 07 1341. 79 173. 21 1391 1312. 27 173.23 173. 03 1384. 44 174. 31 1443. 49 175. 09 1505. 83 174. 78 1561. 6 1348.35 173.49 1400. 84 1463. 18 1541. 91 174. 4 1446. 77 175. 2 1522. 23 174. 46 1568. 16 174.52 175.07 174.39 1574. 72 174.45 1581. 28 174. 18 1600. 97 173.63 1607.53 173.29 1617.37 173.14 1620.65 173. 26 1637. 05 173.07 1640.33 172.92 1653.46 173.15 173. 26 1637. 05 173. 04 1682. 98 172. 78 1738. 75 172. 86 1771. 56 172. 26 1814. 21 172. 05 1856. 86 172. 12 1909. 35 171. 93 1955. 28 171. 65 2001. 21 1666. 58 1719. 07 1679.7 172. 89 1692. 83 172. 77 1745. 32 172.85 1699.39 172.94 172.72 173. 01 1751. 88 172. 68 1725.63 172. 77 1745. 32 172. 65 1778. 12 172. 35 1827. 33 172. 21 1869. 98 172. 03 1912. 63 171. 8 1965. 12 171. 68 2007. 77 171. 49 2047. 14 171. 4 2089. 79 171. 28 2132. 44 171. 35 2184. 93 171. 22 2240. 7 171. 24 2306. 31 171. 47 2378. 49 171. 742427. 229 171. 432508. 476 172.97 172. 68 1725. 63 172. 81 1765 172. 5 1807. 65 172. 1 1847. 02 172 1896. 23 171. 55 1948. 72 171. 78 1991. 37 171. 39 2034. 02 173.01 1751.88 172.8 1784.68 172.24 1833.89 172.1 1876.54 171.88 1932.31 171.84 1968.4 171.47 2017.61 1755. 16 1797. 81 172.45 172 172. 19 171. 77 171. 74 1840. 46 1892. 95 1938.88 1981.52 171.54 171.58 2056.98 2027.45 171.65 2040.58 171.38 171. 39 2034. 02 171. 42 2073. 38 171. 29 2109. 47 171. 36 2155. 4 171. 29 2211. 17 171. 36 2286. 63 171. 2 2335. 84 171. 26 2079. 95 171. 45 2129. 16 171.35 2096.35 2066.82 171.51 171. 35 2096. 35 171. 19 2142. 28 171. 28 2191. 49 171. 32 2253. 82 171. 17 2312. 87 171. 59 2388. 33 2102.91 171.22 171. 24 2175. 09 171. 4 2230. 86 171. 2 2293. 19 171. 15 2352. 24 2148.84 171.4 2204.61 171.56 2280. 07 2322. 72 2401. 45 171. 31 171. 49 171. 542417. 074 171. 73 2498. 32 171. 562406. 918 171. 852457. 697 171.88 171. 852478. 008 171. 292538. 943 2467.853 171. 432508. 476 171. 432518. 631 171.29 171. 172579. 566 171. 232549. 099 171. 23 2569. 41 2528.787 171.17 2589.722 171. 22610. 033 171. 12721. 747 171. 16 2640. 5 171. 062742. 058 171. 08 2691. 28 171. 042792. 837 171. 162670. 968 171.08 2711. 591 171. 082752. 214 171.09 2802. 993 2904. 551 2955. 33 3036. 576 3219. 38 171. 1 2833. 46 171. 212924. 862 171. 832975. 641 172. 833067. 043 171. 062813. 149 171. 122914. 707 171. 682965. 485 171. 072843. 616 171. 332935. 018 171. 832985. 797 172. 983107. 666 171. 06 171. 6 172. 69 173. 83 171. 092884. 239 171. 482945. 174 171. 86 3026. 42 173. 793117. 822 172. 833341. 249 172. 833056. 887 173. 09 3290. 47 173. 973422. 495 173. 833270. 158 172. 833331. 093 173.15 3361. 56 174. 813493. 585 173. 94 3554. 52 173. 533381. 872 174.673432.651 174.83 174. 223544. 364 172. 723605. 299 171. 893706. 857 3503.741 174. 413534. 208 174. 713524. 053 173.72 173. 63574. 832 171. 833676. 389 172. 373615. 455 171. 953727. 168 3564.676 173. 343595. 143 171.85 171. 843686. 545 3666. 234 171.97 171. 953727. 166 172. 253798. 259 173. 113859. 193 169. 153960. 751 156. 84021. 686 166. 394072. 464 3757. 635 3808. 414 3889. 66 3970. 907 172. 113777. 947 172. 743828. 726 172.063767.791 172. 213788. 103 172.22 172. 27 3818. 57 173. 333899. 816 164. 573981. 063 172. 853838. 882 173.13 173. 33940. 439 162. 183991. 218 170. 553950. 595 159. 83 4016 166.96 159.83 164. 74062. 309 4031.841 160. 714041. 997 162. 884052. 153 167.98 4082.62 169. 464092. 776 171. 44102. 932 172.834113.087 172. 974123. 243 173.39 173. 834174. 022 174. 494255. 268 4133.399 173. 654143. 555 174. 314184. 178 175.28 175. 114397. 449 175. 054509. 163 4265.424 175.34 4275.58 175. 324306. 047 175.084417.761 174.99 174. 854448. 228 174. 854488. 851 4438.072 175. 14600. 564 175.07

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Existing - 34R LOMR
                                           175. 044752. 901
4641. 188
          175. 134691. 966
                           175. 124712. 278
                                                            174. 774793. 524
                                                                            174. 73
          174. 794854. 459
                                                            173. 964884. 926
4813.836
                           174. 324864. 615
                                           174. 234874. 771
                                                                            173.83
                                           174.77 4996.64
4905. 238
          173. 714915. 394
                           173. 794986. 484
                                                            175. 085006. 795
                                                                            175, 55
5016.951
          175. 885027. 107
                           176. 025047. 418
                                            176. 2 5067. 73
                                                            176. 26
Manning's n Values
                           num=
  Sťa n Val Sta n Val
                                      Sta
                                            n Val
          . 073970. 907
                            . 0454052. 153
                           Lengths: Left Channel
Bank Sta: Left
                                                    Ri ght
                                                              Coeff Contr.
                 Ri ght
                                                                              Expan.
                                                                               . 5
      3970. 9074052. 153
                                                              . 3
                                     230
                                             230
                                                      230
                                 2
Ineffective Flow
                     num=
           Sta R
                           Permanent
   Sta L
                    El ev
            3996
                    176.9
                                F
    4031 5067.73
                   176.6
CROSS SECTION OUTPUT Profile #1%
* E.G. Elev (ft)
Right OB *
* Vel Head (ft)
                            174.71 * Element
                                                                  Left OB *
                                                                              Channel *
                                     * Wt. n-Val.
                              0.03
                                                                               0.045
* W.S. Elev (ft)
                             174.68
                                     * Reach Len. (ft)
                                                                   50.00
                                                                               50.00
  50.00 *
* Crit W.S. (ft)
                             161. 20
                                     * Flow Area (sq ft)
                                                                              560.75
* E.G. Slope (ft/ft)
                          *0.000048
                                     * Area (sq ft)
                                                               * 6449.75
                                                                           * 1140.07
 456. 54
* Q Total (cfs)
                             800.00
                                     * Flow (cfs)
                                                                              800.00
* Top Width (ft)
                                                                 2853. 20
                          * 3240.13
                                     * Top Width (ft)
                                                                               81. 25
 305.68 *
* Vel Total (ft/s)
                              1.43
                                     * Avg. Vel. (ft/s)
                                                                                1.43
* Max Chl Dpth (ft)
                                     * Hydr. Depth (ft)
                              17.88
                                                                               16.02
                                     * Conv. (cfs)
                                                                           *115611.3
* Conv. Total (cfs)
                          *115611.3
                                                                               35.94
* Length Wtd. (ft)
                              50.00
                                     * Wetted Per. (ft)
* Min Ch El (ft)
                             156.80
                                     * Shear (lb/sq ft)
                                                                                0.05
* Al pha
                               1.00
                                     * Stream Power (lb/ft s) *
                                                                                0.07
* Frctn Loss (ft)
                               0.00
                                     * Cum Volume (acre-ft)
                                                                  891.48
                                                                              230.78
1265.81
* C & E Loss (ft)
                               0.01 * Cum SA (acres)
                                                                   96.18 *
 103.43 *
    Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth
with the lowest, valid, water surface was used.
CROSS SECTION OUTPUT Profile #Floodway
```

* E.G. Elev (ft)				ting - 34R LOMR Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	*	0. 03	*	Wt. n-Val.	*		*	0. 045	*
* W.S. Elev (ft)	*	175. 55	*	Reach Len. (ft)	*	50.00	*	50.00	*
50.00 * * Crit W.S. (ft)	*	161. 19	*	Flow Area (sq ft)	*		*	591. 28	*
* E.G. Slope (ft/ft)	*0	. 000092	*	Area (sq ft)	*		*	591. 28	*
* Q Total (cfs)	*	800.00	*	Flow (cfs)	*		*	800.00	*
* Top Width (ft)	*	35. 00	*	Top Width (ft)	*		*	35.00	*
* Vel Total (ft/s)	*	1. 35	*	Avg. Vel. (ft/s)	*		*	1. 35	*
* Max Chl Dpth (ft)	*	18. 75	*	Hydr. Depth (ft)	*		*	16. 89	*
* Conv. Total (cfs)	*	83244. 4	*	Conv. (cfs)	*		*	83244.4	*
* Length Wtd. (ft)	*	50.00	*	Wetted Per. (ft)	*		*	67. 16	*
* Min Ch El (ft)	*	156. 80	*	Shear (Ib/sq ft)	*		*	0. 05	*
* Al pha	*	1. 00	*	Stream Power (lb/ft s)	*		*	0. 07	*
* Frctn Loss (ft)	*	0. 01	*	Cum Volume (acre-ft)	*	97.80	*	236. 47	*
690.48 * * C & E Loss (ft) 28.87 *	*	0. 01	*	Cum SA (acres)	*	2. 30	*	10. 60	*
********** *****	***	*****	* *	********	***	*****	* * ;	****	**

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

### CROSS SECTION OUTPUT Profile #10%

********* ****	*****	*******	****	*****	*****
* E.G. Elev (ft) Right OB *	* 169.84	* Element	*	Left OB *	Channel *
* Vel Head (ft)	* 0. 22	* Wt. n-Val.	*	*	0. 045 *
* W.S. Elev (ft) 50.00 *	* 169.62	* Reach Len. (ft)	*	50.00 *	50.00 *
* Crit W.S. (ft)	* 162.42	* Flow Area (sq ft)	*	*	383. 62 *
* E.G. Slope (ft/ft) 75.29 *	*0.000558	* Area (sq ft)	*	55.83 *	728. 91 *
* Q Total (cfs)	* 1450.00	* Flow (cfs)	*	*	1450.00 *
* Top Width (ft) 31.30 *	* 136. 26	* Top Width (ft)	*	23. 72 *	81. 25 *
* Vel Total (ft/s)	* 3.78	* Avg. Vel. (ft/s)	*	*	3. 78 *
* Max Chl Dpth (ft)	* 12.82	* Hydr. Depth (ft)	*	*	10. 96 *
* Conv. Total (cfs)	* 61409.1	* Conv. (cfs)	*	*	61409.1 *
* Length Wtd. (ft)	* 50.00	* Wetted Per. (ft) Page 78	*	*	35. 94 *

* Min Ch El (ft)	*	156. 80	* Shear (Ib/sq ft)	*
* Al pha *	*	1. 00	* Stream Power (lb/ft s) *	*
* Frctn Loss (ft) 558.50 *	*	0. 04	* Cum Volume (acre-ft) * 436.80 * 164.36	*
* C & E Loss (ft) 94.36 *	*	0. 03	* Cum SA (acres)	*
	****	*****	**************	* * *
*****				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

#### CROSS SECTION OUTPUT Profile #2%

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**************************************		E #2% ******	**:	*****	* * ;	****	* * *	*****	**
******** * E.G. Elev (ft)	*	173. 18	*	Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft) *	*	0. 05	*	Wt. n-Val.	*		*	0. 045	*
* W.S. Elev (ft) 50.00 *	*	173. 13	*	Reach Len. (ft)	*	50.00	*	50.00	*
* Crit W.S. (ft)	*	161. 50	*	Flow Area (sq ft)	*		*	506. 51	*
* E.G. Slope (ft/ft) 222.57 *	*0.	000095	*	Area (sq ft)	*	2594. 23	*	1014. 16	*
* 0 Total (cfs)	*	950.00	*	Flow (cfs)	*		*	950.00	*
* Top Width (ft) 64.81 *	* 2	2117. 41	*	Top Width (ft)	*	1971. 36	*	81. 25	*
* Vel Total (ft/s)	*	1. 88	*	Avg. Vel. (ft/s)	*		*	1. 88	*
* Max Chl Dpth (ft)	*	16. 33	*	Hydr. Depth (ft)	*		*	14. 47	*
* Conv. Total (cfs)	* (	97581. 0	*	Conv. (cfs)	*		*	97581.0	*
* Length Wtd. (ft)	*	50.00	*	Wetted Per. (ft)	*		*	35. 94	*
* Min Ch El (ft)	*	156. 80	*	Shear (Ib/sq ft)	*		*	0. 08	*
* Al pha *	*	1. 00	*	Stream Power (Ib/ft s)	*		*	0. 16	*
* Frctn Loss (ft) 1046.63 *	*	0. 01	*	Cum Volume (acre-ft)	*	730. 78	*	210. 91	*
* C & E Loss (ft) 101.25 *	*	0. 01	*	Cum SA (acres)	*	83. 16	*	10. 88	*
******	***	*****	* * :	* * * * * * * * * * * * * * * * * * * *	* * ;	*****	* * *	*****	* *

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #0.2% 

```
* E.G. Elev (ft)
                             178.48 * Element
                                                                  Left OB *
                                                                              Channel *
Right OB *
 Vel Head (ft)
                               0.00
                                     * Wt. n-Val.
                                                                    0.070
                                                                               0.045
  0.070
                             178.48
 W.S. Elev (ft)
                                     * Reach Len. (ft)
                                                                    50.00
                                                                               50.00
 50.00
* Crit W.S. (ft)
                             160.98
                                     * Flow Area (sq ft)
                                                                *18991.26
                                                                           * 1448.50
4003.43
* E.G. Slope (ft/ft)
                          *0.000000
                                                                *18991.26
                                                                           * 1448.50
                                     * Area (sq ft)
4003.43
* Q Total (cfs)
                             700.00
                                     * Flow (cfs)
                                                                   488.63
                                                                              127.44
 83. 93
* Top Width (ft)
                          * 4650.76
                                     * Top Width (ft)
                                                                * 3553.94
                                                                               81.25
1015. 58
* Vel Total (ft/s)
                               0.03
                                     * Avg. Vel. (ft/s)
                                                                     0.03
                                                                                0.09
  0.02
 Max Chl Dpth (ft)
                              21.68
                                     * Hydr. Depth (ft)
                                                                     5.34
                                                                               17.83
   3.94
 Conv. Total (cfs)
                          *1765311.0 * Conv. (cfs)
                                                                            *321386.7
                                                                 *1232263.0
*211660.7
* Length Wtd. (ft)
                              50.00 * Wetted Per. (ft)
                                                                * 3555.14
                                                                               83.16
1018. 51
 Min Ch El (ft)
                                     * Shear (lb/sq ft)
                             156.80
                                                                     0.00
                                                                                0.00
  0.00
                               2.35
                                     * Stream Power (lb/ft s) *
 Al pha
                                                                     0.00
                                                                                0.00
  0.00
* Frctn Loss (ft)
                               0.00
                                     * Cum Volume (acre-ft)
                                                                * 1373.46
                                                                              279.95
1844.77
* C & E Loss (ft)
                               0.00 * Cum SA (acres)
                                                                   125. 20
                                                                               11.22
124. 59 *
*****
```

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

#### **BRI DGE**

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RIVER: RIVER-1

REACH: Reach-1 RS: 244.19

I NPUT

Description: Bridge #1 - Taxiway

Distance from Upstream XS = 50 Deck/Roadway Width = 133 2.7 Weir Coefficient Upstream Deck/Roadway Coordinates

•	num=	10	3						
			Lo Cord						
***	****	*****	*****	*****	******	*****	*****	*****	*****
	0	180	0	606	177. 3	0	1956	177. 3	0
	3156	176. 9	0	3996	176. 6	0	4000.99	177. 16	0
	4001	177. 16	170. 99	4031	177. 16	170. 99	4031.01	177. 16	0
	5086	176. 6	0						

```
Existing - 34R LOMR
                                      171. 832975. 641
                                                              171. 832985. 797
 2955. 33
              171. 682965. 485
                                                                                      171. 86 3026. 42 172. 69
              172. 833056. 887
3036. 576
                                       172. 833067. 043
                                                              172. 983107. 666
                                                                                      173. 793117. 822
                                                                                                              173.83
3219. 38
3361. 56
3503. 741
              173. 833270. 158
173. 533381. 872
174. 713524. 053
                                                                                      172. 833341. 249
174. 813493. 585
173. 94 3554. 52
172. 373615. 455
                                       173. 09 3290. 47
173. 973422. 495
                                                              172. 833331. 093
                                                                                                              173.15
                                                              174. 673432. 651
174. 223544. 364
172. 723605. 299
                                                                                                               174.83
                                       174. 413534. 208
                                                                                                               173.72
3564.676
                173. 63574. 832
                                       173. 343595. 143
                                                                                                              171.85
                                      171. 843686. 545
172. 113777. 947
172. 743828. 726
                                                                                      171. 953727. 168
172. 253798. 259
173. 113859. 193
3666. 234
              171. 833676. 389
                                                              171. 893706. 857
                                                                                                              171.97
              172. 063767. 791
172. 27 3818. 57
                                                              172. 213788. 103
3757.635
                                                                                                               172.22
3808. 414
                                                              172. 853838. 882
                                                                                                               173.13
              172. 27 3616. 37
173. 333899. 816
164. 573981. 063
160. 714041. 997
169. 464092. 776
173. 654 143. 555
3889. 66
3970. 907
                                                                                       169. 153960. 751
                                       173. 33940. 439
                                                              170. 553950. 595
                                                                                                               166.96
                                                              170. 553950. 595
159. 83 4016
164. 74062. 309
172. 834113. 087
174. 314184. 178
175. 114397. 449
                                       162. 183991. 218
                                                                                       156. 84021. 686
                                                                                                               159.83
                                                                                      166. 394072. 464
172. 974123. 243
174. 494255. 268
175. 084417. 761
                                      162. 884052. 153
171. 44102. 932
173. 834174. 022
4031. 841
4082. 62
                                                                                                              167. 98
173. 39
4133. 399
                                                                                                               175.28
              175. 34 4275. 58
174. 854448. 228
4265. 424
                                      175. 324306. 047
                                                                                                               174. 99
                                                                                      175. 14600. 564
174. 774793. 524
4438.072
                                      174. 854488. 851
                                                              175. 054509. 163
                                                                                                              175.07
              175. 134691. 966
174. 794854. 459
                                                              175. 044752. 901
174. 234874. 771
174. 77 4996. 64
176. 2 5067. 73
                                      175. 124712. 278
174. 324864. 615
4641. 188
                                                                                                              174.73
4813. 836
4905. 238
                                                                                      173. 964884. 926
                                                                                                              173.83
                                      173. 794986. 484
                                                                                      175. 085006. 795 175. 55
              173. 714915. 394
5016. 951
              175. 885027. 107
                                      176. 025047. 418
                                                                                      176, 26
n Val
        0 . 073970. 907 . 0454052. 153 . 07
Bank Sta: Left Right Coeff Contr. Expan. 3970.9074052.153 .3 .5
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
    Sta L Sta R El ev
0 3996 176. 9
4031 5067. 73 176. 6
                                      F
Downstream Deck/Roadway Coordinates
      num= 9
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
      Downstream Bridge Cross Section Data
3. 28
39. 37
104. 98

    181. 94
    16. 4
    181. 9
    26. 25
    182. 24

    181. 2
    49. 21
    181. 16
    59. 05
    180. 91

    180. 69
    108. 26
    180. 4
    127. 94
    180. 32

    179. 84
    164. 03
    179. 86
    183. 71
    179. 02

             182. 05
180. 94
                                                                                                  29. 53
                                                                                                              181.94
    32. 81
                                                                                                   68.89
                                                                                                              181.02
   82. 02
137. 79
                                                                                                  131. 22
190. 28
              180.48
                                                                                                              179.72
              179. 68
177. 96
                         150. 91
                                                                                                               178. 2
    203. 4
                                                                          236. 2
                          209.96
                                      178.84
                                                  216. 52
                                                              179. 29
                                                                                      179.94
                                                                                                  242.77
                                                                                                              179.98
              180. 34
   249. 33
                          252.61
                                      180. 25
                                                  269.01
                                                              181. 59
                                                                          275.57
                                                                                      181. 62
                                                                                                              182.16
                                                                                                  288. 69
                                      182. 41
179. 89
178. 38
176. 99
175. 75
174. 7
              182. 7
181. 77
178. 6
   295. 26
                           321. 5
                                                   328.06
                                                              182. 48
                                                                          334.62
                                                                                      182. 21
                                                                                                  344.46
   370. 71
433. 04
                          396.95
                                                  400. 24
449. 44
                                                              179.83
                                                                          410.08
                                                                                      179. 13
177. 5
                                                                                                  426. 48
                          442.88
                                                              178.08
                                                                                                  478. 97
                                                                                                             177. 26
                                                                          472.41
  485. 53
547. 86
600. 35
662. 69
                          488.81
                                                   521.62
                                                                                      176.09
                                                                                                  531.46
              177. 23
                                                              176. 31
                                                                           524. 9
                                                                                                              176.05
                          551. 14
610. 2
682. 37
721. 74
                                                              175. 46
174. 58
174. 33
                                                  557. 71
620. 04
                                                                                       175. 1
              175.67
                                                                          574.11
                                                                                                  583. 95
                                                                                                              175.01
                                                                                      173. 58
174. 54
              175. 01
174. 32
                                                                                                  652. 84
705. 33
                                                                          643
698. 77
                                                                                                               173.81
                                                   688. 93
                                                                                                              174.31
                                                   728. 3
                                                                                      174. 19
   718.46
               174. 2
                                      173.97
                                                              173.94
                                                                          734.86
                                                                                                  741.42
                                                                                                              174.05
                                                                                                  790.63
              173.95
                          767.67
                                      174.02
                                                   780.79
                                                              173.69
                                                                          787.35
                                                                                      173.83
    761.1
                                                                                                              173.65
   810.31
                                                                                                              173.36
              173.57
                          816.88
                                       173. 4
                                                   820. 16
                                                              173.06
                                                                           830
                                                                                      172. 91
                                                                                                  843.12
                                                                                      173. 29
                                      173. 5 872. 65 173. 35
172. 98 934. 98 173. 04
                                                                          895.61
    862.8
                                                                                                  905.45
              173.35
                          869.36
                                                                                                              173.43
   915. 29
                          918.57
                                                                                      172.67
                                                                                                  957.94
                                                                                                              172.93
              173. 31
                                                                          948. 1
                                                         Page 82
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Existing - 34R LOMR 172. 39 171. 94 172.79 980.91 967.78 994.03 171.89 1007.15 172. 28 1016. 99 172.07 171. 69 1007. 13 172. 14 1059. 64 171. 73 1095. 73 172. 4 1144. 94 172. 5 1194. 15 173. 1 1266. 32 172. 08 1062. 92 172.14 1043.24 1049.8 171.92 1030.12 171. 69 1089. 17 171. 74 1135. 1 172. 6 1181. 02 172. 81 1233. 51 1076.04 171.89 1082.61 171.47 1102.29 171.81 172. 21 1158. 06 172. 72 1200. 71 173. 58 1276. 16 171. 66 1121. 97 172. 54 1174. 46 172. 94 1223. 67 172. 33 172. 68 1108.85 1164.62 1213.83 173.96 174. 5 1312. 25 175. 17 1361. 46 175. 84 1407. 39 174.74 1289.29 174.04 1299.13 174.64 1318.81 174.52 1331.93 175.84 1377.86 175. 2 1341.78 1348.34 175. 5 1368. 02 175.72 175. 92 1413. 95 175. 92 1390. 98 175.76 1420.51 1384.42 175.88 175. 92 1413. 95 174. 61 1479. 56 174. 41 1525. 49 171. 87 1587. 82 170. 8 1640. 31 170. 24 1702. 64 170. 5 1761. 7 175. 72 1370. 70 175. 77 1453. 32 174. 38 1505. 81 172. 72 1574. 7 171. 51 1610. 79 170. 08 1686. 24 174.99 1469.72 1436.91 174.48 1486.12 174.56 174. 99 1469. 72 174. 68 1515. 65 172. 39 1581. 26 171. 24 1627. 19 170. 29 1699. 36 170. 52 1748. 57 1502.53 173.46 1538.61 172.88 1581. 26 1627. 19 1699. 36 1748. 57 171. 6 1600. 95 170. 59 1646. 87 170. 61 1712. 49 170. 2 1771. 54 171. 32 170. 38 170. 63 1561. 58 1604. 23 1676. 4 1719. 05 170. 44 1725. 61 170. 47 1784. 66 170. 92 1837. 15 170. 27 170. 24 1797. 78 170. 79 1856. 83 171. 06 1814. 19 170. 91 1873. 24 1778. 1 1824. 03 170.6 1801.06 171.18 170.75 1863.4 170.53 170. 75 1863. 4 170. 75 1915. 89 170. 38 1965. 09 170. 43 1997. 9 170. 69 2033. 99 170. 41 2083. 2 173. 96 2135. 68 175. 7 2171. 77 170. 6 1896. 2 170. 25 1899. 48 170. 78 1925. 73 1876.52 170.44 170. 78 1925. 73 170. 76 1974. 94 170. 97 2011. 02 170. 81 2043. 83 170. 46 2093. 04 175. 02 2142. 25 175. 91 2181. 61 170. 6 1896. 2 170. 46 1942. 13 170. 76 1984. 78 170. 8 2020. 87 170. 66 2070. 07 171. 97 2106. 16 170. 25 1849. 46 170. 31 1958. 53 170. 36 1994. 62 170. 93 2027. 43 170. 25 2073. 35 172. 65 2119. 28 1938.85 170.66 1936. 63 1978. 22 2017. 58 2047. 11 2096. 32 2152. 09 170.99 170.57 171.03 175.61 175. 85 175.61 2161.93 2168.49 176 176. 55 2250. 5 176. 48 2302. 99 2191.45 2214.42 176.57 2220.98 176.81 2257.06 176.65 176.37 2270. 19 2319. 39 176. 48 2293. 15 175. 74 2345. 64 176.64 2276.75 176. 23 2312. 83 175.8 175. 4 2362. 04 173. 87 2411. 25 2335. 8 175.85 175.52 2358.76 175.18 175. 74 2345. 64 174. 18 2391. 56 173. 162431. 657 171. 832481. 282 171. 52530. 908 171. 372580. 534 171. 612630. 159 175. 52 2358. 76 174. 53 2404. 69 172. 932441. 582 171. 732491. 208 171. 472540. 833 171. 422590. 459 2378. 44 2421. 09 174. 72 2388. 28 172. 97 2429 173. 33 172. 21 172. 97 2429 1722471. 357 171. 562520. 983 171. 352570. 609 172. 582451. 507 171. 682501. 133 171. 422550. 759 171. 472600. 384 171. 73 2650. 01 171. 63 171. 38 171. 48 2461. 432 2511. 058 2560.684 2610.309 171. 532620. 234 171.692640.085 171.75 171. 78 2689. 71 171. 692739. 336 171. 582788. 962 171. 76 2669. 86 171. 712719. 486 171. 772679. 785 2659.935 171. 82699. 635 171.76 2709. 561 171. 662729. 411 171. 632779. 036 171. 732749. 261 171. 62798. 887 171.77 2759. 186 171.63 171. 712769. 111 171. 632818. 737 2808.812 171. 572828. 662 171. 52838. 587 171. 482848. 512 171.47 171. 372020. 002 171. 432878. 288 171. 052927. 913 171. 382977. 539 2858. 438 2908. 063 2957. 689 171. 462868. 363 171. 152917. 988 171. 292967. 614 171. 292898. 138 171. 142947. 764 171. 562997. 389 171. 342888. 213 171.29 171. 12937. 839 171. 482987. 464 171. 17 171. 53 3007. 314 171. 55 3017. 24 171. 543027. 165 171. 53 3037. 09 171. 523047. 015 171.5 3056.94 171. 483066. 865 171.52 3076.79 171. 63086. 716 171. 683096. 641 171.76 171. 933126. 416 171. 993136. 341 3106.566 171. 843116. 491 172. 113146. 266 172.07 3156. 191 171. 893185. 967 171. 723235. 593 172.013166.116 171. 953176. 042 171. 833195. 892 171.84 3205.817 171. 763225. 667 171. 73245. 518 171. 813215. 742 171.55 171. 763223. 667 171. 313275. 293 171. 353324. 919 172. 943374. 544 172. 13 3424. 17 171. 953473. 796 171. 73243. 316 171. 283295. 143 171. 533344. 769 173. 323394. 395 171. 86 3444. 02 172. 093493. 646 171. 393265. 368 171. 193314. 993 172. 363364. 619 172. 693414. 245 3255. 443 3305. 068 171. 273285. 218 171.23 171. 413334. 844 171.88 173. 17 171. 91 172. 12 172. 8 173. 463384. 469 171. 963434. 095 3354. 694 3404. 32 171. 94 3463. 87 172. 223513. 496 3453.945 172.013483.721 3503. 571 172. 283523. 421 172. 53533. 346 172. 73543. 271 172. 763582. 972 172. 863592. 897 172.95 3553.197 172. 713563. 122 172.693573.047 173. 193642. 523 172. 923692. 148 172. 113741. 774 3602.822 173.023612.747 173. 113622. 673 173. 223672. 298 173. 183632. 598 173. 083682. 223 173.33 172. 78 3652. 448 173. 343662. 373 172. 523721. 924 171. 56 3771. 55 170. 873821. 175 171. 243870. 801 171. 9 3702.073 172.663711.999 172. 333731. 849 3751. 699 3801. 325 3850. 95 171. 743761. 624 170. 94 3811. 25 171. 123860. 876 171. 423781. 475 171. 27 3791. 4 171.07 170. 923841. 025 171. 113890. 651 170. 88 3831. 1 171. 223880. 726 170. 98 170. 74 3900.576 170.643910.501 168. 923920. 427 165. 943930. 352 162. 883940. 277 160.34 158. 83 3979 164. 564029. 603 3950. 202 159. 383960. 127 156. 73989. 902 158. 833999. 827 160.49 166. 434039. 528 4009, 753 162. 314019. 678 167.74049.453 170.29 170. 324099. 079 4059.378 171. 134069. 303 170. 774079. 229 170.674089.154 169.69 4109.004 169. 164118. 929 168. 714138. 779 168. 64148. 705 168. 824128. 854 168.44

```
Existing - 34R LOMR
                                                                   167. 73 4198. 33
4158.629
           168. 264168. 555
                               168. 1 4178. 48
                                                167. 924188. 405
                                                                                     167.58
4208.255
                              167. 384228. 105
           167.47 4218.18
                                                167. 314238. 031
                                                                   167. 264247. 956
                                                                                     167. 18
4257. 881
4307. 506
4357. 132
4406. 758
                              166. 954277. 731
167. 514327. 357
168. 024376. 982
           167. 074267. 806
167. 334317. 432
168. 244367. 057
                                                167. 034287. 656
167. 734337. 282
                                                                   167. 144297. 582
1684347. 207
                                                                                     167.23
                                                                                     168.25
                                                 168. 24386. 908
                                                                   168. 354396. 833
                                                                                     168.48
                                                168. 554436. 533
                                                                   168. 464446. 458
           168. 624416. 683
                              168. 644426. 608
                                                                                     168.38
4456.383
           168. 484466. 309
                              169. 054476. 234
                                                169. 364486. 159
                                                                   169. 574496. 084
                                                                                     169.73
                                                                    170. 34545. 709
                              170.014525.859
4506,009
           169. 874515. 934
                                                170.064535.785
                                                                                     170.49
           170.68 4565.56
                              170.874575.485
                                                171.05 4585.41
                                                                   171. 234595. 335
4555.635
                                                                                     171.42
           171. 624615. 186
 4605.26
                              171. 834625. 111
                                                    1724635.036
                                                                   172. 164644. 961
                                                                                     172.28
           172. 374664. 811
172. 944714. 437
4654.886
                              172. 464674. 736
                                                                   172.674694.586
                                                172. 564684. 662
                                                                                     172.82
4704. 512
4754. 137
4803. 763
                              173. 044724. 362
173. 934773. 988
                                                173. 154734. 287
174. 194783. 913
                                                                   173. 274744. 212
                                                                                     173.44
           173.674764.063
                                                                   174. 434793. 838
                                                                                     174.67
                              175. 214823. 613
175. 994873. 239
                                                175. 474833. 539
176. 124883. 164
           174. 894813. 688
                                                                   175. 664843. 463
                                                                                     175.84
4853.389
           175. 914863. 314
                                                                   176. 24893. 089
                                                                                     176.25
                               176, 24922, 865
                                                176. 28 4932. 79
                                                                   176. 394942. 715
4903.014
           176. 254912. 939
                                                                                     176.49
 4952.64
            176.6
Manning's n Values
                             num=
    Sta n Val Sta n Val
                                       Sta
                                               n Val
  . 073930. 352
                              . 0454009. 753
                                                 . 07
Bank Sta: Left Right
                             Coeff Contr.
                                              Expan.
       3930. 3524009. 753
                              . 3
                                               . 5
                                    2
Ineffective Flow
                      num=
            Sta R
                       Elev Permanent
   Sta L
    0 3954
4009 4952.64
                       176
                        176
                                                           4 horiz. to 1.0 vertical 4 horiz. to 1.0 vertical
Upstream Embankment side slope
Downstream Embankment side slope
                                                     . 98
Maximum allowable submergence for weir flow = Elevation at which weir flow begins =
                                                       176.6
Energy head used in spillway design
Spillway height used in design
Weir crést shape
                                                 = Broad Crested
Number of Bridge Coefficient Sets = 1
Low Flow Methods and Data
        Energy
Selected Low Flow Methods = Highest Energy Answer
High Flow Method
        Energy Only
Additional Bridge Parameters
        Add Friction component to Momentum
        Do not add Weigh't component to Momentum
        Class B flow critical depth computations use critical depth
            inside the bridge at the upstream end
        Criteria to check for pressure flow = Upstream energy grade line
BRIDGE OUTPUT Profile #1%
* E.G. US. (ft)
*Inside BR DS *
                                   174.71 * Element
                                                                          *Inside BR US
                                                                                174. 69
* W.S. US. (ft)
                                   174.68 * E.G. Elev (ft)
174. 62
* Q Total (cfs)
                                   800.00 * W.S. Elev (ft)
                                                                                174.62 *
174. 56
```

* Q Bridge (cfs)	*			- 34R LOMR Crit W.S. (ft)	*	161. 42	*
160.65 * * Q Weir (cfs)	*		*	Max Chl Dpth (ft)	*	17. 82	*
17.86 * * Weir Sta Lft (ft) 2.04 *	*		*	Vel Total (ft/s)	*	2. 15	*
* Weir Sta Rgt (ft) 392.46 *	*		*	Flow Area (sq ft)	*	371. 36	*
* Weir Submerg 0.09 *	*		*	Froude # Chl	*	0.09	*
* Weir Max Depth (ft) 4048.74 *	*		*	Specif Force (cu ft)	*	3724. 05	*
* Min El Weir Flow (ft)	*	176. 68	*	Hydr Depth (ft)	*		*
* Min El Prs (ft) 84.31 *	*	170. 99	*	W.P. Total (ft)	*	83. 61	*
* Delta EG (ft) 36128.9 *	*	0. 13	*	Conv. Total (cfs)	*	33132. 3	*
* Del ta WS (ft)	*	0. 11	*	Top Width (ft)	*		*
* BR Open Area (sq ft) 0.01 *	*	371. 36	*	Frctn Loss (ft)	*	0. 07	*
* BR Open Vel (ft/s) 0.03 *	*	2. 15	*	C & E Loss (ft)	*	0.00	*
* BR SIuice Coef 0.14 *	*		*	Shear Total (Ib/sq ft)	*	0. 16	*
* BR Sel Method 0.29 *	*Ener	gy only	*	Power Total (lb/ft s)	*	0. 35	*
******	*****	*****	**	******	***	*****	*****
*****							

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used. Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

## BRIDGE OUTPUT Profile #Floodway

*******	*****	******	********	****	*****	****
*****						
* E.G. US. (ft)	*	175. 58	* Element	*Ins	side BR US	
*Inside BR DS * * W.S. US. (ft)	*	175. 55	* E.G. Elev (ft)	*	175. 56	*
175.48 * * Q Total (cfs)	*	800.00	* W.S. Elev (ft)	*	175. 49	*
175.42 * ` ´ ´ ´ ´ ´ * * * * * * * * * * * * *	*	800.00	* Crit W.S. (ft)	*	161. 42	*
160. 65 *	*	000.00		*		
* Q Weir (cfs) 18.72 *	^		* Max Chl Dpth (ft)	^	18. 69	*
* Weir Sta Lft (ft) 2.04 *	*		* Vel Total (ft/s)	*	2. 15	*
* Weir Sta Rgt (ft) 392.46 *	*		* Flow Area (sq ft)	*	371. 36	*
* Weir Submerg	*		* Froude # Chl	*	0. 09	*
* Weir Max Depth (ft)	*		* Specif Force (cu ft)	*	4045. 19	*
4388.13 * * Min El Weir Flow (ft)	*	177. 16	* Hydr Depth (ft)	*		*
* Min El Prs (ft)	*	170. 99	* W.P. Total (ft) Page 85	*	83. 61	*

84. 31 *	LAISt				
* Delta EG (ft) 36128.9 *	* 0.13	* Conv. Total (cfs)	*	33132.3 *	
* Delta WS (ft)	* 0.12	* Top Width (ft)	*	*	
* BR Open Area (sq ft) 0.01 *	* 371. 36	* Frctn Loss (ft)	*	0. 07 *	
* BR Open Vel (ft/s) 0.03 *	* 2. 15	* C & E Loss (ft)	*	0.00 *	
* BR SI ui ce Coef 0.14 *	*	* Shear Total (lb/sq ft)	*	0. 16 *	
* BR Sel Method 0.29 *	*Energy only	* Power Total (lb/ft s)	*	0. 35 *	
*****	*****	********	****	*****	****

\*\*\*\*\*

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used. Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

### BRIDGE OUTPUT Profile #10%

**************************************		*****	* *	******	***	****	*****
****							
* E.G. US. (ft) *Inside BR DS *	*	169. 84	*	Element	*In	side BR US	
* W. S. US. (ft) 169. 60 *	*	169. 62	*	E.G. Elev (ft)	*	169. 78	*
* Q Total (cfs) 169.32 *	*	1450. 00	*	W.S. Elev (ft)	*	169. 47	*
* Q Bridge (cfs) 162.03 *	*	1450. 00	*	Crit W.S. (ft)	*	162. 78	*
* Q Weir (cfs)	*		*	Max Chl Dpth (ft)	*	12. 67	*
12.62 * * Weir Sta Lft (ft) 4.21 *	*		*	Vel Total (ft/s)	*	4. 45	*
* Weir Sta Rgt (ft)	*		*	Flow Area (sq ft)	*	325. 75	*
344.25 * * Weir Submerg	*		*	Froude # Chl	*	0. 22	*
* Weir Max Depth (ft)	*		*	Specif Force (cu ft)	*	1992. 14	*
2173.20 *  * Min El Weir Flow (ft)	*	176. 68	*	Hydr Depth (ft)	*	10. 86	*
* Min El Prs (ft)	*	170. 99	*	W.P. Total (ft)	*	41. 74	*
* Delta EG (ft)	*	0. 37	*	Conv. Total (cfs)	*	42320. 1	*
40549.0 * * Delta WS (ft)	*	0. 24	*	Top Width (ft)	*	30.00	*
* BR Open Area (sq ft)	*	371. 36	*	Frctn Loss (ft)	*	0. 16	*
0.04 * * BR Open Vel (ft/s)	*	4. 45	*	C & E Loss (ft)	*	0. 02	*
0.09 * * BR SI ui ce Coef	*		*	Shear Total (lb/sq ft)	*	0. 57	*
0.54 * * BR Sel Method	*Ene	rgy only	*	Power Total (lb/ft s)	*	2. 55	*
2. 27	****	*****	**	******	***	*****	*****
*****							

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

#### BRIDGE OUTPUT Profile #2% \* E.G. US. (ft) \*Inside BR DS \* 173.18 \* Element \*Inside BR US \* W. S. US. (ft) 173.13 \* E.G. Elev (ft) 173.16 \* 173.06 \* Q Total (cfs) 950.00 \* W.S. Elev (ft) 173.06 172.97 \* Q Bridge (cfs) 950.00 \* Crit W.S. (ft) 161.76 \* 160. 99 \* Q Weir (cfs) 16.27 \* \* Max Chl Dpth (ft) 16. 26 \* Weir Sta Lft (ft) \* Vel Total (ft/s) 2.56 2. 42 \* Weir Sta Rgt (ft) \* Flow Area (sq ft) 371.36 392.46 \* \* Weir Submerg \* Froude # Chl 0.11 0. 11 \* Weir Max Depth (ft) \* Specif Force (cu ft) 3165.88 3445. 54 \* Min El Weir Flow (ft) \* Hydr Depth (ft) 176.68 \* Min El Prs (ft) 170.99 \* W. P. Total (ft) 83. 61 84. 31 \* \* Delta EG (ft) 0.18 \* Conv. Total (cfs) 33132. 3 36128. 9 \* Delta WS (ft) \* Top Width (ft) 0.15 \* BR Open Area (sq ft) 371.36 \* Frctn Loss (ft) 0.10 \* 0.02 \* BR Open Vel (ft/s) 2.56 \* C & E Loss (ft) 0.01 0.03 \* BR Sluice Coef \* Shear Total (lb/sq ft) \* 0. 23

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

\*Energy only \* Power Total (lb/ft s) \*

\_..,

0.58 \*

is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections. Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

#### BRIDGE OUTPUT Profile #0.2%

\* BR Sel Method

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* \*\*\*\*\* \* E.G. US. (ft) \* 178.48 \* Element \*Inside BR US

\*Inside BR DS \* 178.48 \* E.G. Elev (ft) \* \* W.S. US. (ft) 178.48 \* Page 87

178. 47 *								
* Q Total (cfs)	*	700.00	*	W.S. Elev (ft)	*	178. 48	*	
* Q Bridge (cfs)	*	111. 40	*	Crit W.S. (ft)	*	161. 18	*	
160.41 * * Q Weir (cfs)	*		*	Max Chl Dpth (ft)	*	21. 68	*	
21. 77 *				max om spen (12)		21.00		
* Weir Sta Lft (ft) 0.11 *	*		*	Vel Total (ft/s)	*	0. 10	*	
* Weir Sta Rgt (ft)	*		*	Flow Area (sq ft)	*	6874. 81	*	
6444.04 *	*		.1.		.1.			
* Weir Submerg 0.01 *	*		*	Froude # Chl	*	0. 00	*	
* Weir Max Depth (ft)	*		*	Specif Force (cu ft)	*	9841. 51	*	
9696. 78 *								
* Min El Weir Flow (ft)	*	176. 68	*	Hydr Depth (ft)	*	1. 48	*	
* Min El Prs (ft)	*	170. 99	*	W.P. Total (ft)	*	4736. 27	*	
4600.08 *								
* Del ta EG (ft) 188487.8 *	*	0. 00	*	Conv. Total (cfs)	*	203617. 6	*	
* Delta WS (ft)	*	0.00	*	Top Width (ft)	*	4650. 74	*	
4513.96 * * PP Open Area (sq. ft)	*	371. 36	*	Ereth Loss (ft)	*	0.00	*	
* BR Open Area (sq ft) 0.00 *		371.30		Frctn Loss (ft)		0.00		
* BR Open Vel (ft/s)	*	0. 30	*	C & E Loss (ft)	*	0.00	*	
0.00 * * BR Sluice Coef	*		*	Shear Total (lb/sq ft)	*	0.00	*	
0.00 *								
* BR Sel Method	*Ener	gy only	*	Power Total (lb/ft s)	*	0.00	*	
0.00 *	****	*****	* * :	******	***	*****	***	***
****								

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth

with the lowest, valid, water surface was used.

#### CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 243.38

I NPUT

Description: XS 243.38

MANASSAS MUNICIPAL AIRPORT - TAXIWAY AND RUNWAY

THI S

Station Elevation Data num= 486 Sta El ev Sta El ev Sta Sta El ev Sta El ev El ev 182. 05 180. 94 3. 28 39. 37 16.4 26.25 0 181.94 181.9 182.24 29.53 181.94 32.81 181. 2 49. 21 180.91 181.16 59.05 68.89 181.02 82.02 104.98 108.26 127.94 179.72 180.48 180.69 180.4 180.32 131. 22

150.91 179.02 137.79 183.71 179.68 179.84 164.03 179.86 190.28 178.2 203.4 177.96 209.96 178.84 216.52 179.29 236.2 179.94 242.77 179.98 249.33 180.34 252.61 180.25 269.01 181.59 275.57 181.62 288.69 182.16 295.26 328.06 182. 7 321.5 182.41 182.48 334.62 182. 21 344.46 182.2

Page 88

THE DOWNSTREAM FACE OF THE SMALL RUNWAY FROM EFFECTIVE MODEL

Existing - 34R LOMR 179. 89 178. 38 176. 99 175. 75 174. 7 396.95 179.83 410.08 178. 9 177. 26 370.71 181.77 400. 24 179. 13 426.48 178.6 442.88 433.04 449.44 177.5 478.97 178.08 472.41 485. 53 547. 86 600. 35 662. 69 177. 23 175. 67 175. 01 174. 32 488. 81 551. 14 610. 2 682. 37 521. 62 557. 71 620. 04 524. 9 574. 11 176.09 531.46 176.05 176.31 175. 46 174. 58 174. 33 583. 95 652. 84 705. 33 175. 1 173. 58 174. 54 175. 01 173. 81 643 688. 93 728. 3 780. 79 698.77 174.31 174. 2 174. 2 173. 95 173. 57 721.74 174.05 718.46 173.97 173.94 734.86 174.19 741.42 173. 83 172. 91 174.02 787.35 761.1 767.67 173.69 790.63 173.65 173. 57 816. 88
173. 35 869. 36
173. 31 918. 57
172. 79 980. 91
172. 14 1043. 24
171. 89 1082. 61
171. 66 1121. 97
172. 54 1174. 46
172. 94 1223. 67
174. 04 1299. 13
175. 2 1348. 34
175. 92 1390. 98
175. 77 1453. 32
174. 38 1505. 81
172. 72 1574. 7
171. 51 1610. 79
170. 08 1686. 24 810.31 816.88 173.4 820.16 173.06 830 843.12 173.36 173. 4 173. 5 172. 98 172. 39 171. 94 171. 69 171. 74 872. 65 934. 98 994. 03 1049. 8 1089. 17 1135. 1 862. 8 915. 29 967. 78 1030. 12 173. 35 173. 04 905. 45 957. 94 895.61 173. 29 173.43 173. 29 905. 45 172. 67 957. 94 172. 28 1016. 99 172. 08 1062. 92 171. 47 1102. 29 172. 21 1158. 06 172. 72 1200. 71 173. 58 1276. 16 174. 52 1331. 93 173. 43 172. 93 172. 07 171. 92 171. 81 172. 33 948.1 173. 04 948. 1 171. 89 1007. 15 172. 14 1059. 64 171. 73 1095. 73 172. 4 1144. 94 172. 5 1194. 15 173. 1 1266. 32 174. 64 1318. 81 1076. 04 1108. 85 171. 74 1135. 1 172. 6 1181. 02 172. 81 1233. 51 174. 5 1312. 25 175. 17 1361. 46 175. 84 1407. 39 174. 99 1469. 72 174. 68 1515. 65 172. 39 1581. 26 171. 24 1627. 19 170. 29 1699. 36 170. 52 1748. 57 170. 24 1797. 78 170. 79 1856. 83 170. 25 1899. 48 170. 31 1958. 53 170. 36 1994. 62 170. 93 2027. 43 170. 25 2073. 35 172. 65 2119. 28 172.68 1164.62 173.96 1213.83 1289.29 174.74 174. 64 1318. 81 175. 5 1368. 02 175. 92 1413. 95 174. 61 1479. 56 174. 41 1525. 49 171. 87 1587. 82 170. 8 1640. 31 170. 24 1702. 64 1289. 29 1341. 78 1384. 42 1436. 91 1502. 53 1561. 58 1604. 23 175. 84 1377. 86 175. 76 1420. 51 175. 72 175.88 174. 48 1486. 12 173. 46 1538. 61 171. 6 1600. 95 170. 59 1646. 87 174. 56 172. 88 171. 32 170.38 1676. 4 170.61 1712.49 170.63 170.08 1686. 24 170. 44 1725. 61 170. 47 1784. 66 170. 5 1761. 7 170. 6 1801. 06 170. 2 1771. 54 171. 06 1814. 19 1719.05 170.27 1778. 1 171.18 170. 47 1784. 66 170. 92 1837. 15 170. 6 1896. 2 170. 46 1942. 13 170. 76 1984. 78 170. 8 2020. 87 170. 66 2070. 07 170. 6 1801. 06 170. 75 1863. 4 170. 75 1915. 89 170. 38 1965. 09 170. 43 1997. 9 170. 69 2033. 99 170. 41 2083. 2 173. 96 2135. 68 171. 06 1814. 19 170. 91 1873. 24 170. 78 1925. 73 170. 76 1974. 94 170. 97 2011. 02 170. 81 2043. 83 170. 46 2093. 04 1824. 03 1876. 52 170.53 170.44 170. 66 170. 99 170. 57 171. 03 1938. 85 1978. 22 2017.58 2047. 11 2096. 32 170. 25 2073. 35 172. 65 2119. 28 175. 85 2168. 49 176. 57 2220. 98 176. 48 2293. 15 175. 74 2345. 64 174. 18 2391. 56 173. 162431. 657 171. 832481. 282 171. 52530. 908 171. 372580. 534 171. 612630. 159 171. 772679. 785 171. 662729. 411 171. 97 2106. 16 175. 61 2161. 93 176. 37 2214. 42 175.02 2142.25 175.61 175. 02 2142. 25 175. 91 2181. 61 176. 81 2257. 06 176. 23 2312. 83 175. 4 2362. 04 173. 87 2411. 25 172. 582451. 507 171. 682501. 133 171. 422550. 759 2096. 32 2152. 09 2191. 45 2270. 19 2319. 39 2378. 44 2421. 09 175. 7 2171. 77 176. 55 2250. 5 176 176. 55 176.65 176. 55 2250. 5 176. 48 2302. 99 175. 52 2358. 76 174. 53 2404. 69 172. 932441. 582 171. 732491. 208 176. 64 2276. 75 175. 85 2335. 8 174. 72 2388. 28 172. 97 2429 175.8 175. 18 173. 33 172. 21 2461. 432 2511. 058 1722471. 357 171.63 1722471. 357 171. 562520. 983 171. 352570. 609 171. 532620. 234 171. 76 2669. 86 171. 712719. 486 171. 712769. 111 171. 632818. 737 171. 462868. 363 171. 152917. 988 171. 292967. 614 171. 472540. 833 171. 422590. 459 171. 692640. 085 171.38 171. 422550. 759 171. 472600. 384 171. 73 2650. 01 171. 82699. 635 171. 732749. 261 171. 62798. 887 171. 482848. 512 171. 292898. 138 171. 142947. 764 2560.684 171.48 2610. 309 2659. 935 2709. 561 2759. 186 2808. 812 2858. 438 171. 75 171. 76 171. 692640. 085 171. 78 2689. 71 171. 692739. 336 171. 582788. 962 171. 52838. 587 171. 342888. 213 171. 772679. 785 171. 662729. 411 171. 632779. 036 171. 572828. 662 171. 432878. 288 171. 052927. 913 171. 382977. 539 171. 543027. 165 171. 77 171. 63 171. 47 171. 29 171. 12937. 839 171. 482987. 464 2908.063 171.17 171. 292967. 614 171. 55 3017. 24 171. 483066. 865 171. 562997. 389 2957.689 171.53 171. 53 3037. 09 171. 63086. 716 171. 993136. 341 171. 523047. 015 3007.314 171.5 171. 52 3076. 79 171. 933126. 416 3056.94 171. 683096. 641 172. 113146. 266 171.76 3106. 566 3156. 191 3205. 817 171. 843116. 491 172.07 172. 013166. 116 171. 813215. 742 171. 393265. 368 171. 193314. 993 171. 953176. 042 171. 763225. 667 171. 313275. 293 171. 353324. 919 171. 893185. 967 171. 723235. 593 171. 273285. 218 171. 413334. 844 171. 833195. 892 171. 73245. 518 171. 283295. 143 171. 533344. 769 171.84 171.55 3255. 443 3305. 068 171. 23 171. 88 3354.694 172. 363364. 619 172. 943374. 544 173. 463384. 469 173. 323394. 395 173.17 3404. 32 3453. 945 172. 13 3424. 17 171. 953473. 796 171. 86 3444. 02 172. 093493. 646 172. 693414. 245 171. 963434. 095 171.91 172.013483.721 171.94 3463.87 172.12 172. 53533. 346 172. 763582. 972 172. 73543. 271 172. 863592. 897 3503.571 172. 223513. 496 172. 283523. 421 172.8 3553.197 172. 713563. 122 172. 693573. 047 172.95

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Existing - 34R LOMR
                                  173. 113622. 673
173. 223672. 298
                                                      173. 183632. 598
3602.822
             173. 023612. 747
                                                                           173. 193642. 523
                                                                                                173.33
             173. 343662. 373
3652.448
                                                      173. 083682. 223
                                                                           172. 923692. 148
                                                                                                172.78
                                  172. 523721. 924
171. 56 3771. 55
170. 873821. 175
                                                                           172. 113741. 774
171. 27 3791. 4
3702.073
             172.663711.999
                                                       172. 333731. 849
                                                                                                 171.9
3751. 699
3801. 325
3850. 95
             171. 743761. 624
170. 94 3811. 25
171. 123860. 876
                                                       171. 423781. 475
170. 88 3831. 1
                                                                                                171.07
                                                                            170. 923841. 025
                                                                                                170.98
                                  171. 243870. 801
                                                       171. 223880. 726
                                                                            171. 113890. 651
                                                                                                170.74
3900.576
             170.643910.501
                                  168. 923920. 427
                                                       165. 943930. 352
                                                                            162. 883940. 277
                                                                                                160.34
                                                                            158. 833999. 827
             159. 383960. 127
                                  158.83 3979
                                                        156. 73989. 902
3950. 202
                                                                                                160.49
4009.753
             162. 314019. 678
                                  164. 564029. 603
                                                       166. 434039. 528
                                                                             167. 74049. 453
                                                                                                170.29
                                                       170. 674089. 154
168. 714138. 779
                                                                            170. 324099. 079
4059. 378
4109. 004
             171. 134069. 303
169. 164118. 929
                                  170. 774079. 229
                                                                                                169.69
                                                                            168. 64148. 705
                                  168. 824128. 854
                                                                                                168.44
4158. 629
4208. 255
4257. 881
4307. 506
             168. 264168. 555
167. 47 4218. 18
167. 074267. 806
167. 334317. 432
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167. 384228. 105
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167. 314238. 031
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167. 734337. 282
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167. 264247. 956
167. 144297. 582
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167. 18
167. 23
168. 25
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             168. 244367. 057
                                  168. 024376. 982
                                                        168. 24386. 908
                                                                            168. 354396. 833
                                                                                                168.48
                                                                           168. 464446. 458
169. 574496. 084
             168. 624416. 683
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                                  168. 644426. 608
                                                                                                168.38
4456.383
             168. 484466. 309
                                  169.054476.234
                                                       169. 364486. 159
                                                                                                169.73
                                                                           170. 34545. 709
171. 234595. 335
172. 164644. 961
172. 674694. 586
173. 274744. 212
4506.009
             169. 874515. 934
                                  170. 014525. 859
                                                       170.064535.785
                                                                                                170.49
4555. 635
4605. 26
4654. 886
             170.68 4565.56
                                  170. 874575. 485
                                                       171.05 4585.41
                                                                                                171.42
             171. 624615. 186
172. 374664. 811
172. 944714. 437
                                  171. 834625. 111
172. 464674. 736
173. 044724. 362
173. 934773. 988
                                                          1724635.036
                                                                                                172.28
                                                       172. 564684. 662
173. 154734. 287
                                                                                                172.82
4704.512
                                                                                                173.44
4754. 137
             173.674764.063
                                                       174. 194783. 913
                                                                           174. 434793. 838
                                                                                                174.67
4803.763
             174. 894813. 688
                                  175. 214823. 613
                                                       175. 474833. 539
                                                                            175. 664843. 463
                                                                                                175.84
             175. 914863. 314
4853.389
                                  175. 994873. 239
                                                       176. 124883. 164
                                                                            176. 24893. 089
                                                                                                176.25
             176. 254912. 939
                                   176. 24922. 865
                                                       176. 28 4932. 79
                                                                            176. 394942. 715
4903.014
                                                                                                176.49
 4952.64
              176. 6
Manning's n Values num=
Sta n Val Sta n V
                                  num=
                                 num= 3
n Val Sta n Val
              . 073930. 352 . 0454009. 753 . 07
Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr.
                                                                                                 Expan.
        3930. 3524009. 753
                                               585 585
                                                                    585
Ineffective Flow num=
                                         2
            Sta R
    Sta L
                          Elev Permanent
               3954
                        176
                                  F
F
        0
     4009 4952.64
                           176
CROSS SECTION OUTPUT Profile #1%
                                          *************
*****
* E.G. Elev (ft)
                               * 174.58
                                             * Element
                                                                                   Left OB *
                                                                                                  Channel *
Right OB *
  Vel Head (ft)
                                               * Wt. n-Val.
                                                                                                   0.045
                                       0.01
* W.S. Elev (ft)
                       * 174.57
                                               * Reach Len. (ft)
                                                                                   585.00
                                                                                                  585.00
 585. 00 *
* Crit W.S. (ft)
                      * 160. 45
                                               * Flow Area (sq ft)
                                                                                                  865.13
* E.G. Slope (ft/ft) *0.000020
                                                                                              * 1207.09
                                               * Area (sq ft)
                                                                               * 7460.92
3829. 18 *
                                                                                                  800.00
* Q Total (cfs)
                               * 800.00
                                              * Flow (cfs)
* Top Width (ft)
                               * 3749.91
                                                                               * 2890.61
                                               * Top Width (ft)
                                                                                                   79.40
 779. 90 *
* Vel Total (ft/s)
                              * 0.92
                                               * Avg. Vel. (ft/s)
                                                                                                    0. 92
* Hydr. Depth (ft)
                                                                                                   15.73
                          *177989.9 * Conv. (cfs)
                                                                                              *177989.9
* Conv. Total (cfs)
                                                  Page 90
```

* Length Wtd. (ft)	*	585. 00	* Wetted Per. (ft)	*		*	55. 63	*
* Min Ch El (ft)	*	156. 70	* Shear (Ib/sq ft)	*		*	0. 02	*
* Al pha *	*	1. 00	* Stream Power (Ib/ft s)	*		*	0. 02	*
* Frctn Loss (ft) 1263.48 *	*	0. 01	* Cum Volume (acre-ft)	*	883. 75	*	227. 89	*
* C & E Loss (ft) 102.83 *	*	0. 01	* Cum SA (acres)	*	92. 99	*	10. 79	*
	****	*****	*******	***	*****	***	*****	* *
*****								

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT PI					***	*****	* * *	*****	**
* E.G. Elev (ft)	*	175. 45	*	Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	*	0. 01	*	Wt. n-Val.	*		*	0.045	*
* W.S. Elev (ft)	*	175. 43	*	Reach Len. (ft)	*	585. 00	*	585.00	*
585.00 * * Crit W.S. (ft)	*	160. 45	*	Flow Area (sq ft)	*		*	912. 71	*
* E.G. Slope (ft/ft)	*0	. 000030	*	Area (sq ft)	*		*	912. 71	*
* Q Total (cfs)	*	800.00	*	Flow (cfs)	*		*	800.00	*
* Top Width (ft)	*	55.00	*	Top Width (ft)	*		*	55.00	*
* Vel Total (ft/s)	*	0.88	*	Avg. Vel. (ft/s)	*		*	0. 88	*
* Max Chl Dpth (ft)	*	18. 73	*	Hydr. Depth (ft)	*		*	16. 59	*
* Conv. Total (cfs)	*1	46512. 4	*	Conv. (cfs)	*		*1	46512. 4	*
* Length Wtd. (ft)	*	585.00	*	Wetted Per. (ft)	*		*	85. 15	*
* Min Ch El (ft)	*	156. 70	*	Shear (lb/sq ft)	*		*	0. 02	*
* Al pha	*	1. 00	*	Stream Power (lb/ft s)	*		*	0. 02	*
* Frctn Loss (ft)	*	0. 01	*	Cum Volume (acre-ft)	*	97. 80	*	234. 05	*
690.48 * * C & E Loss (ft)	*	0.00	*	Cum SA (acres)	*	2. 30	*	10. 55	*
×*************************************	***	*****	* *	******	***	*****	***	*****	**
*****									

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

	Fx	isting – 34R LOMR					
	rofile #10%	*********	***	:****	**:	*****	**
****							
* E.G. Elev (ft) Right OB *	* 169.47	* Element	*	Left OB	*	Channel	*
* Vel Head (ft)	* 0.10	* Wt. n-Val.	*		*	0. 045	*
* W.S. Elev (ft) 585.00 *	* 169.38	* Reach Len. (ft)	*	585. 00	*	585. 00	*
* Crit W.S. (ft)	* 161.55	* Flow Area (sq ft)	*		*	579. 53	*
* E.G. Slope (ft/ft)	*0.000252	* Area (sq ft)	*	69. 21	*	794. 80	*
634.32 * * 0 Total (cfs)	* 1450.00	* Flow (cfs)	*		*	1450.00	*
* Top Width (ft)	* 510.13	* Top Width (ft)	*	22. 48	*	79. 40	*
408.24 * * Vel Total (ft/s)	* 2.50	* Avg. Vel. (ft/s)	*		*	2. 50	*
* Max Chl Dpth (ft)	* 12.68	* Hydr. Depth (ft)	*		*	10. 54	*
* Conv. Total (cfs)	* 91283.7	* Conv. (cfs)	*		*	91283. 7	*
* Length Wtd. (ft)	* 585.00	* Wetted Per. (ft)	*		*	55. 63	*
* Min Ch El (ft)	* 156. 70	* Shear (Ib/sq ft)	*		*	0. 16	*
* Al pha	* 1.00	* Stream Power (lb/ft s)	*		*	0. 41	*
* Frctn Loss (ft)	* 0.09	* Cum Volume (acre-ft)	*	436. 73	*	162. 12	*
558.12 * * C & E Loss (ft) 94.12 *	* 0.04	* Cum SA (acres)	*	58. 02	*	10. 79	*
****	*****	*****	***	*****	* * :	*****	**
*****							

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth
with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT PI		*******	******	*****
* E.G. Elev (ft)	* 173.01	* Element	* Left OB	* Channel *
Right OB * * Vel Head (ft)	* 0.02	* Wt. n-Val.	*	* 0.045 *
* W.S. Elev (ft)	* 172. 98	* Reach Len. (ft)	* 585.00	* 585.00 *
585.00 * * Crit W.S. (ft)	* 160.74	* Flow Area (sq ft)	*	* 777.85 *
* E.G. Slope (ft/ft)	*0. 000041	* Area (sq ft)	* 3323.64	* 1081.10 *
2645.25 * * Q Total (cfs)	* 950.00	* Flow (cfs)	*	* 950.00 *
* Top Width (ft)	* 3037.64	* Top Width (ft)	* 2259.32	* 79.40 *
698.92 * * Vel Total (ft/s) *	* 1. 22	* Avg. Vel. (ft/s)	*	* 1.22 *
* Max Chl Dpth (ft)	* 16. 28	* Hydr. Depth (ft) Page 92	*	* 14.14 *

* Conv. Total (cfs)	*1	49080. 9	y	Conv. (cfs)	*		*1	49080. 9	*
* Length Wtd. (ft)	*	585.00	4	Wetted Per. (ft)	*		*	55. 63	*
* Min Ch El (ft)	*	156. 70	4	Shear (lb/sq ft)	*		*	0. 04	*
* Al pha *	*	1. 00	y	Stream Power (lb/ft s)	*		*	0. 04	*
* Frctn Loss (ft) 1045.08 *	*	0. 01	4	Cum Volume (acre-ft)	*	727. 50	*	208. 16	*
* C & E Loss (ft) 100.84 *	*	0. 01	4	Cum SA (acres)	*	80. 81	*	10. 79	*
*************************	***	*****	* * *	********	***	*****	***	*****	* *

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

#### CROSS SECTION OUTPUT Profile #0.2%

****				
* E.G. Elev (ft)	* 178.47	* Element	<pre>* Left OB '</pre>	* Channel *
Right OB *				
* Vel Head (ft)	* 0.00	* Wt. n-Val.	* 0. 070 <sup>-</sup>	* 0.045 *
0. 070 *				
* W.S. Elev (ft)	* 178.47	* Reach Len. (ft)	* 585.00	* 585.00 *
585. 00 * ` ´		` ,		
* Crit W.S. (ft)	* 160, 25	* Flow Area (sq ft)	*20304.27	* 1517.15 *
7295. 71 *	.00.20			
* E.G. Slope (ft/ft)	*0.000000	* Area (sq ft)	*20304.27	* 1517.15 *
7295. 71 *	0.000000	Area (Sq It)	20304. 27	1317.13
	* 700.00	* Flow (cfc)	* 414.40	* 105.66 *
* 0 Total (cfs)	700.00	* Flow (cfs)	414.40	103.00
179.93	* 4F00 10	* T Wi -l+l- (-E+)	* 0F10 01 s	* 70.40 *
* Top Width (ft)	* 4533. 10	* Top Width (ft)	* 3510.81	* 79.40 *
942. 89 *				
* Vel Total (ft/s)	* 0.02	* Avg. Vel. (ft/s)	* 0.02	* 0.07 *
0. 02 *				
<pre>* Max Chl Dpth (ft)</pre>	* 21.77	* Hydr. Depth (ft)	* 5. 78 <sup>3</sup>	* 19.11 *
7.74 *				
* Conv. Total (cfs)	*2352110. C	) * Conv. (cfs)	*1392457.0	*355047.4
*604606.3 *				
* Length Wtd. (ft)	* 585.00	* Wetted Per. (ft)	* 3513.24	* 80.41 *
945. 81 *	000.00	metted for: (1t)	0010.21	00. 11
* Min Ch El (ft)	* 156. 70	* Shear (lb/sq ft)	* 0.00	* 0.00 *
0.00 *	130.70	Silear (Tb/3q Tt)	0.00	0.00
0.00	* 1.06	* Ctroom Dower (1b/ft o)	* 0.00	* 0.00 *
* Al pha	* 1.96	* Stream Power (lb/ft s)	* 0.00	0.00 *
0.00		* 6 1/ 1 ( 61)		
<pre>* Frctn Loss (ft)</pre>	* 0.00	* Cum Volume (acre-ft)	* 1332.36 <sup>3</sup>	* 276. 24 *
1832. 09 *				
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 106.59 <sup>3</sup>	* 10.79 *
119. 42 * ` ´		•		
*******	******	******	*****	*****
+++++++++				

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) Page 93

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RI VER: RI VER-1

RS: 243.2 REACH: Reach-1

I NPUT

Description: XS 243.2
INSERTED XS TO EVALUATE IMPACT OF PROPOSED SITE(5/21/01)
Station Elevation Data num= 483

```
Existing - 34R LOMR
                                                                             Existing
174. 56 2348. 95
174. 39 2391. 6
174. 25 2430. 96
174. 2 2473. 61
174. 06 2529. 38
174. 11 2581. 87
173. 91 2614. 68
173. 77 2663. 89
173. 03 2709. 82
172. 51 2768. 87
                             174. 51 2342. 39
174. 5 2388. 32
174. 22 2427. 68
174. 35 2467. 05
174. 27 2512. 98
173. 98 2572. 03
   2332. 55
2375. 19
                                                                                                                             174. 46 2358. 79
                                                                                                                                                                                                                                 174.8
                                                                                                                                                                            174. 79 2362. 07
                                                                                                                             174. 46 2358. 79
174. 46 2401. 44
174. 14 2437. 52
174. 36 2490. 01
174. 29 2542. 5
174. 04 2585. 15
                                                                                                                                                                                                                                174. 4
                                                                                                                                                                             174. 28 2414. 56
                                                                                                                                                                             174. 32 2453. 93
174. 17 2499. 86
174. 34 2552. 35
174. 15 2591. 71
   2421. 12
2463. 77
                                                                                                                                                                                                                              174.26
                                                                                                                                                                                                                              174.29
   2506. 42
                                                                                                                                                                                                                              174.29
   2565.47
                                                                                                                                                                                                                              173.97
                              173. 84
173. 79
                                                                                                                              173. 8 2621. 24
173. 55 2673. 73
                                                                                                                                                                              173. 86 2631. 08
173. 65 2680. 29
   2601.56
                                                  2604.84
                                                                                                                                                                                                                                173.7
                              173. 79 2647. 48
173. 44 2703. 26
   2640.92
                                                                                                                                                                                                                              173.44
                                                                                                                              173. 07 2732. 78
                                                                                                                                                                              172.62 2739.34
   2690.13
                                                                                                                                                                                                                              172.59
                            173. 44 2703. 26
172. 38 2762. 31
172. 15 2795. 11
171. 92 2831. 2
171. 47 2900. 09
170. 98 2952. 58
170. 91 3028. 04
169. 71 3070. 68
                                                                             173. 03 2709. 82
172. 51 2768. 87
172. 24 2801. 67
172. 1 2847. 6
171. 23 2909. 93
170. 87 2965. 7
170. 86 3041. 16
                                                                                                                                                                             172. 62 2739. 34
172. 71 2781. 99
171. 98 2811. 52
171. 7 2867. 29
171. 35 2926. 34
170. 86 2995. 23
170. 44 3054. 28
                                                                                                                             173. 07 2732. 78
172. 51 2775. 43
172. 05 2808. 24
171. 89 2854. 16
171. 19 2919. 78
170. 78 2975. 55
170. 58 3044. 44
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2788. 55
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  2824. 64
2893. 53
2946. 02
3018. 19
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169. 43 3083. 81
166. 57 3126. 46
164. 95 3165. 82
164. 03 3208. 47
164. 65 3277. 36
163. 68 3339. 68
163. 95 3382. 31
164. 31 3418. 38
164. 76 3461. 01
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165. 55 3142. 86
                                                                                                                                  169 3090.37
      3067.4
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166. 07 3136. 3
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                            169. 71 3070. 68
167. 12 3119. 89
165. 13 3159. 26
164. 3 3198. 63
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163. 68 3333. 12
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163. 46 3411. 82
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164. 28 3182. 23
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163. 47 3352. 8
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   3188. 79
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3359. 35
3405. 26
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      3447.9
                              164.86 3454.45
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   3477.41
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164. 58 3608. 58
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166. 67 3680. 73
167. 74 3736. 47
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169. 36 3847. 96
168. 49 3920. 09
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166. 37 3618. 42
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166. 49 3628. 26
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169. 04 3857. 79
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                                                                                                                             167. 76 3992. 23
167. 16 4041. 41
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165. 68 4421. 77
                                                                              167. 43 4034. 86
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165. 22 4434. 89
164. 99 4497. 19
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166. 34 4113. 55
165. 79 4172. 57
166. 23 4218. 48
167. 38 4284. 06
167. 37 4339. 8
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164. 73 4474. 24
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                                                                                                                                                                                                                              166.23
   4126.67
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   4185. 69
4231. 59
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167. 15
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4356. 19
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   4411. 94
                                                                                                                                                                                                                              164.69
   4480.79
                              164.86 4490.63
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                             164. 86 4490. 63
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166. 76 4582. 44
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167. 89 4674. 25
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165. 28 4818. 53
                                                                                                                             165. 27 4507. 03
166. 55 4556. 21
167. 04 4611. 95
167. 73 4657. 86
167. 78 4713. 6
167. 18 4756. 23
164. 75 4795. 57
166. 8 4834. 92
                                                                                                                                                                             165. 56 4520. 14
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167. 27 4625. 07
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166. 89 4762. 78
164. 52 4802. 13
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167. 23 4746. 39
165. 98 4789. 02
                                                                                                                                                                                                                               167. 5
                                                                                                                                                                                                                              167.89
   4631.63
   4670. 97
4729. 99
                                                                                                                                                                                                                              167.87
                                                                                                                                                                                                                              166.56
                                                                                                                                                                                                                              164. 76
167. 68
   4766.06
                                                                                166. 2 4821. 81
   4808.69
   4851.32
                              169.05 4867.71
                                                                              170.55 4880.83
                                                                                                                              171. 98 4890. 66
                                                                                                                                                                             172. 99 4897. 22
                                                                                                                                                                                                                              173.39
   4903.78
                              174.02 4907.06
                                                                              174, 49 4913, 62
                                                                                                                              175.03
Manning's n Values
                                                                              num=
                                                              Sta
                                                                             n Val
             Sťa
                           n Val
                                                                                                              Sta
                                                                                                                                n Val
                                      . 07
                                                            3496
                                                                                   . 045 3575. 79
                                                                                                                                 . 07
                                                                             Lengths: Left Channel
                                                                                                                                                                                   Coeff Contr.
Bank Sta: Left
                                                   Ri ght
                                                                                                                                                     Ri ght
                                                                                                                                                                                                                                 Expan.
                              3496 3575.79
                                                                                                           760
                                                                                                                                   760
                                                                                                                                                            200
                                                                                                                                                                                                       . 1
                                                                                                                                                                                                                                    . 3
Ineffective Flow
                                                            num=
                                                                                                2
                                Sta R
                                                                              Permanent
         Sta L
                                                            ELev
                    0
                                   3456
                                                          180
                                                                              F
            4156 4913.62
                                                                                            F
                                                              180
```

#### CROSS SECTION OUTPUT Profile #1% \* E.G. Elev (ft) \* 174.57 \* Element Left OB \* Channel \* Right OB Vel Head (ft) 0.00 \* Wt. n-Val. 0.070 0.045 0.070 \* W.S. Elev (ft) 174. 57 \* Reach Len. (ft) 760.00 760.00 200.00 \* Crit W.S. (ft) \* 158.78 \* Flow Area (sq ft) 435.24 \* 1339.52 4128. 29 \* E.G. Slope (ft/ft) \*0.000001 \* Area (sq ft) \* 5505.23 \* 1339.52 9837. 14 O\_Total (cfs) 800.00 \* Flow (cfs) 54.76 349.80 395.43 \* Top Width (ft) \* 2573.90 \* Top Width (ft) \* 1161.88 79.79 1332. 23 Vel Total (ft/s) 0.14 \* Avg. Vel. (ft/s) 0.13 0. 26 0.10 Max Chl Dpth (ft) \* Hydr. Depth (ft) 19.47 10.88 16.79 7. 12 \* Conv. Total (cfs) \*324055.6 \* \*655595.1 \* Conv. (cfs) \* 44878.5 \*286661.0 \* Length Wtd. (ft) 453.05 \* Wetted Per. (ft) 40.65 81.19 580. Š5 \* Min Ch El (ft) 155. 10 \* Shear (lb/sq ft) 0.00 0.00 0.00 \* Al pha 1. 93 \* Stream Power (lb/ft s) \* 0.00 0.00 0.00 \* Frctn Loss (ft) 0.00 \* Cum Volume (acre-ft) 796.69 210.79 1171. 71 0.00 \* Cum SA (acres) 65.78 9.72 C & E Loss (ft) 88.65 \* \*

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT **********************************				ay ********	***	****	* * ;	*****	**
* E.G. Elev (ft)	*	175. 43	*	Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	*	0. 01	*	Wt. n-Val.	*	0. 070	*	0. 045	*
* W.S. Elev (ft)	*	175. 43	*	Reach Len. (ft)	*	760. 00	*	760. 00	*
200.00 * * Crit W.S. (ft)	*	158. 78	*	Flow Area (sq ft)	*	3. 08	*	1342. 23	*
* E.G. Slope (ft/ft)	*0	. 000009	*	Area (sq ft)	*	3. 08	*	1342. 23	*
* Q Total (cfs)	*	800.00	*	Flow (cfs)	*	0. 07	*	799. 93	*
* Top Width (ft)	*	75. 30	*	Top Width (ft)	*	0. 20	*	75. 10	*
* Vel Total (ft/s)	*	0. 59	*	Avg. Vel. (ft/s)	*	0. 02	*	0. 60	*

```
Existing - 34R LOMR
                                                           15.41
                                                                     17.87
* Max Chl Dpth (ft)
                          20.33 * Hydr. Depth (ft)
* Conv. Total (cfs)
                      *266343.9 * Conv. (cfs)
                                                            22. 2
                                                                  *266321.7
                         759.92 * Wetted Per. (ft)
                                                           15.59
* Length Wtd. (ft)
                                                                     91.12
                         155.10 * Shear (lb/sq ft)
* Min Ch El (ft)
                                                            0.00
                                                                      0.01
                                * Stream Power (lb/ft s) *
* Al pha
                           1.00
                                                            0.00
                                                                      0.00
* Frctn Loss (ft)
                           0.01
                                * Cum Volume (acre-ft)
                                                           97. 78
                                                                    218.91
690.48
* C & E Loss (ft)
                           0.00 * Cum SA (acres)
                                                            2.30
                                                                      9.68
 28. 87
*********************************
*****
```

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

### CROSS SECTION OUTPUT Profile #10%

******	* * :	*****	* *	******	* * :	*****	* * *	****	* *
*****									
* E.G. Elev (ft) Right OB *	*	169. 34	*	Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.070 *	*	0. 02	*	Wt. n-Val.	*	0. 070	*	0.045	*
* W. S. Elev (ft) 200.00 *	*	169. 33	*	Reach Len. (ft)	*	760. 00	*	760. 00	*
* Crit W.S. (ft)	*	159. 77	*	Flow Area (sq ft)	*	225. 62	*	921. 40	*
* E.G. Slope (ft/ft)	*(	0. 000049	*	Area (sq ft)	*	1985. 78	*	921. 40	*
3001.66 * * 0 Total (cfs)	*	1450.00	*	Flow (cfs)	*	105. 28	*	1077. 43	*
* Top Width (ft)	*	1726. 67	*	Top Width (ft)	*	422. 22	*	79. 79	*
1224.66 * * Vel Total (ft/s)	*	0. 65	*	Avg. Vel. (ft/s)	*	0. 47	*	1. 17	*
0.24 * * Max Chl Dpth (ft)	*	14. 23	*	Hydr. Depth (ft)	*	5. 64	*	11. 55	*
* Conv. Total (cfs)	* 2	206780. 0	*	Conv. (cfs)	*	15013. 1	*1	53649. 6	*
* Length Wtd. (ft)	*	603. 38	*	Wetted Per. (ft)	*	40. 65	*	81. 19	*
526.64 * * Min Ch El (ft)	*	155. 10	*	Shear (Ib/sq ft)	*	0. 02	*	0. 03	*
* Al pha	*	2. 49	*	Stream Power (lb/ft s)	*	0. 01	*	0. 04	*
0.00 * * Frctn Loss (ft)	*	0. 03	*	Cum Volume (acre-ft)	*	422. 93	*	150. 60	*
533.70 * * C & E Loss (ft)	*	0. 00	*	Cum SA (acres)	*	55. 04	*	9. 72	*
83. 15 * *********	**:	*****	* *	******	**	*****	<b>*</b> * *	****	* *

\*\*\*\*\*

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections. Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CRUSS	SECTI ON	UIITDIIT	Profile	#2%
CINUSS	JEC II ON	001101	1101116	$\pi \angle 0$

******	*****	******	* *	*****	* * :	*****	* *
*****							
* E.G. Elev (ft) Right OB *	* 172. 98	* Element	*	Left OB	*	Channel	*
* Vel Head (ft)	* 0.00	* Wt. n-Val.	*	0. 070	*	0.045	*
0.070 * * W.S. Elev (ft) 200.00 *	* 172.98	* Reach Len. (ft)	*	760. 00	*	760.00	*
* Crit W.S. (ft) 3206.38 *	* 159.05	* Flow Area (sq ft)	*	371. 68	*	1212. 74	*
* E.G. Slope (ft/ft)	*0.000004	* Area (sq ft)	*	4074. 42	*	1212. 74	*
7732.13 *' * 0 Total (cfs)	* 950.00	* Flow (cfs)	*	66. 88	*	470. 86	*
412.27 * * Top_Width (ft)	* 2176. 15	* Top Width (ft)	*	781. 58	*	79. 79	*
1314.77 * * Vel Total (ft/s) 0.13 *	* 0. 20	* Avg. Vel. (ft/s)	*	0. 18	*	0. 39	*
* Max Chl Dpth (ft)	* 17.88	* Hydr. Depth (ft)	*	9. 29	*	15. 20	*
* Conv. Total (cfs)	*490044.5	* Conv. (cfs)	*	34496.6	* 1	242884. 1	
*212663.8 *  * Length Wtd. (ft)	* 481.90	* Wetted Per. (ft)	*	40. 65	*	81. 19	*
* Min Ch El (ft)	* 155. 10	* Shear (Ib/sq ft)	*	0.00	*	0.00	*
* Al pha	* 2.14	* Stream Power (lb/ft s)	*	0.00	*	0.00	*
0.00 * * Frctn Loss (ft) 975.39 *	* 0.00	* Cum Volume (acre-ft)	*	677. 82	*	192. 75	*
* C & E Loss (ft) 87.31 *	* 0.00	* Cum SA (acres)	*	60. 39	*	9. 72	*
*****	*****	* * * * * * * * * * * * * * * * * * * *	* *	*****	* * :	*****	* *
*****							

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

## CROSS SECTION OUTPUT Profile #0.2%

*******	******	*******	*****	*****
*****				
* E.G. Elev (ft) Right OB *	* 178.47	* Element	* Left OB	* Channel *
* Vel Head (ft) 0.070 *	* 0.00	* Wt. n-Val.	* 0.070	* 0.045 *
* W.S. Elev (ft) 200.00 *	* 178.47	* Reach Len. (ft)	* 760.00	* 760.00 *
* Crit W.S. (ft) 6393.82 *	* 158.60	* Flow Area (sq ft)	* 591.42	* 1651.08 *
* E.G. Slope (ft/ft) *15059.64 *	*0.000000	* Area (sq ft)	*10656. 68	* 1651.08
* Q Total (cfs) 407.94 *	* 700.00	* Flow (cfs)	* 45.43	* 246.63 *
* Top Width (ft) 1337.83 *	* 2779.42	* Top Width (ft)	* 1361.80	* 79.79 *
* Vel Total (ft/s) 0.06 *	* 0.08	* Avg. Vel. (ft/s)	* 0.08	* 0.15 *
* Max Chl Dpth (ft) 11.02 *	* 23.37	* Hydr. Depth (ft)	* 14. 79	* 20.69 *

* Conv. Total (ofc)	* 1	Exi	st	ing - 34R LOMR		* 74014 0	*	: 104101 1	
* Conv. Total (cfs) *671847.1 *	^ I	152855. U		* Conv. (cfs)		* 74816.0		406191.4	
* Length Wtd. (ft) 580.55 *	*	412. 61	*	Wetted Per. (ft)	*	40. 65	*	81. 19	*
* Min Ch El (ft) 0.00 *	*	155. 10	*	Shear (Ib/sq ft)	*	0.00	*	0. 00	*
* Al pha 0.00 *	*	1. 62	*	Stream Power (lb/ft s)	*	0.00	*	0. 00	*
* Frctn Loss (ft) 1681.98 *	*	0.00	*	Cum Volume (acre-ft)	*	1124. 46	*	254. 96	*
* C & E Loss (ft) 104.10 *	*	0. 00	*	Cum SA (acres)	*	73. 87	*	9. 72	*
******	***	*****	* *	******	* * :	*****	* * *	******	< <b>*</b>
*****									

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1 RS: 243

I NPUT

Description: XS 243 JUST UPSTREAM OF CANNON BRANCH

Station E				482					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev		Elev
	El ev	Sta	El ev	Sta	EI ev ********* 182. 57 182. 62 182. 94 183. 34 181. 63 177. 41 175. 48 173. 85 176. 32 185. 52 194. 66 196. 96 196. 63 194. 7 194. 66 196. 41 193. 05 180. 15 170. 18 167. 9 166. 98 167. 38 164. 41 161. 52	Sta ******* 9. 83 55. 72 104. 89 140. 94 167. 16 190. 11 216. 33 255. 66 275. 33 301. 55 324. 5 360. 55 380. 22 403. 16 435. 94 458. 88 475. 27 494. 94 524. 44 563. 77 599. 83 622. 77 645. 71 675. 21	EI ev ******** 182. 52 182. 73 183. 07 183. 35 181. 04 176. 97 175. 47 173. 95 178. 08 187. 73 195. 66 196. 8 196. 34 194. 76 194. 76 194. 76 194. 29 191. 24 178. 51 169. 28 167. 57 166. 82 167. 26 163. 6 161. 31		
681. 77	161. 37	688. 32	161. 76	694.88	161. 39	698. 16	161. 65	701. 44	161. 52
707. 99 737. 48	161. 57 161. 2	714. 55 744. 03	161. 25 161. 4	721. 1 747. 31	161. 2 161. 72	724. 38 750. 58	161. 07 161. 77	730. 93 763. 68	161. 29 161. 2
				Pac	ne 99				

Existing - 34R LOMR 773. 5 799. 7 819. 34 845. 54 871. 73 891. 38 160. 55 161. 16 161. 87 161. 2 161. 18 161. 75 160. 9 770. 23 789. 87 812. 79 842. 26 865. 18 888. 1 160. 63 161. 21 780.05 160. 75 161. 91 776. 77 160.59 783.32 161.03 809.52 802.97 161.46 806.24 162.25 161. 27 161. 23 161. 15 161. 55 161. 36 161. 05 160. 99 825. 89 848. 81 832. 44 852. 08 161.09 838.99 161.07 161. 33 161. 22 161.1 858.63 878. 28 897. 92 927. 39 881. 55 904. 47 884. 83 907. 75 161 161.51 161.06 160.9 924. 12 953. 59 979. 78 914. 3 947. 04 160. 94 161. 03 937. 22 969. 96 160.8 930.67 160.84 161.04 963. 41 996. 15 956.86 161.1 161.02 161.17 161.19 973. 23 1019. 07 161.3 979.78
160.84 1028.9
161.11 1055.09
160.79 1078.01
160.74 1104.21
160.89 1146.77
160.24 1166.42
159.92 1195.88
161.47 1228.63
163.03 1248.27
153.2 1331.46
165.96 1346.5
165.8 1389.07
165.9 1425.08
166.05 1454.55
165.8 1493.87 992. 88 160. 87 1005. 98 161. 11 992. 88 161. 04 1035. 44 160. 85 1058. 37 160. 87 1084. 56 160. 66 1117. 3 160. 41 1150. 05 160. 18 1169. 69 159. 86 1199. 16 163. 36 1231. 9 162. 82 1252. 36 158. 84 1333. 4 166. 11 1362. 87 165. 7 1395. 62 165. 99 1431. 63 166. 05 1464. 38 165. 85 1500. 42 160. 87 996. 15
161. 07 1038. 72
160. 82 1064. 91
160. 89 1087. 83
160. 97 1127. 12
160. 06 1153. 32
160. 24 1176. 24
159. 6 1212. 26
163. 67 1235. 18
162. 42 1254. 82
164. 63 1334. 49
165. 79 1369. 42
165. 83 1405. 44
166. 15 1438. 18
165. 82 1470. 93
165. 79 1506. 97
165. 59 1546. 28 161.3 161.11 160.87 160.7 160. 87 1005. 98 161. 16 1045. 27 160. 98 1068. 19 160. 84 1094. 38 161. 25 1130. 4 159. 9 1156. 59 160. 48 1182. 79 161.06 1051. 82 1074. 74 1097. 66 160.84 160. 95 161. 17 159. 91 160. 26 1133. 67 1163. 14 160. 48 1182. 79 159. 65 1218. 8 163. 73 1241. 72 162. 14 1258. 83 164. 79 1339. 95 165. 84 1372. 7 165. 83 1408. 71 166. 23 1444. 73 165. 86 1480. 76 1189.34 160.68 1222.08 163.42 1245 157.87 1290 165.64 1343. 23 1379. 24 1418. 54 1451. 28 165.76 165.9 166. 2 165.86 1484.04 165.85 1500.42 165.8 1516.8 165.6 1529.9 165. 48 1539. 73 165. 48 1549. 56 165.53 1523.35 165.51 165.59 1546.28 165. 51 1529. 9 165. 44 1559. 39 164. 91 1601. 98 164. 63 1631. 46 165. 51 1683. 88 165. 81 1713. 37 165. 04 1752. 68 165. 06 1791. 99 165. 22 1824. 75 165. 09 1867. 34 164. 98 1900. 1 165. 51 1942. 69 166. 02 1988. 56 165. 48 1539. 73 165. 46 1565. 94 164. 59 1611. 81 164. 91 1634. 74 165. 79 1690. 43 165. 71 1716. 64 165. 09 1765. 78 164. 96 1795. 27 165. 15 1831. 31 1556. 11 1588. 87 165. 36 1572. 49 164. 54 1615. 08 165. 32 1585. 6 164. 43 1621. 63 165.07 164. 43 1621. 63 165 1660. 95 165. 83 1700. 26 165. 43 1729. 75 164. 99 1778. 89 165. 23 1808. 37 165. 25 1844. 41 164. 78 1887 165. 25 1926. 31 165. 63 1972. 18 166. 23 2011. 49 166. 83 2050. 81 167. 84 2083. 57 169. 34 2129. 43 169. 42 2172. 02 168. 94 2214. 61 168. 37 2253. 92 168. 12 2299. 79 167. 97 2332. 55 168. 05 2365. 31 164.46 164. 96 1644. 57
165. 78 1696. 99
165. 52 1723. 19
164. 95 1775. 61
165. 19 1801. 82
165. 29 1837. 86
164. 87 1880. 45
165. 2 1913. 21
165. 57 1959. 07
166. 08 2004. 94
166. 65 2040. 98
167. 86 2080. 29
169. 04 2119. 6
169. 4 2162. 19
168. 92 2208. 06
168. 64 2244. 1
168. 09 2283. 41
168. 13 2329. 27
167. 78 2362. 04
167. 9 2404. 62
167. 13 2447. 21
166. 17 2483. 25
165. 78 2532. 39
165. 78 2574. 98
165. 67 2614. 3
166 2656. 89
166. 47 2692. 92
166. 44 2725. 68
166. 47 2765
166. 09 2807. 59
165. 64 2837. 07
165. 42 2863. 28 165. 25 165. 78 165. 27 164. 94 1628. 19 1670. 78 1706. 81 1742. 85 1785. 44 165.15 164. 96 1795. 27
165. 15 1831. 31
164. 86 1873. 9
165. 09 1903. 38
165. 59 1949. 25
166 1998. 39
166. 52 2031. 15
167. 26 2073. 74
168. 38 2106. 5
169. 48 2158. 92
169. 09 2201. 51
168. 65 2237. 54
168. 24 2270. 3
168. 13 2322. 72
167. 76 2348. 93
167. 91 2391. 52
167. 23 2437. 39
166. 33 2470. 15
165. 82 2525. 84
165. 85 2571. 71
165. 49 2607. 74
166. 05 2643. 78
166. 55 2683. 09
166. 49 2719. 13
166. 43 2758. 44
166. 16 2801. 03
165. 6 2830. 52
165. 51 2853. 45
165. 06 2889. 49 1821.48 165.15 1854.24 165.01 1893. 55 1936. 14 1985. 28 2021. 32 2054. 08 165. 27 165. 8 166. 02 1988. 56 166. 52 2027. 87 167. 09 2060. 63 168. 05 2090. 12 166. 25 166.95 168.08 2086. 84 169. 26 169. 46 2145. 81 169. 14 2194. 95 2139. 26 2181. 85 169.23 168. 77 168.76 2227.72 2221.16 168.27 2257. 2 2303. 07 168. 18 2267. 03 167. 98 2309. 62 167.96 167. 97 167. 97 2332. 53 168. 05 2365. 31 167. 56 2411. 18 166. 88 2450. 49 165. 79 2493. 08 165. 59 2545. 5 2335. 83 2375. 14 2417. 73 2453. 77 167. 86 2342. 38 168. 17 2384. 97 167. 4 2427. 56 166. 68 2463. 59 168.05 167. 56 166. 84 165. 79 165. 53 166. 68 2463. 59 165. 64 2516. 01 165. 8 2558. 6 165. 74 2601. 19 166. 02 2640. 5 166. 57 2676. 54 166. 38 2712. 58 166. 54 2745. 34 166. 21 2794. 48 165. 86 2827. 24 165. 5 2850. 18 2502.91 165. 68 2581. 53 2555.33 165.77 2591.36 165.71 2624.12 165.83 2630. 68 2669. 99 2702. 75 2738. 79 166. 14 2663. 44 166. 45 2696. 2 166.41 166. 14 2663. 44 166. 45 2696. 2 166. 56 2732. 24 166. 6 2774. 83 166. 18 2810. 86 165. 53 2840. 35 165. 28 2869. 83 166.53 166.48 166.44 2784. 65 166.13 2817. 41 165.58 2843.62 165.11 164. 93 2902. 59 166. 11 2938. 63 2886. 21 2918. 97 165. 06 2889. 49 165. 53 2928. 8 164. 96 2896. 04 165. 82 2935. 35 165. 14 2876.38 165.07 2909.15 165.51 166.18 166. 44 2951. 74 166. 91 2997. 6 166. 5 2974. 67 167. 25 3007. 43 166. 52 2964. 84 166. 61 2984. 5 167. 24 3013. 98 2945.18 166.92 2991.05 167. 15 3004. 15 167.55

```
Existing - 34R LOMR
                              167. 27 3040. 19
           167.43 3027.09
                                                167. 33 3043. 47
 3017. 26
                                                                   167. 42 3053. 29
                                                                                     167.49
                             167. 27 3040. 17
167. 33 3095. 88
167. 34 3131. 92
165. 99 3171. 23
164. 76 3190. 89
168. 21 3223. 65
                                                                   167. 24 3112. 26
           167. 26 3072. 95
                                                167.41 3102.44
  3066.4
                                                                                     167. 23
           167. 37 3125. 37
166. 85 3167. 96
164. 52 3184. 34
                                                167. 18 3138. 47
165. 5 3174. 51
165. 08 3194. 17
                                                                   167. 16 3148. 3
164. 61 3177. 79
                                                                                     166.97
 3115. 54
 3151.58
                                                                                      164.48
           164. 52 3184. 34
167. 74 3213. 82
 3181.06
                                                                                      167.16
                                                                    165. 4
                                                                               3204
                                                169. 39 3233. 48
                                                                                       172.4
 3210.55
                                                                   170. 43 3246. 58
 3249.86
            172.8 3259.69
                              173.82
Manning's n Values
                              num=
                             n Val
Sta n Val
                        Sta
                                               n Val
                                          Sta
            . 07 1254. 82 . 045 1334. 49 . 07
                             Lengths: Left Channel
                                                                     Coeff Contr.
Bank Sta: Left
                   Ri ght
                                                         Right
                                                                                       Expan.
        1254. 82 1334. 49
                                                                                        . 3
                                        4920
                                                 3930
                                                          1480
                                                                         . 1
Ineffective Flow
                                     2
                       num=
   Sta L
            Sta R
                       El ev
                              Permanent
       0
             1070
                        180
                                   F
    2500 3259.69
                        180
CROSS SECTION OUTPUT Profile #1%
* E.G. Elev (ft)
                             * 174.57 * Element
                                                                          Left OB *
                                                                                       Channel *
Right OB *
  Vel Head (ft)
                                  0.00
                                         * Wt. n-Val.
                                                                           0.070
                                                                                        0.045
  0.070
* W.S. Elev (ft)
                             * 174.57
                                         * Reach Len. (ft)
                                                                       * 4920.00
                                                                                   * 3930.00
1480.00 *
* Crit W.S. (ft)
                             * 159. 29
                                         * Flow Area (sq ft)
                                                                       * 2521.56
                                                                                   * 1456. 25
9413. 18
* E.G. Slope (ft/ft)
*15497.25 *
                             *0.00003
                                         * Area (sq ft)
                                                                       * 9127.01
                                                                                   * 1456.25
* Q Total (cfs)
                             * 2665.00
                                         * Flow (cfs)
                                                                          570.20
                                                                                       590.99
1503.82
* Top Width (ft)
                            * 2774.92
                                         * Top Width (ft)
                                                                          770.05
                                                                                        79.67
1925. 20
 Vel Total (ft/s)
                                 0. 20
                                         * Avg. Vel. (ft/s)
                                                                            0.23
                                                                                         0.41
   0. 16
 Max Chl Dpth (ft)
                                         * Hydr. Depth (ft)
                                 21. 37
                                                                           13.64
                                                                                        18.28
8.08 *
* Conv. Total (cfs)
                             *1425180.0 * Conv. (cfs)
                                                                        *304928.5
                                                                                    *316045.5
*804205.9 *
* Length Wtd. (ft)
                             * 2469.02
                                         * Wetted Per. (ft)
                                                                         185. 45
                                                                                        86.43
1165.83
 Min Ch El (ft)
                                                                            0.00
                             * 153. 20
                                         * Shear (lb/sq ft)
                                                                                         0.00
   0.00
 Al pha
                                  1.56
                                         * Stream Power (lb/ft s) *
                                                                            0.00
                                                                                         0.00
   0.00
                                  0.01
                                         * Cum Volume (acre-ft)
                                                                          669.04
* Frctn Loss (ft)
                                                                                       186. 40
1113. 55
                                  0.00 * Cum SA (acres)
                                                                           48. 92
* C & E Loss (ft)
                                                                                         8.33
  81. 17 *
```

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #Floodway

****							
* E.G. Elev (ft)	* 175.42	* Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	* 0.04	* Wt. n-Val.	*	0. 070	*	0.045	*
0.070 * * W.S. Elev (ft)	* 175.38	* Reach Len. (ft)	*	4920. 00	*	3930. 00	*
1480.00 * * Crit W.S. (ft)	* 159.30	* Flow Area (sq ft)	*	244. 23	*	1520. 65	*
5.38 * * E.G. Slope (ft/ft)	*0. 000055	* Area (sq ft)	*	244. 23	*	1520. 65	*
5.38 *' * Q Total (cfs)	* 2665.00	* Flow (cfs)	*	150. 19	*	2514. 29	*
0.52 * * Top Width (ft)	* 100.00	* Top Width (ft)	*		*	79.67	*
0. 51 *		•		17.02		77.07	
* Vel Total (ft/s) 0.10 *	* 1.51	* Avg. Vel. (ft/s)	*	0. 61	*	1. 65	*
* Max Chl Dpth (ft) 10.55 *	* 22. 18	* Hydr. Depth (ft)	*	12. 32	*	19. 09	*
* Conv. Total (cfs)	*360041.6	* Conv. (cfs)	*	20290. 8	*:	339680. 0	*
* Length Wtd. (ft)	* 3279.12	* Wetted Per. (ft)	*	31. 54	*	86. 43	*
* Min Ch El (ft)	* 153. 20	* Shear (Ib/sq ft)	*	0. 03	*	0. 06	*
0. 00 * * Al pha	* 1.15	* Stream Power (lb/ft s)	*	0. 02	*	0. 10	*
0.00 * * Frctn Loss (ft)	* 0.11	* Cum Volume (acre-ft)	*	95. 62	*	193. 93	*
690. 47 *	* 0.01	,	*	2. 12	*	8. 33	*
* C & E Loss (ft) 28.87 *	* 0.01	* Cum SA (acres)		۷. ۱۷		0. 33	
*****	*****	* * * * * * * * * * * * * * * * * * * *	* *	*****	* * ;	*****	* *
*****							

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

#### CROSS SECTION OUTPUT Profile #10%

******************************											
*****											
* E.G. Elev (ft) Right OB *	* 169. 32	* Element	* Left OB	* Channel *							
* Vel Head (ft) 0.070 *	* 0.01	* Wt. n-Val.	* 0.070	* 0.045 *							
* W.S. Elev (ft) 1480.00 *	* 169. 31	* Reach Len. (ft)	* 4920.00	* 3930.00 *							
* Cri t W.S. (ft) 3285.02 *	* 159.60	* Flow Area (sq ft)	* 1549.13	* 1037.07 *							
* E.G. Slope (ft/ft) 5455.72 *	*0.000042	* Area (sq ft)	* 5222.48	* 1037.07 *							
* Q Total (cfs) 981.48 *	* 3015.00	* Flow (cfs)	* 874.34	* 1159.18 *							
* Top Width (ft) 1846.38 *	* 2656.52	* Top Width (ft)	* 730.47	* 79.67 *							
* Vel Total (ft/s) 0.30 *	* 0.51	* Avg. Vel. (ft/s)	* 0.56	* 1.12 *							
* Max Chl Dpth (ft) 2.92 *	* 16. 11	* Hydr. Depth (ft)	* 8.38	* 13.02 *							
* Conv. Total (cfs)	*466840.8	* Conv. (cfs) Page 102	*135381.8	*179487. 1							

*1F1071 0 *		LAI	٠.	Trig on Louin					
*151971.9 *									
* Length Wtd. (ft)	*	2945. 30	*	Wetted Per. (ft)	*	185. 45	*	86. 43	*
1123. 75 *									
	4	450 00	4	Cl (1 ls / Ct.)	*	0 00	4	0 00	4
* Min Ch El (ft)	^	153. 20	^	Shear (Ib/sq ft)	^	0. 02	*	0. 03	^
0. 01 *									
* Al pha	*	2. 28	*	Stream Power (lb/ft s)	*	0. 01	*	0. 03	*
0.00 *		2. 20		otream rower (16/11 3)		0.01		0.00	
0.00									
* Frctn Loss (ft)	*	0. 13	*	Cum Volume (acre-ft)	*	360. 05	*	133. 51	*
514. 29 * ` ´				,					
0 · · · = /	*	0.00	*	Cum CA (corso)	*	44. 98	*	8. 33	*
* C & E Loss (ft)		0. 00		Cum SA (acres)		44. 98		0.33	
76. 10 *									
******	****	*****	* * :	******	* * *	*****	* * *	*****	* *
*****									

Warning: Divided flow computed for this cross-section. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

## 

****									
* E.G. Elev (ft)	*	172. 98	*	Element	*	Left OB	*	Channel	*
Right OB *									
* Vel Head (ft)	*	0. 00	*	Wt. n-Val.	*	0. 070	*	0. 045	*
0. 070 *									
* W.S. Elev (ft)	*	172. 98	*	Reach Len. (ft)	*	4920.00	*	3930.00	*
1480.00 * ` ´				` '					
* Crit W.S. (ft)	*	159. 42	*	Flow Area (sq ft)	*	2227.64	*	1329. 56	*
7559. 69 * ` ´				<b>\</b> 1 /					
* E.G. Slope (ft/ft)	*0	. 000007	*	Area (sq ft)	*	7929. 91	*	1329. 56	
*12439. 05 *				( )					
* Q Total (cfs)	*	2805. 00	*	Flow (cfs)	*	645. 61	*	706.87	*
1452. 52 *						0.0.0.			
* Top Width (ft)	* '	2741. 09	*	Top Width (ft)	*	744.34	*	79. 67	*
1917. 08 *		_, 0,		rop macm (re)		, , , , , ,		, ,. 0,	
* Vel Total (ft/s)	*	0. 25	*	Avg. Vel. (ft/s)	*	0. 29	*	0. 53	*
0. 19 *		0. 20		7. vg. voi: (11,73)		0.27		0.00	
* Max Chl Dpth (ft)	*	19. 78	*	Hydr. Depth (ft)	*	12. 05	*	16. 69	*
6. 49 *		17.70		nyar: beptil (11)		12.00		10.07	
* Conv. Total (cfs)	* 1	077598. 0	,	* Conv. (cfs)	,	*248022. 9	,	<sup>4</sup> 271559. 7	
*558015. 6 *		077370.0		conv. (crs)		240022. /		271337.7	
* Length Wtd. (ft)	* '	2561. 56	*	Wetted Per. (ft)	*	185. 45	*	86. 43	*
1165. 83 *	•	2301.30		wetted ref. (1t)		105. 45		00.43	
* Min Ch El (ft)	*	153. 20	*	Shear (lb/sq ft)	*	0. 01	*	0. 01	*
0.00 *		155. 20		Silear (10/54 11)		0.01		0.01	
0.00	*	1. 72	*	Ctroom Dower (lb/ft c)	*	0. 00	*	0.00	*
* Al pha		1.72		Stream Power (lb/ft s)		0.00		0.00	
0.00	*	0.00	*	Cum Valuma (aana £t)	*	F72 10	*	170 50	*
* Frctn Loss (ft)		0. 02		Cum Volume (acre-ft)	*	573. 10	*	170. 58	
727.07		0.00		2 24 ( )		47.00		0.00	*
* C & E Loss (ft)	*	0. 00	^	Cum SA (acres)	*	47. 08	*	8. 33	^
79. 90 *	- الماليات				، بادیات	المراجعة والمراجعة والمراجعة والمراجعة والمراجعة	الماسا		
*****	* * *	*****	× ;	* * * * * * * * * * * * * * * * * * * *	< × >	*****	· × >	*****	× ×

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

```
CROSS SECTION OUTPUT Profile #0.2%
* Left OB * Channel *
                          * 0.070 * 0.045 *
                Page 103
```

	EXI	Stilly - 34k LOWK					
0.070 * * W.S. Elev (ft)	* 178.47	* Reach Len. (ft)	*	4920. 00	*	3930. 00	*
1480.00 * * Crit W.S. (ft)	* 158.77	* Flow Area (sq ft)	*	3243. 43	*	1767. 43	
*13965.41 * * E.G. Slope (ft/ft)	*0. 000001	* Area (sq ft)	*1	2339. 78	*	1767. 43	
*23016.65 * * Q Total (cfs)	* 2100.00	* Flow (cfs)	*	397. 25	*	373. 73	*
1329.02 * * Top Width (ft)	* 2860.36	* Top Width (ft)	*	855. 49	*	79. 67	*
1925. 20 * * Vel Total (ft/s)	* 0.11	* Avg. Vel. (ft/s)	*	0. 12	*	0. 21	*
O.10 * * Max_Chl_Dpth (ft)	* 25. 27	* Hydr. Depth (ft)	*	17. 55	*	22. 18	*
11.98 * * Conv. Total (cfs)	*2452352.0	* Conv. (cfs)	*	463898. 0	*	436439. 3	
*1552015.0 * * Length Wtd. (ft)	* 2385.05	* Wetted Per. (ft)	*	185. 45	*	86. 43	*
1165.83 * * Min Ch El (ft)	* 153. 20	* Shear (Ib/sq ft)	*	0.00	*	0.00	*
0. 00 * * Al pha	* 1.35	* Stream Power (lb/ft s)	*	0.00	*	0.00	*
0.00 * * Frctn Loss (ft)	* 0.00	* Cum Volume (acre-ft)	*	923. 85	*	225. 14	*
1594.56 * * C & E Loss (ft)	* 0.00	* Cum SA (acres)	*	54. 53	*	8. 33	*
	*****	*******	***	****	***	*****	* *
*****							

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

#### CROSS SECTION

RIVER: RIVER-1

RS: 190 REACH: Reach-1

I NPUT

Description: XS 190 (LETTERED CROSS SECTION T)
THE DIVIDED FLOW SECTION STARTS
AS A TRIBUTARY WITH COMMON XS-180

	AS A	INIDUIA	IX I WI III	COMMON A	3-100				
Station E	I evati on	Data	num=	307					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
0	214. 16	3. 27	214. 07	9. 81	213. 97	13.09	213.82	16. 36	213.69
19. 63	213.58	22. 9	213. 43	26. 17	213. 2	29. 44	212.87	32.72	212. 56
35. 99	212. 23	39. 26	211. 64	42.53	210.84	45.8	209.87	49. 07	208. 98
52. 34	207. 9	55. 62	206. 58	58. 89	205. 31	62. 16	204. 17	65. 43	203.07
71. 97	200. 51	75. 24	199. 29	78. 52	198. 08	81. 79	196. 92	85.06	195.85
88. 33	194. 77	91. 6	193. 72	94. 87	192. 91	98. 15	191. 86	101. 42	190. 85
104. 69	190. 14	107. 96	189. 21	111. 23	187. 85	114. 5	186. 37	117. 77	184.88
121. 05	183. 46	124. 32	181. 12	127. 59	177. 94	130.86	174.85	134. 13	172. 17
137. 4	169. 26	137. 67	169. 03	140. 67	166. 42	143. 95	163. 65	147. 22	160. 33
158	155	188	153.8	208	155	215. 92	158. 89	217. 68	159. 56
222. 46	161. 55	225. 73	162. 79	229. 01	163. 57	232. 28	163. 67	235. 55	163. 78
				Pag	e 104				

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Existing - 34R LOMR
    238. 82
255. 18
271. 54
287. 89
304. 25
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162. 98
162. 91
162. 97
162. 92
162. 72
                       163. 91
163. 16
                                           242.09
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163. 08
                                                                                                                       248. 64
264. 99
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                                                                                                    163.38
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                                           258.45
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297. 71
314. 07
                       163. 04
162. 8
162. 97
162. 84
                                           274. 81
291. 16
307. 52
323. 88
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162. 91
162. 93
162. 79
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294. 44
310. 79
327. 15
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162. 95
162. 91
162. 75
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162. 98
162. 87
162. 67
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317. 34
     320.61
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     340.24
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     356.59
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382. 77
399. 12
418. 75
435. 11
451. 47
467. 83
487. 46
510. 36
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162. 52
162. 43
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    379. 5
395. 85
412. 21
431. 84
448. 2
464. 55
484. 18
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162. 48
162. 73
162. 47
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425. 3
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454. 74
474. 37
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162. 7
162. 27
162. 32
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162. 57
162. 25
162. 35
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458. 01
477. 64
497. 27
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162. 68
162. 25
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461. 28
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162. 01
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     503.81
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526. 71
546. 34
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618. 32
634. 43
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162. 33
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162.16 549.61
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569. 24
588. 87
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162. 37
162. 21
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163. 26
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162. 31
162. 16
162. 5
162. 96
163. 45
    545. 07
559. 43
575. 79
595. 41
615. 04
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162. 19
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611. 77
628. 13
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624. 86
641. 22
660. 84
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162. 86
163. 38
163. 9
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       631.4
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     647.76
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                        163. 96 670. 66
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163. 83695. 9479
164. 09713. 3466
164. 45741. 1845
164. 831026. 523
164. 041043. 922
162. 831061. 321
162. 711082. 199
162. 621103. 077
                       163. 67688. 9884
163. 95706. 3871
682. 0289
702. 9073
                                                              163. 81692. 4681
164. 03709. 8669
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                       163. 95/06. 3871
164. 31727. 2656
164. 79755. 1035
164. 331036. 962
162. 871054. 361
162. 76 1071. 76
162. 661096. 118
160. 831137. 875
162. 361165, 713
                                                              164. 03709. 8669
164. 35 734. 225
164. 831023. 043
164. 191040. 442
162. 831057. 841
162. 73 1075. 24
162. 641099. 598
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164. 59744. 6642
164. 721030. 003
163. 861047. 402
162. 81 1064. 8
162. 711085. 679
162. 561130. 915
723. 7858
751. 6237
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164. 51
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162. 78
162. 69
161. 84
1033. 483
1050. 881
1068. 28
1089. 158
                                                                                                     160. 951144. 834
1134.395
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                                                              160. 831141. 354
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                       160. 831137. 875
162. 361165. 713
162. 841186. 591
162. 98 1207. 47
163. 131256. 186
163. 931357. 098
164. 191384. 936
164. 821423. 214
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162. 89 1197. 03
163. 051217. 909
1162. 233
1183. 111
1203. 99
                                                              162. 471169. 193
162. 861190. 071
                                                                                                                                           162. 791179. 632
162. 93 1200. 51
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163. 081221. 389
163. 821350. 139
164. 061371. 017
164. 631409. 294
165. 221440. 612
166. 811485. 849
                                                              163. 011214. 429
163. 311259. 666
163. 971360. 578
164. 341388. 416
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1203. 77
1224. 868
1353. 619
1374. 497
1419. 734
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164. 031364. 058
164. 381405. 815
164. 891437. 132
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                                                              164. 831426. 693
165. 911478. 889
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167. 391499. 768
169. 641551. 964
1711579. 802
1451.051
                        165. 671458. 011
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                                                             165. 9114/8. 889
167. 251496. 288
169. 341548. 484
170. 871576. 322
171. 77 1600. 68
172. 771621. 559
173. 21638. 957
174. 091694. 633
174. 451722. 471
                                                                                                                                           167. 541506. 727
169. 81558. 923
171. 141583. 281
                       167. 11492. 808
169. 021541. 525
170. 391572. 842
1489. 328
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1534. 565
1562. 403
                                                                                                                                                                                 170.22
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                                                                                                    172. 05 1604. 16
172. 831625. 038
173. 281649. 396
174. 191698. 113
1586. 761
1611. 119
1631. 998
1684. 194
                       171. 431593. 721
172. 491618. 079
173. 11635. 478
174. 051687. 674
                                                                                                                                          172. 2 1607. 64
172. 911628. 518
173. 491670. 275
174. 221705. 072
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173. 01
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174.3
1708.552
                       174. 331718. 991
                                                                                                    174. 481725. 951
                                                                                                                                            174. 51729. 431
                                                                                                                                                                                 174.53
  1732.91
                       174.54 1736.39
                                                              174.57
Manning's n Values
                                                              num=
 Sta n Val Sta n Val
                                                                                        Sta
                                                                                                   n Val
                          . 1 147. 22
                                                                                217. 68
                                                               . 045
                                                             Lengths: Left Channel
                                                                                                                       Right Coeff Contr. Expan.
Bank Sta: Left
                                     Ri ght
                  147. 22 217. 68
                                                                                               735
                                                                                                                             735
                                                                                     735
                                                                                                                                                  . 1
Blocked Obstructions
                                                           num=
                                                                                      1
Sta L Sta R
         1200 1736.39 177.48
```

	ofile #1%	******	+++	+++++++	+ + +		++
****			~ ~ ~	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~			
* E.G. Elev (ft) Right OB *	* 174.56	* Element	*	Left OB	*	Channel	*
* Vel Head (ft)	* 0.00	* Wt. n-Val.	*	0. 100	*	0. 045	*
0.100 * * W.S. Elev (ft) 735.00 *	* 174.56	* Reach Len. (ft)	*	735. 00	*	735.00	*
* Crit W.S. (ft)	*	* Flow Area (sq ft)	*	110. 31	*	1356. 35	
*10977.24 *  * E.G. Slope (ft/ft)  *10077.24 *	*0.000006	* Area (sq ft)	*	110. 31	*	1356. 35	
* Q Total (cfs)	* 2665.00	* Flow (cfs)	*	11. 55	*	743. 81	*
* Top Width (ft)	* 1068.78	* Top Width (ft)	*	16. 00	*	70. 46	*
* Vel Total (ft/s)	* 0. 21	* Avg. Vel. (ft/s)	*	0. 10	*	0. 55	*
0.17 * * Max Chl Dpth (ft) 11.17 *	* 20.76	* Hydr. Depth (ft)	*	6. 89	*	19. 25	*
* Conv. Total (cfs)	*1127841.0	* Conv. (cfs)	*	4887. 1	7	*314783. 6	
* Length Wtd. (ft)	* 735.00	* Wetted Per. (ft)	*	21. 43	*	72. 79	*
* Min Ch El (ft)	* 153.80	* Shear (Ib/sq ft)	*	0.00	*	0. 01	*
* Al pha	* 2.30	* Stream Power (lb/ft s)	*	0.00	*	0.00	*
* Frctn Loss (ft)	* 0.01	* Cum Volume (acre-ft)	*	147. 37	*	59. 52	*
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	*	4. 53	*	1. 56	*
31. 78   * *****************	*****	*******	***	****	**>	*****	<b>*</b> *
*****							

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

	Profile #Floo	odway ********	****	*****	*****	**
********* * E.G. Elev (ft) Right OB *	* 175.30	* Element	*	Left OB	* Channel	*
* Vel Head (ft) 0.100 *	* 0.01	* Wt. n-Val.	*	0. 100	* 0.045	*
* W.S. Elev (ft) 735.00 *	* 175. 29	* Reach Len. (ft)	*	735. 00	* 735.00	*
* Crit W.S. (ft) 5273.88 *	*	* Flow Area (sq ft)	*	42. 91	* 1408.05	*
* E.G. Slope (ft/ft) 5273.88 *	*0.000012	* Area (sq ft)	*	42. 91	* 1408.05	*
* Q Total (cfs) 1477.91 *	* 2665.00	* Flow (cfs)	*	4. 29	* 1182.80	*
* Top Width (ft) 414.32 *	* 488.00	* Top Width (ft)	*	3. 22	* 70.46	*
* Vel Total (ft/s) 0.28 *	* 0.40	* Avg. Vel. (ft/s)	*	0. 10	* 0.84	*
* Max Chl Dpth (ft) 12.73 *	* 21.49	* Hydr. Depth (ft)	*	13. 33	* 19. 98	*
* Conv. Total (cfs)	*754871.2	* Conv. (cfs) Page 106	*	1216. 5	*335032. 1	

+410/00 / +		LAI	String on Louin					
*418622.6 *  * Length Wtd. (ft)  427.15 *	*	735.00	* Wetted Per. (ft)	*	16. 28	*	72. 79	*
* Min Ch El (ft) 0.01 *	*	153. 80	* Shear (Ib/sq ft)	*	0.00	*	0. 02	*
* Al pha 0.00 *	*	2. 27	* Stream Power (lb/ft s)	*	0. 00	*	0. 01	*
* Frctn Loss (ft) 600.78 *	*	0. 01	* Cum Volume (acre-ft)	*	79. 41	*	61. 82	*
* C & E Loss (ft) 21.82 *	*	0.00	* Cum SA (acres)	*	0. 82	*	1. 56	*
*******	****	*****	*******	* * *	*****	* * *	*****	* *
*****								

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

## 

******	*****	*******	* * *	*****	* * *	*****	* *
********* * E.G. Elev (ft)	* 169.19	* Element	*	Left OB	*	Channel	*
Right OB *	107.17	LI OMOTIL		2011 02		onamor	
* Vel Head (ft) 0.100 *	* 0.01	* Wt. n-Val.	*	0. 100	*	0. 045	*
* W.S. Elev (ft) 735.00 *	* 169. 18	* Reach Len. (ft)	*	735. 00	*	735.00	*
* Crit W.S. (ft)	*	* Flow Area (sq ft)	*	41. 48	*	977. 49	*
* E.G. Slope (ft/ft)	*0.000044	* Area (sq ft)	*	41. 48	*	977. 49	*
5695. 29 * * 0 Total (cfs) 1708. 93 *	* 3015.00	* Flow (cfs)	*	8. 77	*	1207. 30	*
* Top Width (ft)	* 1062.51	* Top Width (ft)	*	9. 72	*	70. 46	*
982.32 * * Vel Total (ft/s)	* 0.45	* Avg. Vel. (ft/s)	*	0. 21	*	1. 24	*
0.32 * * Max Chl Dpth (ft)	* 15.38	* Hydr. Depth (ft)	*	4. 26	*	13. 87	*
5.80 * * Conv. Total (cfs)	*455388.8	* Conv. (cfs)	*	1324.8	*1	82351.8	
*271712.1 * * Length Wtd. (ft)	* 735.00	* Wetted Per. (ft)	*	13. 16	*	72. 79	*
989.96 * * Min_Ch_El_(ft)	* 153.80	* Shear (Ib/sq ft)	*	0. 01	*	0.04	*
0. 02 * * Al pha	* 3.33	* Stream Power (lb/ft s)	*	0. 00	*	0. 05	*
0.00 * * Frctn Loss (ft)	* 0.03	* Cum Volume (acre-ft)	*	62. 77	*	42. 64	*
324.85 * * C & E Loss (ft)	* 0.00	* Cum SA (acres)	*	3. 18	*	1. 56	*
28. 05	*****	*******	***	****	* * *	*****	**

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

# 

\*\*\*\*\* \* Left OB \* Channel \*

* Vel Head (ft) 0.100 *	* 0.00	sting - 34R LOMR * Wt. n-Val.	*	0. 100	*	0. 045	*
* W. S. Elev (ft) 735.00 *	* 172. 96	* Reach Len. (ft)	*	735. 00	*	735. 00	*
* Crit W.S. (ft) 9405.18 *	*	* Flow Area (sq ft)	*	86. 26	*	1243. 59	*
* E.G. Slope (ft/ft) 9405.18 *	*0.000010	* Area (sq ft)	*	86. 26	*	1243. 59	*
* Q Total (cfs) 1946. 23 *	* 2805.00	* Flow (cfs)	*	10. 98	*	847. 79	*
* Top Width (ft) 982.32 *	* 1066.83	* Top Width (ft)	*	14. 05	*	70. 46	*
* Vel Total (ft/s) 0.21 *	* 0. 26	* Avg. Vel. (ft/s)	*	0. 13	*	0. 68	*
* Max Chl Dpth (ft) 9.57 *	* 19.16	* Hydr. Depth (ft)	*	6. 14	*	17. 65	*
* Conv. Total (cfs) *625304.8 *	*901219.0	* Conv. (cfs)	*	3526. 8	*2	72387. 5	
* Length Wtd. (ft) 993.74 *	* 735.00	* Wetted Per. (ft)	*	18. 90	*	72. 79	*
* Min Ch El (ft) 0.01 *	* 153.80	* Shear (Ib/sq ft)	*	0.00	*	0. 01	*
* Al pha 0.00 *	* 2.49	* Stream Power (Ib/ft s)	*	0.00	*	0. 01	*
* Frctn Loss (ft) 558.00 *	* 0.01	* Cum Volume (acre-ft)	*	120. 39	*	54. 50	*
* C & E Loss (ft) 30.64 *	* 0.00	* Cum SA (acres)	*	4. 25	*	1. 56	*
	*****	*****	***	*****	***	*****	**
****							

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

#### CROSS SECTION OUTPUT Profile #0.2%

*****	* * *	******	* *	******	***	*****	**	******	* *
*****									
* E.G. Elev (ft) Right OB *	*	178. 47	*	Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.100 *	*	0.00	*	Wt. n-Val.	*	0. 100	*	0. 045	*
* W.S. Elev (ft)	*	178. 47	*	Reach Len. (ft)	*	735. 00	*	735. 00	*
* Crit W.S. (ft)	*		*	Flow Area (sq ft)	*	181. 22	*	1632. 14	
* E.G. Slope (ft/ft)	*0	0. 000002	*	Area (sq ft)	*	181. 22	*	1632. 14	
* Q Total (cfs)	*	2100. 00	*	Flow (cfs)	*	13. 39	*	601. 21	*
1485.40 * * Top Width (ft)	*	1609. 35	*	Top Width (ft)	*	20. 18	*	70. 46	*
1518.71 * * Vel Total (ft/s)	*	0. 12	*	Avg. Vel. (ft/s)	*	0. 07	*	0. 37	*
0.10 * * Max Chl Dpth (ft)	*	24. 67	*	Hydr. Depth (ft)	*	8. 98	*	23. 16	*
* Conv. Total (cfs)	*1	496851.0	,	* Conv. (cfs)	*	9546. 4	7	428535. 2	
* Length Wtd. (ft)	*	735. 00	*	Wetted Per. (ft)	*	27. 15	*	72. 79	*
1535.65 * * Min Ch El (ft)	*	153. 80	*	Shear (Ib/sq ft)	*	0. 00	*	0. 00	*
0.00 * * Al pha	*	3. 04	*	Stream Power (lb/ft s) Page 108	*	0. 00	*	0. 00	*

```
0.00 *
                    0.00 * Cum Volume (acre-ft) * 216.74 * 71.79 *
* Frctn Loss (ft)
942.73 *
* C & É Loss (ft)
                    0.00 * Cum SA (acres)
                                            5. 08 *
                                                   1.56 *
 38. 11 *
*******************
*****
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Warning: The cross-section end points had to be extended vertically for the computed water surface. Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1

RS: 182 REACH: Reach-1

I NPUT

Description: XS 182 CROSS SECTION XS-182 ADDED

90

XS INSERTED TO EVALUATE IMPACT OF PROPOSED

FILL IN THE FLOODWAY

Existing - 34R LOMR 161. 21508. 421 160. 21630. 314 161. 331500. 803 160. 771607. 459 160. 971554. 131 1493. 185 161. 131531. 276 160.85 1561. 749 1653. 169 1691. 26 1736. 97 1904. 572 159. 961645. 551 160. 011637. 932 159.89 159. 631660. 787 160. 861698. 879 162. 631744. 588 162. 291912. 191 158. 831668. 405 161. 381706. 497 162. 831866. 481 161. 911919. 809 158. 831676. 024 161. 851721. 733 162. 831881. 718 161. 71 1957. 9 159. 851683. 642 162. 21729. 352 162. 71896. 954 160. 941965. 519 160.28 162.39 162.55 162. 291912. 191
160. 912011. 228
162. 832079. 793
162. 72163. 594
165. 422209. 304
165. 84 2275. 3
166. 35 2310. 29
165. 49 2345. 28
164. 82 2380. 27
164. 18 2405. 26
163. 74 2430. 25
163. 39 2455. 25
163. 22 2490. 24
163. 02 2520. 23
163. 72 2550. 22
164. 27 2580. 21
165. 64 2620. 2
166. 29 2660. 18
166. 24 2700. 17
166. 34 2745. 16 160.83 162. 222034. 083 162. 552110. 266 164. 622186. 449 1973. 137 161. 692018. 847 161. 862026. 465 162.6 162. 832087. 411 163. 182171. 212 162. 782102. 648 163. 922178. 831 2041.702 162.55 164. 622186. 449
165. 83 2260. 31
166. 36 2290. 3
166. 03 2335. 28
165. 04 2365. 27
164. 39 2395. 26
163. 97 2420. 26
163. 48 2445. 25
163. 34 2475. 24
163. 13 2510. 23
163. 59 2540. 22
164. 08 2565. 21
165. 2 2600. 2
166. 19 2645. 19
166. 29 2685. 18
166. 27 2720. 16
166. 63 2760. 15 2155. 976 164.98 163. 1821/1. 212 165. 612216. 922 165. 83 2280. 3 166. 26 2315. 29 165. 4 2355. 28 164. 59 2385. 27 164. 16 2410. 26 163. 922178. 831 165. 772224. 541 165. 89 2285. 3 166. 23 2325. 29 165. 09 2360. 28 164. 46 2390. 27 164. 04 2415. 26 2155. 976 2201. 686 2265. 3 2300. 29 2340. 28 2370. 27 2400. 26 165.83 166.37 165. 63 164. 96 164. 27 163.82 164. 16 2410. 26 163. 71 2435. 25 163. 4 2460. 24 163. 19 2500. 23 163. 09 2530. 22 163. 85 2555. 22 164. 61 2590. 2 166. 02 2625. 19 166. 31 2670. 18 166. 2 2705. 17 166. 53 2750. 16 166. 69 2790. 14 164. 04 2415. 26 163. 61 2440. 25 163. 35 2470. 24 163. 11 2505. 23 163. 41 2535. 22 163. 93 2560. 21 165. 03 2595. 2 166. 04 2635. 19 166. 37 2680. 18 166. 22 2710. 17 2425. 26 2450. 25 163.41 163.26 2450. 25 2480. 24 2515. 23 2545. 22 2570. 21 2605. 2 2650. 19 2690. 17 163.05 163.67 164. 15 165.45 166.24 166.28 166.33 166. 24 2700. 17 166. 34 2745. 16 166. 58 2780. 15 167. 03 2820. 13 167. 47 2855. 12 167. 75 2900. 11 167. 88 2935. 1 168. 25 2960. 09 168. 55 3020. 07 168. 87 3060. 06 166. 2 2705. 17
166. 53 2750. 16
166. 69 2790. 14
167. 25 2825. 13
167. 55 2865. 12
167. 84 2910. 11
167. 75 2940. 1
168. 31 2975. 09
168. 75 3025. 07
168. 9 3070. 06
169. 11 3100. 05
169. 47 3125. 04
169. 85 3175. 02
170. 03 3230. 01
171 3274. 99
171. 42 3309. 98
171. 99 3344. 97
172. 37 3374. 96
172. 96 3409. 95
173. 56 3444. 94
174. 07 3489. 93
174. 21 3514. 92
174. 77 3554. 91
175. 34 3594. 9
175. 28 3634. 88
176. 27 3664. 87
177. 15 3699. 86
177. 95 3734. 85
178. 58 3764. 84
179. 36 3794. 94 166. 6 2755. 15 166. 82 2795. 14 2725.16 166.63 2760.15 166.59 2765.15 166.84 2805.14 166.98 166. 84 2805. 14 167. 38 2845. 13 167. 68 2885. 11 168. 03 2920. 1 167. 88 2950. 09 168. 41 3000. 08 168. 84 3040. 07 168. 96 3085. 05 169. 32 3110. 04 166. 82 2795. 14 167. 26 2835. 13 167. 65 2875. 12 167. 98 2915. 1 167. 7 2945. 1 168. 35 2980. 08 168. 81 3030. 07 168. 96 3075. 06 169. 26 3105. 05 2810.14 167.45 2850. 13 2890. 11 2930. 1 2955. 09 167.68 168.02 168.11 168.47 3010.08 168.94 3050.06 169.05 168. 87 3060. 06 169. 06 3095. 05 169. 38 3120. 04 169. 78 3155. 03 169. 96 3220. 01 170. 98 3270 171. 33 3299. 99 171. 93 3339. 97 172. 32 3369. 97 172. 73 3404. 95 173 32 3439 94 169. 26 3105. 05 169. 63 3130. 04 169. 9 3180. 02 170. 12 3235. 01 171. 08 3279. 99 171. 65 3319. 98 172. 09 3349. 97 172. 49 3379. 96 173 3414. 95 173. 51 3449. 94 174. 07 3494. 93 174. 29 3519. 92 174. 9 3564. 91 175. 41 3604. 89 175. 71 3644. 88 176. 39 3674. 87 177. 25 3709. 86 178. 31 3739. 85 3090.05 169.48 169. 32 3110. 04 169. 7 3135. 04 169. 89 3190. 02 170. 26 3255 171. 04 3284. 99 171. 71 3329. 98 172. 16 3354. 97 172. 53 3384. 96 173. 08 3419. 95 169. 72 169. 73 3115.04 3140.04 3215.01 170.68 3265 3294. 99 3334. 98 171. 1 171. 9 172. 28 3364. 97 172.61 3404. 95 3439. 94 3389.96 173.12 173. 08 3419. 95 173. 43 3459. 94 174. 17 3499. 93 174. 28 3529. 92 174. 92 3574. 9 175. 31 3609. 89 175. 9 3649. 88 176. 6 3679. 87 177. 41 3714. 86 178. 36 3744. 85 178. 95 3779. 84 3429.95 173. 32 173.59 173. 32 3439. 94 173. 94 3484. 93 174. 25 3509. 92 174. 41 3544. 91 175. 04 3589. 9 175. 07 3619. 89 176. 1 3659. 88 177. 01 3694. 87 3474. 93 3504. 92 174.23 174.4 3534. 91 3579. 9 175.01 175.23 3614. 89 3654. 88 175. 98 176. 77 3689.87 177.58 3719.86 177. 8 3724. 86 178. 31 3739. 85 178.19 178. 33 3754. 85 3749.85 178. 74 3769. 84 179.17 179. 31 3789. 84 179.36 3794.94 179.94 3801.49 3784.84 180.11 Manning's n Values num= Sta n Val Sta n Val Sta n Val Sta Sťa n Val n Val . 1639. 9363 . 045761. 8289 . 031637. 932 . 0251683. 642 Lengths: Left Channel Right Coeff Contr. 635 635 635 .1 Expan. Bank Sta: Left Ri ght 639. 9363754. 2106

Existing - 34R LOMR								
*****						**		
* E.G. Elev (ft) Right OB *	* 174.55	* Element	* Let	ft OB *	Channel	*		
* Vel Head (ft) 0.045 *	* 0.01	* Wt. n-Val.	* 0.	100 *	0. 045	*		
* W.S. Elev (ft) 635.00 *	* 174.54	* Reach Len. (ft)	* 635	5. 00 *	635. 00	*		
* Cri t W.S. (ft) *26652.71 *	*	* Flow Area (sq ft)	* 3987	7. 76 *	2129. 44			
* E.G. Slope (ft/ft) *26652.71 *	*0.000018	* Area (sq ft)	* 3987	7.76 *	2129. 44			
* 0 Total (cfs) *16962.00 *	*19965.00	* Flow (cfs)	* 962	2. 12 *	2040. 88			
* Top Width (ft)	* 3419.79	* Top Width (ft)	* 52	1.09 *	114. 27	*		
2784.43 * * Vel Total (ft/s)	* 0.61	* Avg. Vel. (ft/s)	* (	). 24    *	0. 96	*		
0.64 * * Max_Chl_Dpth (ft)	* 19.71	* Hydr. Depth (ft)	*	7. 65 *	18. 63	*		
9.57 * * Conv. Total (cfs)	*4771374.0	* Conv. (cfs)	*2299	933. 8	*487743. 9			
*4053696.0 * *_Length Wtd. (ft)	* 635.00	* Wetted Per. (ft)	* 52	1.69 *	116. 56	*		
2785.19 * * Min Ch El (ft)	* 154.83	* Shear (Ib/sq ft)	* (	0. 01 *	0. 02	*		
0. 01 * * Al pha	* 1.19	* Stream Power (lb/ft s)	* (	). 00    *	0. 02	*		
0.01 * * Frctn Loss (ft)	* 0.02	* Cum Volume (acre-ft)	* 112	2. 80 *	30. 11	*		
346.33 * * C & E Loss (ft)	* 0.00	* Cum SA (acres)	*	*		*		
*		` ,						
	*****	* * * * * * * * * * * * * * * * * * * *	*****	*****	*****	**		
********** *******	*****	*********	*****	*****	*****	**		
*******  CROSS SECTION OUTPUT P	rofile #Floo							
*******  CROSS SECTION OUTPUT P	rofile #Floo	dway	****		*****			
*********  CROSS SECTION OUTPUT POST    ***********  * E. G. Elev (ft)  Ri ght OB *	rofile #Floo ******	dwa <b>y</b> **********	****** * Le1	*****	******** Channel			
********  CROSS SECTION OUTPUT POST    **********  * E.G. Elev (ft) Right OB *  * Vel Head (ft) 0.045 *	rofile #Floo ******** * 175.28 * 0.01	dway ************ * Element * Wt. n-Val.	****** * Le1 * 0.	****** Ft OB *	******** Channel 0.045	* *		
********  CROSS SECTION OUTPUT PI  **********  * E.G. Elev (ft)  Right OB *  * Vel Head (ft)  0.045 *  * W.S. Elev (ft)  635.00 *	rofile #Floo ******* * 175.28	dway ************************************	****** * Le1 * 0.	******* ft OB * 100 * 5.00 *	******** Channel 0. 045 635. 00	* *		
********  CROSS SECTION OUTPUT POST    **********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)     0.045 *  * W.S. Elev (ft)     635.00 *  * Crit W.S. (ft)  *25980.54 *	*********  * 175. 28  * 0. 01  * 175. 28	<pre>dway **********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)</pre>	****** * Le1 * 0. * 635 * 1168	******* ft OB * 100 * 5.00 * 3.15 *	******** Channel 0. 045 635. 00 2213. 22	* *		
********  CROSS SECTION OUTPUT PORT    **********  * E.G. Elev (ft)  Right OB *  * Vel Head (ft)  0.045 *  * W.S. Elev (ft)  635.00 *  * Crit W.S. (ft)  *25980.54 *  * E.G. Slope (ft/ft)  *25980.54 *	*********  * 175. 28  * 0. 01  * 175. 28  * * * * * * * * * * * * * * * * * * *	dway  *********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)	******* * Le1 * 0. * 635 * 1168 * 1168	******* ft OB * 100 * 5.00 * 3.15 *	******** Channel 0. 045 635. 00 2213. 22 2213. 22	* *		
********  CROSS SECTION OUTPUT PORT    ***********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	***********  * 175. 28  * 0. 01  * 175. 28  * * 0. 01  * 175. 28  * * * * * * * * * * * * * * * * * * *	dway **********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)	* Le1  * 0.  * 635  * 1166  * 336	******* ft OB * 100 * 5.00 * 3.15 * 3.15 *	******** Channel 0. 045 635. 00 2213. 22 2213. 22 2047. 59	* *		
*********  CROSS SECTION OUTPUT Processes to the second of	**********  * 175. 28  * 0. 01  * 175. 28  * * 0. 00015  *19965. 00  * 2380. 00	dway *********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)	* Le1  * 0.  * 635  * 1166  * 338  * 93	******* ft OB * 100 * 5.00 * 3.15 * 3.15 * 3.54 *	******** Channel 0. 045 635. 00 2213. 22 2213. 22 2047. 59 114. 27	** * * * *		
*********  CROSS SECTION OUTPUT Processes to the second of	***********  * 175. 28  * 0. 01  * 175. 28  * 0. 00015  * 19965. 00  * 2380. 00  * 0. 68	dway *********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)	* Le1  * 0.  * 635  * 1166  * 336  * 93	******* ft OB * 100 * 5.00 * 3.15 * 3.15 * 3.54 * 3.94 * 0.29 *	******** Channel 0. 045 635. 00 2213. 22 2213. 22 2047. 59 114. 27 0. 93	** * * * *		
*********  CROSS SECTION OUTPUT Process  **********  * E.G. Elev (ft)  Right OB *  * Vel Head (ft)  0.045 *  * W.S. Elev (ft)  635.00 *  * Crit W.S. (ft)  *25980.54 *  * E.G. Slope (ft/ft)  *25980.54 *  * O Total (cfs)  *17578.87 *  * Top Width (ft)  2171.79 *  * Vel Total (ft/s)  0.68 *  * Max Chl Dpth (ft)  11.96 *	***********  * 175. 28  * 0. 01  * 175. 28  * 0. 000015  *19965. 00  * 2380. 00  * 0. 68  * 20. 45	dway *********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)	* * * * * * * * * * * * * * * * * * *	******* ft OB * 100 * 5.00 * 3.15 * 3.15 * 3.54 * 3.94 * 3.94 *	********* Channel 0. 045 635. 00 2213. 22 2213. 22 2047. 59 114. 27 0. 93 19. 37	** * * * * *		
*********  CROSS SECTION OUTPUT Processor    ***********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	***********  * 175. 28  * 0. 01  * 175. 28  * 0. 000015  *19965. 00  * 2380. 00  * 0. 68  * 20. 45  *5071660. 0	dway *********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)  * Conv. (cfs)	* * * * * * * * * * * * * * * * * * *	******* ft OB * 100 * 5.00 * 3.15 * 3.15 * 3.54 * 3.94 * 3.94 *	******** Channel 0. 045 635. 00 2213. 22 2213. 22 2047. 59 114. 27 0. 93	** * * * * *		
*********  CROSS SECTION OUTPUT Processor    ***********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	***********  * 175. 28  * 0. 01  * 175. 28  * 0. 000015  *19965. 00  * 2380. 00  * 0. 68  * 20. 45  *5071660. 0  * 635. 00	dway **********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)  * Conv. (cfs)  * Wetted Per. (ft)	* * * * * * * * * * * * * * * * * * *	******* ft OB * 100 * 5.00 * 3.15 * 3.15 * 3.54 * 3.94 * 2.44 * 997.4 5.93 *	******** Channel 0. 045 635. 00 2213. 22 2213. 22 2047. 59 114. 27 0. 93 19. 37 *520144. 5	** * * * * *		
*********  CROSS SECTION OUTPUT Processor    ************  * E. G. Elev (ft) Right OB *  * Vel Head (ft)	***********  * 175. 28  * 0. 01  * 175. 28  * 0. 000015  *19965. 00  * 2380. 00  * 0. 68  * 20. 45  *5071660. 0	dway *********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)  * Conv. (cfs)	* * * * * * * * * * * * * * * * * * *	******* ft OB * 100 * 5.00 * 3.15 * 3.15 * 3.54 * 3.94 * 3.94 *	********* Channel 0. 045 635. 00 2213. 22 2213. 22 2047. 59 114. 27 0. 93 19. 37 *520144. 5 116. 56	** * * * * *		

```
0.01
* Frctn Loss (ft)
                            0.02 * Cum Volume (acre-ft) * 69.19 * 31.27 *
 337.10 *
* C & E Loss (ft)
                            0.00 * Cum SA (acres)
                ********************
*****
CROSS SECTION OUTPUT Profile #10%
                                **************
* E.G. Elev (ft)
Right OB *
* Vel Head (ft)
                                                          * Left OB *
                        * 169.16 * Element
                                                                       Channel *
                                  * Wt. n-Val.
                        * 0.01
                                                              0.100 *
                                                                        0.045 *
 0.041
* W.S. Elev (ft)
                        * 169.15 * Reach Len. (ft)
                                                             635.00
                                                                       635.00 *
 635.00 *
                                  * Flow Area (sq ft)
* Crit W.S. (ft)
                                                          * 1541.47
                                                                     * 1513.29
*12777.64
* E.G. Slope (ft/ft)
                        *0.000033 * Area (sq ft)
                                                          * 1541.47
                                                                     * 1513.29
*12777.64
* Q Total (cfs)
                        *10495.00
                                  * Flow (cfs)
                                                             342.94
                                                                     * 1589.42
8562.64
 Top Width (ft)
                        * 2823.72
                                  * Top Width (ft)
                                                             367. 20
                                                                       114. 27
2342. 25 *
* Vel Total (ft/s)
                            0.66
                                  * Avg. Vel. (ft/s)
                                                               0.22
                                                                         1.05
  0. 67
* Max Chl Dpth (ft)
                           14. 32
                                  * Hydr. Depth (ft)
                                                               4. 20
                                                                        13. 24 *
5.46 *
* Conv. Total (cfs)
                        *1822617.0 * Conv. (cfs)
                                                           * 59556.3 *276027.1
*1487034.0
                                  * Wetted Per. (ft)
* Length Wtd. (ft)
                        * 635.00
                                                             367.66
                                                                       116. 56
2342. 96
* Min Ch El (ft)
                                  * Shear (lb/sq ft)
                          154.83
                                                               0.01
                                                                         0.03
  0.01
                            1. 22
                                  * Stream Power (lb/ft s) *
                                                               0.00 *
 Al pha
                                                                         0.03
  0.01
* Frctn Loss (ft)
                                 * Cum Volume (acre-ft) *
                                                                        21.62 *
                            0.03
                                                              49.42 *
 169.00 *
* C & E Loss (ft)
                            0.00 * Cum SA (acres)
*******************
CROSS SECTION OUTPUT Profile #2%
                               ,
***********************
* E.G. Elev (ft)
Right OB *
                        * 172.95
                                 * Element
                                                             Left OB *
                                                                       Channel *
* Vel Head (ft)
                                  * Wt. n-Val.
                            0.01
                                                              0.100 *
                                                                        0.045 *
 0.044
* W.S. Elev (ft)
                        * 172.94 * Reach Len. (ft)
                                                             635.00 *
                                                                       635.00
 635.00 *
                                  * Flow Area (sq ft)
* Crit W.S. (ft)
                                                          * 3177.16
                                                                    * 1946. 24
*22303.35
* E.G. Slope (ft/ft)
*22303.35 *
                        *0.000021 * Area (sq ft)
                                                          * 3177.16
                                                                     * 1946, 24
* Q Total (cfs)
*14492.97 *
                        *17155.00
                                  * Flow (cfs)
                                                             747. 98
                                                                     * 1914.05
* Top Width (ft)
                        * 3253.64
                                  * Top Width (ft)
                                                             489.87
                                                                       114. 27
2649<sup>°</sup>. 50 *
* Vel Total (ft/s)
                        * 0.63
                                  * Avg. Vel. (ft/s)
                                                               0. 24
                                                                         0.98 *
  0.65
                                    Page 112
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Existing - 34R LOMR
 Max Chl Dpth (ft)
                             18.11 * Hydr. Depth (ft)
                                                                   6.49 * 17.03 *
   8.42
* Conv. Total (cfs)
*3178923.0 *
                         *3762818.0 * Conv. (cfs)
                                                               *164063.6
                                                                          *419831.8
                            635.00 * Wetted Per. (ft)
                                                                 490.42
* Length Wtd. (ft)
                                                                            116.56
2650. 25
 Min Ch El (ft)
                                    * Shear (lb/sq ft)
                                                                              0.02
                            154.83
                                                                   0.01
  0.01
* Al pha
                              1.19
                                    * Stream Power (lb/ft s) *
                                                                   0.00
                                                                              0.02
  0.01
* Frctn Loss (ft)
                                    * Cum Volume (acre-ft)
                              0.02
                                                                  92.86
                                                                             27.59
 290. 48
                              0.00 * Cum SA (acres)
* C & E Loss (ft)
            *****************
*****
CROSS SECTION OUTPUT Profile #0.2%
* E.G. Elev (ft)
Right OB *
* Vel Head (ft)
                            178.47 * Element
                                                                 Left OB *
                                                                            Channel *
                                    * Wt. n-Val.
                              0.01
                                                                  0.100
                                                                             0.045
 0.047
* W.S. Elev (ft)
                            178.46
                                    * Reach Len. (ft)
                                                                 635.00
                                                                            635.00
 635.00 *
* Cri t W.S. (ft)
*38040.36 *
                                    * Flow Area (sq ft)
                                                              * 6148.36
                                                                         * 2577.09
* E.G. Slope (ft/ft)
*38040.36 *
                         *0.000013
                                    * Area (sq ft)
                                                              * 6148.36
                                                                         * 2577.09
* 0 Total (cfs)
                         *27500.00
                                    * Flow (cfs)
                                                               1562.89
                                                                         * 2382.47
*23554.64
* Top Width (ft)
                         * 3694.00
                                    * Top Width (ft)
                                                                 581.45
                                                                            114. 27
2998<sup>.</sup> 27
 Vel Total (ft/s)
                              0.59
                                    * Avg. Vel. (ft/s)
                                                                   0.25
                                                                              0.92
  0.62
 Max Chl Dpth (ft)
                                    * Hydr. Depth (ft)
                             23.63
                                                                  10.57
                                                                             22.55
12.69 *
* Conv. Total (cfs)
                         *7737592.0 * Conv. (cfs)
                                                               *439746.2
                                                                          *670347.3
*6627498.0
                                    * Wetted Per. (ft)
                                                                            116.56
 Length Wtd. (ft)
                            635.00
                                                                 582.22
2999. Ĭ1
* Min Ch El (ft)
                            154.83
                                    * Shear (lb/sq ft)
                                                                   0.01
                                                                              0.02
  0.01
                              1. 17
                                    * Stream Power (lb/ft s) *
                                                                   0.00
 Al pha
                                                                              0. 02
  0.01
                                    * Cum Volume (acre-ft)
* Frctn Loss (ft)
                              0.01
                                                                 163.34
                                                                             36.27
 492. 27
                              0.00 * Cum SA (acres)
* C & E Loss (ft)
            ********************
*****
CROSS SECTION
RI VER: RI VER-1
                          RS: 180
REACH: Reach-2
Description: XS 180 (LETTERED CROSS-SECTION S)
Station Elevation Data
                          num=
                                   476
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El ev

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Existing - 34R LOMR 16. 39 196. 36 39. 34 194. 05 62. 29 190. 55 88. 51 187. 79 121. 29 180. 45 196.8 197. 84 6. 56 197.09 9.83 22.95 196.04 0 26. 23 49. 17 68. 84 195. 7 192. 54 190. 12 185. 63 32. 78 52. 45 75. 4 104. 9 194. 85 192. 06 189. 32 183. 83 36. 06 55. 73 85. 23 114. 74 194. 56 191. 49 188. 34 181. 54 193.17 45. 9 65. 56 95. 07 127. 85 190.42 186.39 98.35 179.21 176. 86 173. 79 171. 99 171. 16 170. 6 147. 52 163. 91 134. 41 157. 35 178. 19 174. 71 150. 8 131.13 178.63 140.96 177.45 176.16 154.08 175.35 167.19 160.63 174.16 173.53 157. 35 180. 3 203. 25 222. 92 245. 87 268. 81 311. 43 354. 35 173. 75 173. 28 172.81 183.58 190.14 172.63 193.42 171.57 173. 28 171. 25 170. 94 170. 37 170. 28 169. 18 168. 35 172.81 171.04 170.97 170.47 170.16 169.14 206. 53 226. 2 249. 15 275. 37 321. 27 360. 61 190. 14 209. 81 232. 75 255. 7 285. 21 327. 82 373. 72 403. 22 171. 02 170. 88 196.69 213.08 171. 22 219. 64 239. 31 265. 54 236.03 170.54 170. 48 169. 4 168. 72 168. 27 170. 43 169. 75 168. 81 262. 26 298. 32 334. 38 170. 3 169. 3 304. 88 347. 49 168. 73 168. 42 168. 2 168. 27 168. 13 167. 39 166. 78 166. 56 409. 78 439. 28 393. 39 419. 61 399. 94 429. 45 383.55 168.36 168. 17 167.88 167. 78 166. 95 416.34 167.67 167.65 436 167.37 436 472. 07 495. 01 524. 52 557. 3 596. 64 455. 67 166. 83 465. 51 445.84 166.68 478.62 166.72 455. 67 485. 18 514. 68 547. 46 586. 8 616. 31 649. 09 166. 95 166. 84 166. 29 165. 92 165. 37 164. 75 164. 53 166. 83 166. 87 166. 28 165. 74 165. 13 164. 74 445. 84 481. 9 511. 4 540. 91 580. 25 613. 03 488. 46 521. 24 550. 74 593. 36 619. 59 166. 81 166. 36 165. 7 165. 04 501. 57 534. 35 166.49 166. 3 166.03 165. 82 165. 08 164. 42 164. 51 563.86 165. 76 164. 93 606. 47 639. 26 672. 04 629. 42 665. 48 164. 6 164.64 655.65 645.81 164.5 164.35 164. 51 6/2. 04
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161. 99 1566. 44
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164. 42 783. 5
164. 28 809. 72
164. 07 832. 67
164 852. 34
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161. 87 1235. 89
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161. 82 1484. 81
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160. 07 1730. 01
160. 33 1844. 4
159. 89 1942. 44
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161. 97 2397. 29
162. 52 2430. 09 164. 43 164. 03 724.49 164. 52 731.05 164. 4 164. 05 767. 11
163. 94 803. 17
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164. 07 849. 06
164. 02 878. 57
163. 22 917. 91
162. 92 950. 69
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163. 82 1098. 21
163. 01 1124. 43
161. 08 1157. 22
160. 3 1176. 89
161. 42 1193. 28
161. 94 1226. 06
161. 38 1298. 18
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156. 46 1380. 18
153. 3 1447
158. 57 1465. 19
162. 03 1481. 54
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160. 82 2154. 85
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161. 81 2384. 18
162. 38 2420. 25 760. 55 164.08 760. 55 796. 61 819. 56 845. 78 875. 29 911. 35 947. 41 973. 64 164. 02 164. 18 163. 95 164. 31 163. 57 163. 83 163. 84 162. 89 163. 95 845. 78 164 875. 29 163. 51 911. 35 162. 84 947. 41 162. 72 973. 64 162. 68 1003. 14 163. 14 1019. 53 163. 65 1068. 71 163. 58 1094. 93 162. 86 1121. 16 161. 67 1150. 66 159. 99 1170. 33 160. 87 1190 161. 97 1219. 5 904. 79 944. 13 162. 6 970.36 162.95 999. 86 163.06 1016. 25 163.69 1062. 15 1088. 37 163.49 162.97 1114. 6 1147. 38 1167. 05 162 159.87 159. 99 1170. 33 160. 87 1190 161. 97 1219. 5 161. 57 1291. 62 160. 79 1343. 98 159. 29 1376. 91 154. 15 1392 156. 91 1461. 92 161. 64 1478. 27 162. 23 1507. 55 161. 78 1608. 97 160. 36 1710. 38 160. 16 1788. 85 160. 02 1903. 22 159. 84 2138. 51 160. 27 2256. 29 160. 83 2334. 99 161. 62 2374. 34 162. 43 2413. 69 162. 67 2459. 6 160.42 1186. 72 1212. 95 161.94 161. 7 1212. 95 1265. 4 1334. 17 1367. 1 1389. 99 1458. 65 1475 160.82 160.21 154.39 156.03 161. 82 162. 09 1497.74 161.84 1572.98 160.46 1694.03 160.03 160. 02 1/39. 83 160. 33 1867. 28 159. 87 1971. 85 160. 33 2210. 4 160. 71 2282. 52 161. 14 2361. 22 162. 28 2403. 85 162. 53 2439. 92 1762. 7 1886. 88 1984. 92 160.14 159.88 160.28 2230. 06 2325. 15 2367. 78 2410. 41 160.83 161.5 162.39 162.65 163. 12 2482. 55 164. 1 2531. 74 165. 04 2584. 21 164. 57 2633. 39 162. 67 2459. 6 162. 88 2466. 16 163. 66 2495. 67 163. 65 2512. 06 164. 65 2548. 14 164. 83 2574. 37 164. 83 2600. 6 164. 78 2610. 44 163. 03 2472. 71 163. 99 2515. 34 165 2577. 65 164. 8 2620. 28 2446. 48 2492. 39 163.46 164.42 2541. 58 2594. 04 164.86 164.5

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Existing - 34R LOMR
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164. 74 2695. 7
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166. 33 2820. 31
166. 32 2862. 94
                                                                            164. 41 2659. 63 164. 36 2662. 91 164. 39 165. 03 2705. 54 165. 21 2712. 09 165. 53
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                  164.62 2682.58
  2672.74
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169. 4 3223. 64
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167. 65 3062. 97
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167. 63 3085. 92
168. 28 3128. 55
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3059. 69
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3148. 22
3184. 29
3230. 2
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                  168. 65 3151. 5
169. 07 3197. 41
169. 48 3240. 04
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169. 24 3213. 81
169. 82 3253. 16
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                 169. 48 3240. 04
170. 01 3272. 83
170. 46 3305. 62
170. 76 3351. 53
171. 49 3394. 16
171. 96 3426. 95
172. 75 3466. 3
173. 23 3502. 37
173. 54 3528. 61
174. 26 3564. 68
                                               170. 06 3276. 11
170. 5 3308. 9
  3266.27
                                                                             170. 18 3285. 95
                                                                                                          170. 22 3295. 79
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                                                                            170. 18 3285. 95
170. 59 3315. 46
171. 11 3367. 93
171. 72 3407. 28
172. 29 3449. 91
172. 87 3479. 42
173. 37 3515. 49
173. 56 3535. 17
174. 65 3587. 63
  3299.07
                                                                                                                       3325.3
                                                                                                          170.64
                                                                                                                                       170.88
                                               170. 5 3308. 9
171. 08 3364. 65
171. 61 3397. 44
172. 12 3436. 79
172. 77 3472. 86
173. 28 3505. 65
173. 46 3571. 34
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3387. 6
3420. 39
3459. 74
3495. 82
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                                                                                                                                       171.82
                                                                                                          172. 62 3453. 19
172. 91 3489. 26
173. 73 3518. 77
173. 79 3548. 28
                                                                                                                                        172.62
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                                                                                                                                        173.69
  3522.05
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  3554.84
                                               174.46 3571.24
                                                                                                          175.03 3600.75
                                                                                                                                        175.23
  3607.31
                  175. 28 3617. 14
                                               175. 57
                                                            3623.7
                                                                             175.66 3636.82
                                                                                                          175.89 3646.66
                                                                                                                                        176.02
                                               175. 57 3623. 7
176. 12 3666. 33
176. 72 3689. 29
177. 76 3738. 47
178. 7 3774. 55
179. 28 3804. 06
180. 37 3849. 97
180. 9 3892. 6
  3649. 94
3679. 45
                                                                                                          176. 43 3676. 17
177 3708. 96
                  176. 15 3659. 77
                                                                            176. 39 3669. 61
                                                                                                                                        176.6
                  176.55 3686.01
                                                                             176. 75 3695. 84
                                                                                                                                        177.34
                                                                            176. 75 3695. 84
178. 07 3741. 75
179. 03 3781. 1
179. 52 3810. 62
180. 64 3856. 52
181. 15 3899. 15
181. 77 3938. 5
                  177. 44 3725. 36
178. 52 3764. 71
179. 17 3797. 5
                                                                                                          178. 2 3748. 31
179. 19 3784. 38
179. 71 3813. 9
180. 71 3863. 08
 3718. 8
3758. 15
3787. 66
3823. 73
                                                                                                                                       178. 38
179. 22
                  179. 17 3797. 5
180. 09 3833. 57
                                                                                                                                        179.76
                                                                                                                                        180.71
                                                                                                         181. 24 3908. 99
181. 92 3945. 06
  3869.64
                  180.65
                               3882.76
                                                                                                                                        181. 3
                                                181. 64 3931. 95
  3918.83
                  181.53 3922.11
                                                                                                                                       182. 13
                   182.3
  3961.46
Manning's n Values
                                               num=
Sta n Val Sta n Val Sta n Val
                    . 1 1363. 83 . 045 1465. 19 . 1
Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. 1363.83 1465.19 700 700 .1
                                                                                                                                         Expan.
                                                                                                                                         . 3
CROSS SECTION OUTPUT Profile #1%
                                                           ,,
********************************
* E.G. Elev (ft)
Right OB *
* Vel Head (ft)
                                      * 174.53 * Element
                                                                                                                * Left OB *
                                                                                                                                         Channel *
                                                      0.01
                                                                  * Wt. n-Val.
                                                                                                                       0.100
                                                                                                                                           0.045
   0.100 *
                               * 174.52 * Reach Len. (ft)
* W.S. Elev (ft)
700.00 *
                                                                                                                * 700.00
                                                                                                                                         700.00
* Flow Area (sq ft)
                                                                                                              *11487. 99
                                                                                                                                    * 2001.89
                                                                                                                *11487.99
                                                                                                                                    * 2001.89
* Q Total (cfs)
*10688.27 *
                                           *19965.00
                                                                                                                * 5726.09
                                                                 * Flow (cfs)
                                                                                                                                    * 3550.64
 * Top Width (ft)
                                           * 3408.33
                                                                                                                * 1205.36
                                                                 * Top Width (ft)
                                                                                                                                         101.36
2101.62 *
  Vel Total (ft/s) * 0.58
                                                                  * Avg. Vel. (ft/s)
                                                                                                                        0.50
                                                                                                                                            1.77
     0.51 *
* Max Chi Dpth (ft) 

* 21.22 * Hydr. Depth (ft)
                                                                                                                        9.53 *
                                                                                                                                          19.75 *
                                                                     Page 115
```

0 00 th	Ex	isting – 34R LOMR								
9.93 * * Conv. Total (cfs)	*2674274.0	) * Conv. (cfs)	*766998.9 *475601.3							
*1431673.0 * * Length Wtd. (ft)	* 700.00	* Wetted Per. (ft)	* 1206. 18 * 103. 73 *							
2102.13 * * Min Ch El (ft)	* 153. 30	* Shear (Ib/sq ft)	* 0.03 * 0.07 *							
0. 03 * * Al pha	* 2. 28	* Stream Power (lb/ft s)	* 0.02 * 0.12 *							
0.02 * * Frctn Loss (ft)	* 0.04	* Cum Volume (acre-ft)	* 197.56 * 32.99 *							
285.84 * * C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 19.55 * 1.63 *							
31. 30 * *********************************	******	********	******							
CROSS SECTION OUTPUT Profile #Floodway										
**************************************	VIIIE #FIUC	uway *************	******							
* E.G. Elev (ft)	* 175. 27	* Element	* Left OB * Channel *							
Right OB *  * Vel Head (ft)  0.100 *	* 0.01	* Wt. n-Val.	* 0.100 * 0.045 *							
* W. S. El ev (ft) 700.00 *	* 175. 26	* Reach Len. (ft)	* 700.00 * 700.00 *							
* Cri t W. S. (ft) *20268.52 *	*	* Flow Area (sq ft)	* 8324.19 * 2076.39							
* E.G. Slope (ft/ft) *20268.52 *	*0.000051	* Area (sq ft)	* 8324.19 * 2076.39							
* 0 Total (cfs) *11626.28 *	*19965.00	* Flow (cfs)	* 4714. 23 * 3624. 49							
* Top Width (ft) 1614.81 *	* 2384.00	* Top Width (ft)	* 667.83 * 101.36 *							
* Vel Total (ft/s) 0.57 *	* 0.65	* Avg. Vel. (ft/s)	* 0.57 * 1.75 *							
* Max Chl Dpth (ft) 12.55 *	* 21.96	* Hydr. Depth (ft)	* 12.46 * 20.49 *							
* Conv. Total (cfs) *1621376.0 *	*2784276.0	) * Conv. (cfs)	*657436.3 *505463.4							
* Length Wtd. (ft) 1622.64 *	* 700.00	* Wetted Per. (ft)	* 679.31 * 103.73 *							
* Min Ch El (ft) 0.04 *	* 153.30	* Shear (Ib/sq ft)	* 0.04 * 0.06 *							
* Al pha 0. 02 *	* 1.94	* Stream Power (Ib/ft s)	* 0.02 * 0.11 *							
* Frctn Loss (ft) 269.88 *	* 0.04	* Cum Volume (acre-ft)	* 164.64 * 34.19 *							
* C & E Loss (ft) 22.87 *	* 0.00	* Cum SA (acres)	* 13.13 * 1.63 *							
	******	********	*******							
CROSS SECTION OUTPUT PI	ofile #10%									
		********	******							
* E.G. Elev (ft) Right OB *	* 169.13	* Element	* Left OB * Channel *							
* Vel Head (ft) 0.100 *	* 0.02	* Wt. n-Val.	* 0.100 * 0.045 *							
* W. S. El ev (ft) 700.00 *	* 169. 11	* Reach Len. (ft)	* 700.00 * 700.00 *							
* Crit W.S. (ft) *10409.28 *	*	* Flow Area (sq ft)	* 5238.17 * 1453.17							
10407. 20		Page 116								

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Existing - 34R LOMR
                                                                          * 1453.17
* E.G. Slope (ft/ft)
                          *0.000106
                                    * Area (sq ft)
                                                               * 5238.17
*10409. 28
                                                               * 2338.71
* Q Total (cfs)
                          *10495.00 * Flow (cfs)
                                                                           * 2873.50
5282. 79
 Top Width (ft)
                          * 2877.45
                                     * Top Width (ft)
                                                               * 1051.45
                                                                             101.36
1724.64
* Vel Total (ft/s)
                                     * Avg. Vel. (ft/s)
                                                                                1.98
                              0.61
                                                                    0.45
  0.51
* Max Chl Dpth (ft)
                              15.81
                                     * Hydr. Depth (ft)
                                                                    4.98
                                                                               14.34
6.04 *
* Conv. Total (cfs)
                          *1018457.0
                                     * Conv. (cfs)
                                                                *226953.0
                                                                           *278850.4
*512653.3 *
* Length Wtd. (ft)
                             700.00
                                     * Wetted Per. (ft)
                                                               * 1052.05
                                                                             103.73
1725. 08
                                     * Shear (lb/sq ft)
 Min Ch El (ft)
                             153.30
                                                                    0.03
                                                                                0.09
  0.04
 Al pha
                               3.30
                                     * Stream Power (lb/ft s) *
                                                                    0.01
                                                                               0.18
  0.02
* Frctn Loss (ft)
                               0.09
                                     * Cum Volume (acre-ft)
                                                                   94.94
                                                                               24. 13
 130. 30
                               0.00 * Cum SA (acres)
 C & E Loss (ft)
                                                                   17.54
                                                                               1.63
  25. 10
CROSS SECTION OUTPUT Profile #2%
* E.G. Elev (ft)
                            172. 93
                                    * Element
                                                                  Left OB *
                                                                             Channel *
Right OB *
                                     * Wt. n-Val.
  Vel Head (ft)
                              0.01
                                                                   0.100
                                                                              0.045
  0.100
* W.S. Elev (ft)
                            172. 91
                                     * Reach Len. (ft)
                                                                  700.00
                                                                             700.00
 700.00 *
* Crit W.S. (ft)
                                     * Flow Area (sq ft)
                                                               * 9563.10
                                                                           * 1838.92
*17550.06
* E.G. Slope (ft/ft)
                          *0.000067
                                     * Area (sq ft)
                                                               * 9563.10
                                                                          * 1838.92
*17550.06
* 0 Total (cfs)
                          *17155.00
                                     * Flow (cfs)
                                                               * 4694.70
                                                                           * 3391.42
9068.88
* Top Width (ft)
                          * 3300.79
                                     * Top Width (ft)
                                                               * 1184.98
                                                                             101.36
2014. 46 *
* Vel Total (ft/s)
                               0.59
                                     * Avg. Vel. (ft/s)
                                                                    0.49
                                                                                1.84
  0.52
* Max Chl Dpth (ft)
                             19.61
                                     * Hydr. Depth (ft)
                                                                    8.07
                                                                               18. 14
8.71 *
* Conv._Total_(cfs)
                          *2088281.0
                                     * Conv. (cfs)
                                                                *571486.7
                                                                           *412837.8
*1103957.0
                                                               * 1185.72
* Length Wtd. (ft)
                             700.00
                                     * Wetted Per. (ft)
                                                                             103.73
2014. 94
 Min Ch El (ft)
                             153.30
                                     * Shear (lb/sq ft)
                                                                    0.03
                                                                               0.07
  0.04
 Al pha
                               2.51
                                     * Stream Power (lb/ft s) *
                                                                    0.02
                                                                               0.14
  0.02
 Frctn Loss (ft)
                               0.05
                                     * Cum Volume (acre-ft)
                                                                  166. 20
                                                                               30.36
 236. 30
 C & E Loss (ft)
                               0.00 * Cum SA (acres)
                                                                   19. 28
                                                                               1.63
  30.03
*****
CROSS SECTION OUTPUT Profile #0.2%
                                        ****************
```

* E.G. Elev (ft)	* 17	8. 46	*	Element	*	Left OF	3 *	Channel	*
Right OB *  * Vel Head (ft) 0.100 *	*	0. 01	*	Wt. n-Val.	*	0. 100	*	0. 045	*
* W. S. Elev (ft) 700.00 *	* 17	8. 45	*	Reach Len. (ft)	*	700.00	*	700.00	*
* Crit W.S. (ft) *29497.69 *	*		*	Flow Area (sq ft)	* *	16261. 14	*	2399. 62	
* E.G. Slope (ft/ft) *29497.69 *	*0.00	0039	*	Area (sq ft)	* *	16261. 14	*	2399. 62	
* 0 Total (cfs) *15053.35 *	*2750	0. 00	*	Flow (cfs)	*	8428. 02	*	4018.63	
* Top Width (ft) 2287.72 *	* 362	0. 41	*	Top Width (ft)	*	1231. 32	*	101. 36	*
* Vel Total (ft/s) 0.51 *	*	0. 57	*	Avg. Vel. (ft/s)	*	0. 52	*	1. 67	*
* Max Chl Dpth (ft) 12.89 *	* 2	5. 15	*	Hydr. Depth (ft)	*	13. 21	*	23. 67	*
* Conv. Total (cfs) *2409726.0 *	*4402	175. 0	7	* Conv. (cfs)	;	*1349150.	0	*643298.	6
* Length Wtd. (ft) 2288.29 *	* 70	0. 00	*	Wetted Per. (ft)	*	1232. 48	*	103. 73	*
* Min Ch El (ft) 0.03 *	* 15	3. 30	*	Shear (Ib/sq ft)	*	0. 03	*	0. 06	*
* Al pha 0. 02 *	*	1. 95	*	Stream Power (Ib/ft s)	*	0. 02	*	0. 09	*
* Frctn Loss (ft) 414.42 *	*	0. 03	*	Cum Volume (acre-ft)	*	275. 48	*	39. 39	*
* C & E Loss (ft) 33.91 *	*	0. 00	*	Cum SA (acres)	*	20. 12	*	1. 63	*
******************	*****	*****	* * *	******	* * :	*****	***	******	**

### CROSS SECTION

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RI VER: RI VER-1 REACH: Reach-2

RS: 170

I NPUT

Descripti	on XS 1	70 (LETT	FRFD CRO	SS-SECTI	ON R)				
Station E			num=	490	0.1,				
Sta	Elev	Sta	Elev	Sta	El ev	Sta	El ev	Sta	El ev
*****		*****	*****	*****	*****	*****		*****	
0	199. 81	3. 28	199. 32	9. 84	198. 83	19. 67	197. 73	26. 23	197. 18
36. 07	196. 05	42.63	195. 12	49. 18	194. 27	55. 74	193. 75	59. 02	193.3
62.3	193.06	68. 86	192. 73	72. 14	192.63	78. 69	192. 58	85. 25	192.36
88. 53	192. 41	91. 81	192. 79	95. 09	192.88	101.65	192. 73	104. 93	192.49
108. 2	192. 58	111. 48	192.84	114. 76	193. 22	118. 04	193. 39	121. 32	193. 34
131. 16	192. 96	134.44	192. 98	137. 72	193. 21	140. 99	193. 32	144. 27	193. 29
147. 55	193. 14	154. 11	193. 03	160. 67	192. 73	163. 95	192. 68	167. 23	192.46
170. 5	192.39	180. 34	192.62	190. 18	192.07	193. 46	191. 95	206. 57	191. 72
219. 69	191. 42	226. 25	191. 01	232. 8	190. 25	236.08	189. 58	239. 36	189. 27
242.64	189. 11	252. 48	188. 31	259.04	187. 84	265. 59	187. 25	272. 15	186. 85
281. 99	185.85	285. 27	185. 36	291.83	183. 96	295. 1	183. 51	298. 38	183. 2
304. 94	182. 83	311. 5	182. 82	314. 78	182. 55	321. 34	181. 89	324. 61	181. 51
331. 17	180. 53	337.73	179. 72	341.01	179. 38	350.85	178. 77	357. 4	178. 26
360. 68	178. 07	367. 24	177. 53	373.8	176. 74	380. 36	176. 21	386. 91	175. 53
393. 47	175. 08	403.31	174. 18	409.87	173.34	416. 42	172. 21	422. 98	171. 45
426. 26	171. 16	432.82	171. 03	436. 1	171. 06	439. 38	171. 2	445. 93	171. 2
449. 21	171. 02	452.49	170. 72	462.33	170. 38	465. 61	170. 12	472. 17	169. 9
478. 72	169. 81	488. 56	169. 49	491.84	169. 32	495. 12	169. 03	504.96	168. 7
				Pag	e 118				

Existing - 34R LOMR 168. 27 167. 48 166. 88 165. 53 164. 82 518.07 511.51 168.37 514.79 168.31 524.63 167.89 531.19 167.66 168. 37 167. 44 166. 99 165. 56 164. 81 164. 33 544. 3 580. 37 534. 47 563. 98 541.02 167.42 550.86 167.16 557.42 166.97 570. 53 609. 88 639. 39 682. 02 166. 37 165. 27 164. 78 164. 04 166. 42 165. 22 164. 65 593. 49 629. 56 662. 35 704. 97 583.65 165.96 616. 44 645. 95 688. 58 623 655. 79 698. 41 741. 04 600.05 164.9 632. 83 672. 18 164.4 164.06 163.77 163.91 721. 37 754. 16 793. 5 163. 75 163. 59 734. 48 767. 27 727.92 163.55 163.57 163.52 163.63 747.6 760.71 163.54 777.11 163.43 163.36 783.67 163.48 163. 54 767. 27 163. 37 806. 62 163. 19 852. 52 163. 06 875. 48 163. 06 908. 27 162. 98 927. 94 163. 19 973. 85 163. 08 1000. 08 800. 06 845. 97 872. 2 898. 43 924. 66 826. 29 163.34 163.33 816.46 163.49 163.27 163. 34 163. 31 163. 02 162. 9 162. 88 163. 39 163. 26 163. 33 816. 46 163. 24 855. 8 162. 98 882. 04 162. 88 911. 55 163. 24 934. 5 163. 2 977. 12 163. 05 1006. 64 832. 85 865. 64 163. 12 163. 03 163. 22 163. 12 859. 08
163. 03 888. 59
162. 91 914. 82
163. 14 941. 06
163. 14 983. 68
162. 92 1013. 19
162. 56 1078. 77
162. 11 1111. 56
161. 91 1141. 07
162. 05 1177. 14
161. 78 1200. 09
162. 14 1226. 32
161. 73 1249. 28
162. 53 1278. 79
162. 29 1301. 74
162. 23 1331. 25 859.08 162.88 162. 88 163. 04 163. 35 163. 26 162. 96 162. 38 891. 87 921. 38 944. 34 954. 17 993. 52 163. 26 993. 52 163. 07 1032. 87 162. 43 1091. 89 162. 23 1124. 68 161. 81 1157. 47 161. 82 1186. 98 161. 68 1209. 93 162. 54 1236. 16 161. 78 1262. 39 162. 52 1288. 62 162. 15 1311. 57 162. 2 1341. 08 162. 21 1357. 48 162. 74 1396. 83 162. 43 1419. 78 162. 67 1442. 73 163. 1 1482. 08 162. 62 1511. 59 161. 93 1533. 45 161. 83 1588. 66 158. 62 1627. 88 986.96 163. 08 1000. 08 162. 81 1039. 42 162. 4 1098. 45 161. 95 1131. 23 162. 02 1164. 02 162. 04 1190. 26 162 1219. 77 162. 04 1242. 72 162. 04 1268. 95 162. 52 1291. 9 163. 05 1006. 64 162. 8 1065. 66 162. 17 1101. 72 161. 96 1134. 51 162. 14 1170. 58 161. 96 1193. 53 161. 99 1223. 04 161. 99 1246 162. 18 1275. 51 162. 46 1295. 18 1016.47 1088.61 162.15 1118.12 161.69 1150. 91 161.82 1180. 42 1203. 37 1229. 6 1255. 83 161.6 162.42 161.6 162.58 162. 29 1301. 74
162. 29 1301. 74
162. 23 1331. 25
162. 41 1350. 92
162. 39 1390. 27
162. 6 1436. 17
162. 85 1468. 96
163. 05 1498. 47
160. 14 1523. 81
162. 73 1549. 5
161. 17 1621. 34
154. 19 1650. 76
156. 36 1729. 19
159. 68 1752. 06
161. 2 1801. 08
160. 9 1840. 29
160. 89 1876. 21
159. 33 1938. 25
158. 6 1974. 17
159. 04 2029. 68 1282.06 162.13 162. 46 1295. 18 162. 21 1324. 69 162. 17 1347. 64 162. 24 1377. 15 162. 89 1403. 38 162. 63 1432. 89 162. 67 1455. 85 163. 31 1495. 19 161. 43 1520. 6 162. 83 1539. 87 161. 42 1605 162. 34 1318. 13 162. 04 1344. 36 162. 3 1367. 32 162. 71 1400. 11 162. 4 1426. 34 162. 75 1449. 29 163. 1 1488. 64 162. 79 1517. 39 162. 64 1536. 66 161. 83 1601. 74 158. 03 1644. 22 152. 7 1722. 65 161. 11 1745. 53 160. 8 1784. 74 161. 24 1827. 23 161. 41 1863. 15 159. 65 1921. 92 158. 88 1961. 11 1305.02 162. 34 1318. 13 162.08 1334.53 162.23 1354. 2 1393. 55 1416. 5 162.88 162. 66 162. 74 162. 46 163. 15 163. 03 160. 62 1439. 45 1472. 24 1505. 03 1527.02 161.94 162. 83 1539. 87 161. 42 1605 154. 77 1647. 49 153. 83 1725. 92 160. 85 1748. 8 160. 98 1794. 55 160. 94 1830. 49 161. 21 1869. 68 159. 4 1928. 45 158. 63 1967. 64 158. 95 2016. 62 161. 93 1533. 45
161. 83 1588. 66
158. 62 1627. 88
152. 7 1714
159. 99 1742. 26
160. 39 1779. 05
161. 32 1814. 16
161. 39 1853. 35
160. 27 1908. 86
159. 18 1954. 58
159. 04 1997. 03
159. 22 2054. 94
159. 57 2094. 28
160. 77 2150. 02
162. 8 2202. 47
164. 39 2238. 53
165. 84 2284. 43
166. 75 2340. 16
166. 92 2386. 06
167. 27 2451. 63
167. 16 2504. 08
167. 11 2546. 7
167. 15 2589. 32
167. 1 2661. 45
167. 24 2710. 62
167. 53 2766. 36
167. 6 2812. 25
167. 76 2864. 71 1552.72 159. 1 1624. 61 1654 153. 79 159. 03 1732. 46 1768. 4 159.62 161. 29 1807. 62 1846. 82 161.27 160. 39 1879. 47 159.32 158. 88 1961. 11 158. 93 2006. 82 159. 09 2058. 22 159. 73 2110. 67 161. 21 2156. 57 163. 12 2209. 03 164. 65 2245. 09 166. 16 2290. 99 166. 72 2346. 72 167. 02 2395. 9 167. 02 2458. 19 167. 05 2510. 64 167. 06 2553. 26 167. 22 2595. 88 167. 2 2668 167. 3 2723. 74 167. 5 2776. 19 167. 58 2828. 65 167. 75 2874. 54 158. 63 1967. 64 158. 95 2016. 62 159. 12 2068. 06 160. 01 2117. 23 161. 37 2172. 96 163. 36 2215. 58 164. 85 2254. 92 166. 21 2310. 66 166. 83 2359. 83 167. 07 2415. 57 167. 23 2474. 58 167. 14 2520. 48 167. 1 2559. 82 167. 2 2602. 44 167. 18 2674. 56 167. 32 2736. 85 167. 44 2782. 75 167. 68 2841. 76 167. 78 2894. 22 1944.78 158. 88 1961. 11 159.27 158.6 1974.17 159.04 2029.68 159.33 2074.61 160.2 2127.07 161.92 2192.63 163.66 2222.14 165.27 2261.48 166.56 2323.77 166.82 2366.39 167.13 2418.85 167.13 2487.69 1987. 23 159.1 2035. 27 2081. 17 2140. 18 2195. 91 2231. 98 2271. 32 2333. 61 159. 4 160. 37 162. 7 163. 9 165. 45 166. 62 166. 9 2376.23 167.12 2445. 07 167.11 167. 13 2487. 69 167. 16 2523. 75 167. 05 2569. 65 167. 27 2615. 55 167. 23 2677. 84 167. 48 2743. 41 167. 55 2789. 31 167. 72 2848. 32 167. 9 2904. 05 168. 03 2986. 01 2445. 07 2497. 53 2540. 15 2576. 21 2625. 39 2704. 07 167.11 167. 16 167. 21 167. 2 167. 47 2749.96 167.49 2799.14 167.71 167. 78 2894. 22 167. 99 2943. 39 167. 94 2979. 45 168. 17 3031. 91 167. 76 2864. 71 168. 07 2920. 44 167.75 2874.54 2854.87 168.02 168. 01 2933. 56 2913.89 167.87 167. 9 2966. 34 168. 11 3008. 96 167. 97 2969. 62 168. 06 3022. 07 168. 03 2986. 01 167. 93 3048. 3 2959.78 167.99 2999. 12 3048.3 167.89

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Existing - 34R LOMR
                             168. 02 3077. 81
                                              168. 26 3084. 36
 3061.41
           167. 93 3067. 97
                                                                168. 31 3090. 92
                                                                                  168. 42
                                                                168. 92 3133. 54
 3097.48
           168.41 3110.59
                                              168. 76
                                                                                   169.09
                             168. 68 3117. 15
                                                      3123. 7
           169. 26 3156. 49
169. 97 3218. 78
170. 31 3254. 84
171. 09 3287. 62
                                              169. 37 3176. 16
170. 2 3231. 89
170. 66 3267. 95
                                                                169. 55 3195. 83
170. 17 3238. 45
170. 66 3274. 51
170. 63 3313. 85
                             169. 26 3166. 32
170. 09 3225. 33
 3149.93
                                                                                   169.79
 3205. 66
3245. 01
                                                                                   170.3
                             170.45
                                      3261.4
                                                                                   170.82
 3281.07
                             171.04 3294.18
                                               170.72 3297.46
                                                                                   171.05
                             171. 23
171. 75
 3323.69
           171.07
                    3336.8
                                    3343.36
                                               171. 24 3353. 19
                                                                 171. 32 3363. 03
                                                                                   171.45
                                                                 172.09 3418.76
                                                       3412.2
 3369.58
           171.47
                   3385.98
                                    3392.53
                                               171.78
                                                                                   172, 22
                  3444.99
                                               172.89 3461.38
  3428.6
           172.32
                             172.74
                                    3454.82
                                                                 172. 95 3467. 94
                                                                                   173.1
           173. 34
174. 59
 3474.49
                   3484.33
                             173. 51
                                    3494. 16
                                               173.76 3500.72
                                                                 173.85 3513.84
                                                                                   174.19
                                                       3549.9
 3526.95
                                               174.89
                                                                 175. 13 3556. 45
                                                                                   175.18
                   3533.51
                             174.69
                                    3540.06
                             175. 72 3585. 96
177. 18 3638. 41
178. 58 3674. 48
179. 78 3710. 54
                                                                176. 34 3605. 63
177. 81 3654. 81
179. 1 3690. 87
180. 2 3730. 21
 3566. 29
           175. 48
                  3572.85
                                               175. 96 3599. 07
                                                                                   176.63
  3625.3
           177.08
                   3631.86
                                               177. 44
                                                      3644.97
                                                                                   178.13
 3661. 36
3697. 43
                  3667. 92
3703. 98
                                               178. 88 3684. 31
           178.38
                                                                                   179.42
                                                       3717.1
           179.65
                                               180.07
                                                                                   180.66
                                                                 181. 51 3776. 11
                             181. 16 3762. 99
 3740.05
           180. 95 3756. 44
                                               181. 36 3772. 83
                                                                                   181. 6
                                                                 182.47 3828.56
 3785.94
           181. 72
                  3792.5
                             181. 94 3808. 89
                                               182. 31 3822. 01
                                                                                   182.73
Manning's n Values
                             num=
    Sťa n Val
                                       Sta
                      Sta
                            n Val
                                              n Val
   **********
                            . 045 1729. 19
              . 1 1627. 88
                            Lengths: Left Channel
                                                       Ri ght
                                                                   Coeff Contr.
Bank Sta: Left
                  Ri ght
                                                                                   Expan.
      1627. 88 1729. 19
                                      0 0 0
                                                                   . 1
                                                                                    . 3
CROSS SECTION OUTPUT Profile #1%
                                     ***************
* E.G. Elev (ft)
Right OB *
                           * 174.49
                                        * Element
                                                                    * Left OB *
                                                                                    Channel *
* Vel Head (ft)
                                 0.02
                                        * Wt. n-Val.
                                                                        0.100 *
                                                                                     0.045
 0. 100 *
                          * 174.47
* W.S. Elev (ft)
                                        * Reach Len. (ft)
* Crit W.S. (ft)
                          * 164.09 * Flow Area (sq ft)
                                                                    *13099.76
                                                                                * 2104.20
*14712.58 *
* E.G. Slope (ft/ft)
*14712.58 *
* Q Total (cfs)
7557.78 *
                          *0.000072
                                       * Area (sq ft)
                                                                    *13099.76
                                                                                * 2104.20
                           *19965.00
                                       * Flow (cfs)
                                                                    * 8014.20
                                                                                 * 4393.02
* Top Width (ft)
                          * 3122.88
                                        * Top Width (ft)
                                                                    * 1227.74
                                                                                   101.31
1793. 83 *
                          * 0.67
* Vel Total (ft/s)
                                        * Avg. Vel. (ft/s)
                                                                         0.61
                                                                                      2.09
   0.51 *
* Max Chl Dpth (ft)
                      * 21.77
                                        * Hydr. Depth (ft)
                                                                        10.67
                                                                                     20.77 *
8. 20 *
* Conv. Total (cfs)
*888854.0 *
                          *2348039.0 * Conv. (cfs)
                                                                    *942531.6
                                                                                 *516653.5
* Length Wtd. (ft)
                                        * Wetted Per. (ft)
                                                                  * 1229.44
                                                                                   103.78
1794. 61
* Min Ch El (ft)
                        * 152.70 * Shear (Ib/sq ft) *
                                                                         0.05
                                                                                      0.09
   0.04
                                                                         0.03 *
                                                                                      0.19 *
 Al pha
                                 2.72 * Stream Power (lb/ft s) *
   0.02
* Frctn Loss (ft)
                                       * Cum Volume (acre-ft)
* C & E Loss (ft)
                                        * Cum SA (acres)
******************
```

CROSS SECTION OUTPUT Profile #Floodway

Existing - 34R LOMR								
**************************************	*****	**** <del>*</del> *******						
* E.G. Elev (ft) Right OB *	* 175. 23	* Element	* Left OB * Channel *					
*	* 0.02	* Wt. n-Val.	* 0.100 * 0.045 *					
* W.S. Elev (ft)	* 175. 21	* Reach Len. (ft)	* * *					
* Crit W.S. (ft) *13320.13 *	* 164.08	* Flow Area (sq ft)	*12165.82 * 2179.17					
* E.G. Slope (ft/ft) *13320.13 *	*0.000065	* Area (sq ft)	*12165.82 * 2179.17					
* Q Total (cfs) 7754.13 *	*19965.00	* Flow (cfs)	* 7803.99 * 4406.88 *					
* Top Width (ft)	* 2300.00	* Top Width (ft)	* 966.88 * 101.31 *					
1231.81 * * Vel Total (ft/s)	* 0.72	* Avg. Vel. (ft/s)	* 0.64 * 2.02 *					
0.58 * * Max Chl Dpth (ft)	* 22.51	* Hydr. Depth (ft)	* 12.58 * 21.51 *					
* Conv. Total (cfs)	*2481291.0	* Conv. (cfs)	*969895.5 *547695.9					
*963699.1 *  * Length Wtd. (ft)	*	* Wetted Per. (ft)	* 978.95 * 103.78 *					
1239.80 * * Min Ch El (ft)	* 152.70	* Shear (Ib/sq ft)	* 0.05 * 0.08 *					
0. 04 * * Al pha	* 2. 29	* Stream Power (Ib/ft s)	* 0.03 * 0.17 *					
0.03 * * Frctn Loss (ft)	*	* Cum Volume (acre-ft)	* * *					
* C & E Loss (ft)	*	* Cum SA (acres)	* * *					
*								
	*****	******	******					
****		*********	*******					
********  CROSS SECTION OUTPUT P	rofile #10%	********************						
*******  CROSS SECTION OUTPUT P *********  * E.G. Elev (ft)	rofile #10%							
*******  CROSS SECTION OUTPUT P  ********  * E. G. Elev (ft) Right OB *  * Vel Head (ft)	Profile #10% ******	********	*******					
********  CROSS SECTION OUTPUT P *********  * E. G. El ev (ft) Ri ght OB *	rofile #10% ******* * 169.04	**************************************	**************************************					
********  CROSS SECTION OUTPUT P  **********  * E.G. Elev (ft) Right OB *  * Vel Head (ft) 0.100 *  * W.S. Elev (ft)  * Crit W.S. (ft)	***********  * 169.04  * 0.04  * 169.00	************ * Element * Wt. n-Val.	******************  * Left OB * Channel *  * 0.100 * 0.045 *					
********  CROSS SECTION OUTPUT P  *********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)     0.100 *  * W.S. Elev (ft)	***********  * 169.04  * 0.04  * 169.00	**************************************	***************  * Left OB * Channel *  * 0.100 * 0.045 *  * * *					
********  CROSS SECTION OUTPUT P  **********  * E.G. Elev (ft) Right OB *  * Vel Head (ft) O.100 *  * W.S. Elev (ft)  * Crit W.S. (ft) 5807.59 *  * E.G. Slope (ft/ft) 5807.59 *  * Q Total (cfs)	**********  * 169.04  * 0.04  * 169.00  * 161.22	***********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)	***************  * Left OB * Channel *  * 0.100 * 0.045 *  * * *  * 6577.77 * 1550.04 *					
********  CROSS SECTION OUTPUT P  **********  * E.G. Elev (ft) Right OB *  * Vel Head (ft) O. 100 *  * W.S. Elev (ft)  * Crit W.S. (ft) 5807.59 *  * E.G. Slope (ft/ft) 5807.59 *  * Q Total (cfs) 2754.59 *  * Top Width (ft)	**********  * 169.04  * 0.04  * 169.00  * 161.22  *0.000153	**********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)	*****************  * Left OB * Channel *  * 0.100 * 0.045 *  * * *  * 6577.77 * 1550.04 *  * 6577.77 * 1550.04 *					
********  CROSS SECTION OUTPUT P  **********  * E.G. Elev (ft) Right 0B *  * Vel Head (ft) 0.100 *  * W.S. Elev (ft)  * Crit W.S. (ft) 5807.59 *  * E.G. Slope (ft/ft) 5807.59 *  * 0 Total (cfs) 2754.59 *	**********  * 169.04  * 0.04  * 169.00  * 161.22  *0.000153  *10495.00	<pre>*********** * Element * Wt. n-Val. * Reach Len. (ft) * Flow Area (sq ft) * Area (sq ft) * Flow (cfs)</pre>	******************  * Left OB * Channel *  * 0.100 * 0.045 *  * * *  * 6577.77 * 1550.04 *  * 6577.77 * 1550.04 *  * 3902.63 * 3837.78 *					
*********  CROSS SECTION OUTPUT P  **********  * E.G. Elev (ft) Right OB *  * Vel Head (ft) O. 100 *  * W. S. Elev (ft)  * Crit W.S. (ft) 5807.59 *  * E.G. Slope (ft/ft) 5807.59 *  * O Total (cfs) 2754.59 *  * Top Width (ft) 1399.14 *  * Vel Total (ft/s) O. 47 *	**********  * 169.04  * 0.04  * 169.00  * 161.22  *0.000153  *10495.00  * 2632.32	<pre>*********** * Element * Wt. n-Val. * Reach Len. (ft) * Flow Area (sq ft) * Area (sq ft) * Flow (cfs) * Top Width (ft) * Avg. Vel. (ft/s)</pre>	*******************  * Left OB * Channel *  * 0.100 * 0.045 *  * * *  * 6577.77 * 1550.04 *  * 6577.77 * 1550.04 *  * 3902.63 * 3837.78 *  * 1131.87 * 101.31 *					
********  CROSS SECTION OUTPUT P  **********  * E.G. Elev (ft) Right OB *  * Vel Head (ft) O. 100 *  * W.S. Elev (ft)  * Crit W.S. (ft) 5807.59 *  * E.G. Slope (ft/ft) 5807.59 *  * Q Total (cfs) 2754.59 *  * Top Width (ft) 1399.14 *  * Vel Total (ft/s)	**********  * 169.04  * 0.04  * 169.00  * 161.22  *0.000153  *10495.00  * 2632.32  * 0.75	<pre>*********** * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)</pre>	*******************  * Left OB * Channel *  * 0.100 * 0.045 *  * * *  * 6577.77 * 1550.04 *  * 6577.77 * 1550.04 *  * 3902.63 * 3837.78 *  * 1131.87 * 101.31 *  * 0.59 * 2.48 *					
*********  CROSS SECTION OUTPUT P  **********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	**********  * 169.04  * 0.04  * 169.00  * 161.22  *0.000153  *10495.00  * 2632.32  * 0.75  * 16.30	********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)	*******************  * Left OB * Channel *  * 0.100 * 0.045 *  * * *  * 6577.77 * 1550.04 *  * 6577.77 * 1550.04 *  * 3902.63 * 3837.78 *  * 1131.87 * 101.31 *  * 0.59 * 2.48 *  * 5.81 * 15.30 *					
*********  CROSS SECTION OUTPUT P  **********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	**********  * 169.04  * 0.04  * 169.00  * 161.22  *0.000153  *10495.00  * 2632.32  * 0.75  * 16.30  *848906.6	********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)  * Conv. (cfs)  * Wetted Per. (ft)	*******************  * Left OB * Channel *  * 0.100 * 0.045 *  * * * * *  * 6577.77 * 1550.04 *  * 6577.77 * 1550.04 *  * 3902.63 * 3837.78 *  * 1131.87 * 101.31 *  * 0.59 * 2.48 *  * 5.81 * 15.30 *  *315671.3 *310425.2					
*********  CROSS SECTION OUTPUT P  **********  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	***********  * 169. 04  * 0. 04  * 169. 00  * 161. 22  *0. 000153  *10495. 00  * 2632. 32  * 0. 75  * 16. 30  *848906. 6  *	********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)	*******************  * Left OB * Channel *  * 0.100 * 0.045 *  * * *  * 6577.77 * 1550.04 *  * 6577.77 * 1550.04 *  * 3902.63 * 3837.78 *  * 1131.87 * 101.31 *  * 0.59 * 2.48 *  * 5.81 * 15.30 *  *315671.3 *310425.2  * 1133.28 * 103.78 *  * 0.06 * 0.14 *					

	Exi	sting – 34R LOMR	
0.02 * * Frctn Loss (ft)	*	* Cum Volume (acre-ft)	* * *
* C & E Loss (ft)	*	* Cum SA (acres)	* * *
***********************************	******	********	*******
	ofile #2%	******	******
******** * E.G. Elev (ft)	* 172.87	* Element	* Left OB * Channel *
Right OB * * Vel Head (ft)	* 0.02	* Wt. n-Val.	* 0.100 * 0.045 *
0.100 * ` ´ * W.S. Elev (ft)	* 172.85	* Reach Len. (ft)	* * *
* Crit W.S. (ft)	* 163.61	* Flow Area (sq ft)	*11122.16 * 1940.08
*11859.25	*0.000090	* Area (sq ft)	*11122.16 * 1940.08
*11859.25 * * Q Total (cfs)	*17155.00	* Flow (cfs)	* 6843.31 * 4274.11 *
6037.58 * * Top Width (ft)	* 3039.49	* Top Width (ft)	* 1215. 17 * 101. 31 *
1723.01 * * Vel Total (ft/s)	* 0.69	* Avg. Vel. (ft/s)	* 0.62 * 2.20 *
0.51 * * Max Chl Dpth (ft)	* 20.15	* Hydr. Depth (ft)	* 9.15 * 19.15 *
6.88 * * Conv. Total (cfs) *637438.0 *	*1811196.0	* Conv. (cfs)	*722505.1 *451252.8
* Length Wtd. (ft) 1723.77 *	*	* Wetted Per. (ft)	* 1216.76 * 103.78 *
* Min Ch El (ft) 0.04 *	* 152.70	* Shear (Ib/sq ft)	* 0.05 * 0.10 *
* Al pha 0. 02 *	* 3.06	* Stream Power (Ib/ft s)	* 0.03 * 0.23 *
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	* * *
* C & E Loss (ft)	*	* Cum SA (acres)	* * *
* * * * * * * * * * * * * * * * * * *	******	********	******
CROSS SECTION OUTPUT Pr	ofile #0.2%		
****************************	*****	* * * * * * * * * * * * * * * * * * * *	*******
* E.G. Elev (ft) Right OB *	* 178.42	* Element	* Left OB * Channel *
* Vel Head (ft) 0.100 *	* 0.01	* Wt. n-Val.	* 0.100 * 0.045 *
* W. S. Elev (ft)	* 178.41	* Reach Len. (ft)	* * *
* Crit W.S. (ft) *22080.14 *	* 164.95	* Flow Area (sq ft)	*18024.31 * 2503.36
* E.G. Slope (ft/ft) *22080.14 *	*0.000049	* Area (sq ft)	*18024. 31 * 2503. 36
* 0 Total (cfs) *11669.83 *	*27500.00	* Flow (cfs)	*10988.85 * 4841.32
* Top Width (ft) 1933.15 *	* 3306.87	* Top Width (ft)	* 1272.41 * 101.31 *
* Vel Total (ft/s) 0.53 *	* 0.65	* Avg. Vel. (ft/s)	* 0.61 * 1.93 *
		Page 122	

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Existing - 34R LOMR
25.71 * Hydr. Depth (ft)
* Max Chl Dpth (ft)
                                                        * 14.17 * 24.71 *
11. 42 *

* Conv. Total (cfs)
*1663519.0 *
                       *3920088.0 * Conv. (cfs)
                                                          *1566446.0 *690123.3
* Length Wtd. (ft)
                                                          * 1274. 29 *
                                  * Wetted Per. (ft)
                                                                       103.78 *
1934. Ō0
* Min Ch El (ft)
                          152.70 * Shear (Ib/sq ft)
                                                              0.04 *
                                                                         0.07 *
  0.04
* Al pha
                                                                         0.14 *
                            2.22 * Stream Power (lb/ft s) *
                                                               0.03 *
  0.02
* Frctn Loss (ft)
                                  * Cum Volume (acre-ft)
* C & E Loss (ft)
                                  * Cum SA (acres)
*******************************
*****
```

CROSS SECTION

RI VER: RI VER-2 REACH: Reach-1 RS: 250. 12

I NPUT

Station E Sta	on: SIDE CHANNEL Levation Data Elev Sta	num= 285 Elev Sta	Elev Sta	El ev Sta	El ev
Sta		El ev Sta			******  167. 82  167. 83  167. 83  167. 83  167. 83  167. 83  167. 82  167. 24  166. 49  165. 32  165. 68  165. 32  164. 83  164. 83  164. 83  164. 83  164. 83  165. 35  165. 72  167. 26  167. 49  167. 72  167. 98  168. 64  170. 61  171. 53  170. 83
473. 7678 489. 0507 504. 3335 519. 6163	170. 95476. 8244 171. 27492. 1072 171. 62507. 3901 171. 57522. 6729	171. 06 479. 881 171. 15495. 1638 171. 74510. 4466 171. 47525. 7295	171. 13482. 9375 171. 02498. 2204 171. 67513. 5032 171. 33 528. 786	171. 2485. 9941 170. 83501. 2769 171. 62516. 5598 171. 19531. 8426	171. 27 171 171. 58 171. 04
517.0103	171.57522.0729			171. 17031. 0420	171.04

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Existing - 34R LOMR
            170. 88537. 9557
                                 170. 7541. 0123
534. 8992
                                                    170. 52544. 0688
                                                                        170. 34547. 1254
                                                                                             170.16
 550. 182
                                 169. 8556. 2951
            169. 98553. 2386
                                                    169. 53559. 3517
                                                                         169. 26562. 4083
                                                                                             168.97
                                169. 6556. 2951
167. 86 570. 243
167. 42 584. 394
167. 03 598. 536
167. 19 612. 687
167. 77 626. 838
                                                    167. 75 573. 075
167. 36 587. 226
167. 01 601. 368
167. 31 615. 519
167. 96 629. 661
            167. 96 567. 411
167. 47 581. 562
167. 03 595. 713
                                                                         167. 62 575. 907
167. 24 590. 049
167. 01 604. 2
167. 43 618. 342
 564.588
                                                                                             167.52
  578.73
                                                                                             167.11
 592. 881
                                                                                             167.07
            167. 13 609. 855
167. 6 624. 006
 607.032
                                                                                             167.49
 621.174
                                                                         168. 14 632. 493
                                                                                             168.29
 635.325
                                 168.57
            168. 42 638. 148
                                          640. 98
                                                      168.7 643.812
                                                                         168.81 646.644
                                                                                             168.96
            169.08 652.299
 649.467
                                 169. 18 655. 131
                                                     169.35 657.963
                                                                         169.56 660.786
                                                                                             169.68
649. 467
663. 618
677. 769
691. 911
706. 062
720. 204
734. 355
                                 169.92 669.273
                                                                         170. 22 674. 937
            169.79
                      666.45
                                                     170.06 672.105
                                                                                             170.35
                                                    170. 68 686. 256
171. 34 700. 398
171. 98 714. 549
172. 75 728. 7
173. 6 742. 842
            170.47 680.592
                                 170.6 683.424
                                                                         170.73 689.079
                                                                                             170.86
                                171. 22 697. 575
171. 84 711. 717
172. 59 725. 868
            171. 04 694. 743
171. 72 708. 894
                                                                         171. 46 703. 23
172. 11 717. 381
                                                                                              171. 6
                                                                                             172.25
                                                                         172. 93 731. 523
173. 82 745. 674
            172. 42
173. 25
                                172. 59
173. 42
                     723.036
                                                                                              173.1
                     737. 187
                                          740. 01
                                                                                             174.02
                                                     174. 74 756. 993
175. 74 771. 135
            174. 28 751. 329
                                                                         174.96 759.825
 748.506
                                174. 52 754. 161
                                                                                             175.13
            175.34
                                 175.54 768.312
                                                                         175. 92 773. 967
 762.648
                      765.48
                                                                                             176.08
 776. 799
            176. 26 779. 631
                                 176. 4 782. 454
                                                     176.49 785.286
                                                                          176. 6 788. 118
                                                                                              176. 7
                                                                         177. 16 802. 26
177. 95 816. 411
                                                    177. 05 799. 437
177. 75 813. 579
 790. 941
                                176. 95 796. 605
            176.84 793.773
                                                                                             177.28
 805.092
            177.41 807.924
                                 177.57 810.756
                                                                                             178.15
 819. 243
833. 385
             178. 3 822. 066
                                178. 5 824. 898
179. 79 839. 049
                                                     178. 74
                                                             827. 73
                                                                         178. 98 830. 562
                                                                                              179. 2
            179. 44 836. 217
                                                     180. 35 841. 872
                                                                         180. 76 844. 704
Manning's n Values
                                num=
Sta n Val Sta n Val
                                             Sta
                                                    n Val
            . 03189. 5071
                                 . 025342. 3355 . 07
Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. 189. 5071342. 3355 515 515 . 1
                                                                                              Expan.
Skew Angle = 30
CROSS SECTION OUTPUT Profile #1%
                                         ·
*********************
*****
* E.G. Elev (ft)
                             * 175.46 * Element
                                                                             * Left OB *
                                                                                              Channel *
Right OB *
  Vel Head (ft)
                              * 0.32
                                            * Wt. n-Val.
                                                                                 0.030
                                                                                               0.025
0.070 *
* W.S. Elev (ft)
                              * 175.14 * Reach Len. (ft)
                                                                             * 515.00
                                                                                              515.00
 515.00 *
* Crit W.S. (ft)
                                             * Flow Area (sq ft)
                                                                             * 1496. 22
                                                                                          * 1526.15
2230. 42 *
* E. G. Slope (ft/ft) *0.000413
                                            * Area (sq ft)
                                                                             * 1496, 22
                                                                                           * 1526.15
2230. 42
* 0 Total (cfs)
                                                                             * 5819.56
                                                                                           * 8544.99
                               *17300.00
                                             * Flow (cfs)
2935. 46
* Top Width (ft)
                                                                             * 189.51
                                                                                              152.83
* Vel Total (ft/s) * 3.29
1.32 *
                                             * Avg. Vel. (ft/s)
                                                                                   3.89
                                                                                                 5.60
                         * 10.31
 Max Chl Dpth (ft)
                                             * Hydr. Depth (ft)
                                                                                   7.90
                                                                                                 9.99
   5.34 *
                              *851217.6
* Conv. Total (cfs)
                                             * Conv. (cfs)
                                                                             *286341.6
                                                                                          *420441.7
*144434.4
 Length Wtd. (ft)
                              * 515.00
                                             * Wetted Per. (ft)
                                                                                197.00
                                                                                              152.94
 418. 61
* Min Ch El (ft)
                              * 164.83
                                             * Shear (lb/sq ft)
                                                                                   0.20
                                                                                                 0.26
   0. 14
 Al pha
                                                                                                 1.44
                                     1. 92
                                             * Stream Power (lb/ft s) *
                                                                                   0.76
   0.18
* Frctn Loss (ft)
                             * 0.21 * Cum Volume (acre-ft) * 369.55 *
                                                                                              151. 66
 614. 28
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

#### CROSS SECTION OUTPUT Profile #Floodway \* E.G. Elev (ft) Right OB \* \* Vel\_Head (ft) \* 176.20 \* Element \* Left OB \* Channel \* \* 0.65 \* Wt. n-Val. 0.030 \* 0.025 \* 0.070 \* W.S. Elev (ft) \* 175.55 \* Reach Len. (ft) 515.00 \* 515.00 \* 515.00 \* \* Crit W.S. (ft) \* Flow Area (sq ft) 211. 39 \* 1589. 24 2251.68 \* E.G. Slope (ft/ft) \*0.000710 \* Area (sq ft) 211. 39 \* 1589. 24 2251. 68 \* Q Total (cfs) \*17300.00 \* Flow (cfs) \* 1000.41 \*11988.62 4310. 97 Top Width (ft) \* 530.00 \* Top Width (ft) \* 152.83 20. 51 356.66 \* \* Vel Total (ft/s) 4. 27 \* Avg. Vel. (ft/s) 4.73 7.54 1. 91 \* Max Chl Dpth (ft) \* 10.72 \* Hydr. Depth (ft) 10. 31 10. 40 6. 31 \* \* Conv. Total (cfs) \*161744.0 \* \*649082.5 \* Conv. (cfs) \* 37534.7 \*449803.8 Length Wtd. (ft) 361.72 \* \* Wetted Per. (ft) \* 515.00 31. 15 \* 152.94 \* Min Ch El (ft) \* 164.83 \* Shear (lb/sq ft) 0.30 \* 0.46 0. 28 2. 28 \* Stream Power (lb/ft s) \* 1.42 \* 3.48 \* Al pha 0.53 0.26 \* Cum Volume (acre-ft) \* 307.61 \* 159.81 \* \* Frctn Loss (ft) 586.44 C & E Loss (ft) 0.11 \* Cum SA (acres) 10. 33 \* 11.87 \* \*

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

\*\*\*\*\*

# CROSS SECTION OUTPUT Profile #10% \*\*\*\*\*\*\*\*\* \* E. G. Elev (ft) \* 170.84 \* Element \* Left OB \* Channel \*

E.G. EIEV (II)	170.04	Erellent		Leit Ob		Chariner	
Right OB * * Vel Head (ft)	* 0.39	* Wt. n-Val.	*	0. 030	*	0. 025	*
0.070 * * W.S. Elev (ft)	* 170. 45	* Reach Len. (ft)	*	515. 00	*	515. 00	*
515.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	*	607. 75	*	809. 64	*
522.05 * * E.G. Slope (ft/ft)	*0.001056	* Area (sq ft)	*	607. 75	*	809. 64	*
522.05 * * * * * * * * * * * * * * * * * * *	* 7480.00	* Flow (cfs)	*	2106. 67	*	4750. 30	*
023.03							

* Top Width (ft)	Exi * 574.48	sting - 34R LOMR * Top Width (ft)	*	189. 51	*	152. 83	*
232. 15 *		* Avg. Vel. (ft/s)	*	3. 47	*	5. 87	*
1. 19 *	3.00	Avg. ver. (1173)		3.47		3.07	
<pre>* Max Chl Dpth (ft) 2.25 *</pre>	* 5.62	* Hydr. Depth (ft)	*	3. 21	*	5. 30	*
* Conv. Total (cfs) 19171.2 *	*230167.8	* Conv. (cfs)	*	64824.6	*1	46172. 0	*
* Length Wtd. (ft) 232.69 *	* 515.00	* Wetted Per. (ft)	*	192. 32	*	152. 94	*
* Min Ch El (ft) 0.15 *	* 164.83	* Shear (Ib/sq ft)	*	0. 21	*	0. 35	*
* Al pha 0. 18 *	* 1.71	* Stream Power (lb/ft s)	*	0. 72	*	2. 05	*
* Frctn Loss (ft) 239.73 *	* 0.47	* Cum Volume (acre-ft)	*	162. 74	*	89. 02	*
* C & E Loss (ft) 9.61 *	* 0.03	* Cum SA (acres)	*	8. 50	*	6. 28	*
	*****	********	**	*****	***	*****	**

Warning: Divided flow computed for this cross-section. Warning: The cross-section end points had to be extended vertically for the computed water surface.

## 

*****									
* E.G. Elev (ft)	*	174.04	*	Element	*	Left OB	*	Channel	*
Right OB *									
* Vel Head (ft)	*	0. 35	*	Wt. n-Val.	*	0. 030	*	0. 025	*
0. 070 *									
* W.S. Elev (ft)	*	173. 68	*	Reach Len. (ft)	*	515. 00	*	515.00	*
515. 00 *									
* Crit W.S. (ft)	*		*	Flow Area (sq ft)	*	1221. 04	*	1304. 23	*
1638. 12 *				,					
* E.G. Slope (ft/ft)	*0	. 000540	*	Area (sq ft)	*	1221. 04	*	1304. 23	*
1638. 12 *  `				` ' '					
* 0 Total (cfs)	*1	4350.00	*	Flow (cfs)	*	4764. 24	*	7517. 01	*
2068. 75 * ` ´				•					
* Top Width (ft)	*	741. 10	*	Top Width (ft)	*	189. 51	*	152. 83	*
398. 77 *									
* Vel Total (ft/s)	*	3. 45	*	Avg. Vel. (ft/s)	*	3. 90	*	5. 76	*
1. 26 *				g ()					
* Max Chl Dpth (ft)	*	8. 85	*	Hydr. Depth (ft)	*	6. 44	*	8. 53	*
4. 11 *									
* Conv. Total (cfs)	*6	17692. 0	*	Conv. (cfs)	*:	205075.5	* :	323567.8	*
89048.6 *	_			(512)					
* Length Wtd. (ft)	*	515.00	*	Wetted Per. (ft)	*	195. 55	*	152. 94	*
399.73 *		0.0.00				. ,			
* Min Ch El (ft)	*	164.83	*	Shear (lb/sq ft)	*	0. 21	*	0. 29	*
0.14 *		101.00		3116d1 (1273q 11)		0.21		0.27	
* Al pha	*	1. 91	*	Stream Power (lb/ft s)	*	0. 82	*	1. 66	*
0. 17 *		1. / 1		Stream rower (16/11/3)		0.02		1.00	
* Frctn Loss (ft)	*	0. 27	*	Cum Volume (acre-ft)	*	301. 35	*	132. 69	*
485. 52 *		0.27		cam vorame (dere 11)		301.33		132.07	
* C & E Loss (ft)	*	0.00	*	Cum SA (acres)	*	11. 24	*	6. 28	*
19.59 *		0.00		cuiii SA (acres)		11.27		0. 20	
******	***	*****	**:	*****	* * ;	*****	<b>*</b> * *	*****	* *
*****									

CROSS SECTION OUTPUT									
*****									
* E.G. Elev (ft) Right OB *	*	179. 03	*	Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.070 *	*	0. 30	*	Wt. n-Val.	*	0. 030	*	0. 025	*
* W. S. Elev (ft) 515.00 *	*	178. 73	*	Reach Len. (ft)	*	515. 00	*	515.00	*
* Crit W.S. (ft) 3849.17 *	*		*	Flow Area (sq ft)	*	2177. 22	*	2075. 34	*
* E.G. Slope (ft/ft) 3849.17 *	*0.	000266	*	Area (sq ft)	*	2177. 22	*	2075. 34	*
* Q Total (cfs) 5316.77 *	*25	5400. 00	*	Flow (cfs)	*	8628. 69	*1	1454. 53	*
* Top Width (ft)	*	824. 79	*	Top Width (ft)	*	189. 51	*	152. 83	*
482.45 *  * Vel Total (ft/s)	*	3. 14	*	Avg. Vel. (ft/s)	*	3. 96	*	5. 52	*
1.38 * * Max Chl Dpth (ft) 7.98 *	*	13. 90	*	Hydr. Depth (ft)	*	11. 49	*	13. 58	*
* Conv. Total (cfs) *325733.9 *	*15	556140. 0	7	* Conv. (cfs)	×	528639. 9	*	701765. 9	
* Length Wtd. (ft) 483.58 *	*	515. 00	*	Wetted Per. (ft)	*	200. 60	*	152. 94	*
* Min Ch El (ft)	*	164. 83	*	Shear (Ib/sq ft)	*	0. 18	*	0. 23	*
* Al pha	*	1. 98	*	Stream Power (lb/ft s)	*	0. 72	*	1. 25	*
* Frctn Loss (ft)	*	0. 13	*	Cum Volume (acre-ft)	*	555. 42	*	198. 32	*
* C & E Loss (ft)	*	0. 02	*	Cum SA (acres)	*	16. 93	*	6. 28	*
34.64 *	<b>* * *</b> :	******	**	* * * * * * * * * * * * * * * * * * * *	k * 3	*****	< * *	******	* *
****									

#### CROSS SECTION

RI VER: RI VER-2 REACH: Reach-1 RS: 225

INPUT Description: SIDE CHANNEL: Station Elevation Data Sta Elev Sta ************************************	num= 132	El ev Sta	El ev Sta	El ev
	Elev Sta	******	******	*****
32. 38982 177. 438. 86778 64. 77963 176. 6271. 25759 97. 16944 175. 48103. 6474 129. 5593 174. 65136. 0372 161. 9491 173. 69 168. 427 194. 3389 172. 67200. 8168 226. 7287 171. 59233. 2067 259. 1185 168. 23265. 5965 291. 5083 165. 09297. 9863 323. 8982 165. 83330. 3761	177. 8312. 95593 177. 2645. 34574 176. 3477. 73556 175. 32110. 1254 174. 46142. 5152 173. 49 174. 905 172. 47207. 2948 171. 34239. 6846 166. 89272. 0744 165. 27304. 4643 165. 83336. 8541 165. 83369. 2439 Page	177. 819. 43389 177. 13 51. 8237 176. 0684. 21352 175. 16116. 6033 174. 27148. 9931 173. 29 181. 383 172. 26213. 7728 171. 09246. 1626 165. 54278. 5524 165. 46310. 9422 165. 83 343. 332 165. 83375. 7219 e 127	177. 6725. 91185 176. 9958. 30167 175. 890. 69148 175123. 0813 174. 08155. 4711 173. 08187. 8609 172. 05220. 2507 170. 84252. 6405 164. 83285. 0304 165. 65317. 4202 165. 83 349. 81 165. 83382. 1998	177. 53 176. 86 175. 64 174. 84 173. 89 172. 88 171. 84 169. 57 164. 9 165. 83 165. 83

```
Existing - 34R LOMR
                            165. 83401. 6337
388. 6778
          165. 83395. 1557
                                             165. 83408. 1117
                                                               165. 83414. 5896
                                                                                 165.83
           165. 83427. 5456
421.0676
                                              165. 83440. 5015
                                                               165. 83446. 9794
                            165. 83434. 0235
                                                                                 165.83
453. 4574
485. 8472
518. 2371
                                                               165. 05479. 3693
164. 24511. 7591
163. 83544. 1489
                                              165. 48472. 8913
164. 37505. 2811
163. 83537. 6709
           165. 83459. 9354
                                                                                 164.76
                            165. 83466. 4133
           164. 63492. 3252
                             164. 5498. 8032
                                                                                 164.11
           163. 99 524. 715
                                                                                 163.92
                            163.86 531.193
           164.05557.1048
                            164. 18563. 5828
                                              164. 31570. 0607
                                                               164. 44576. 5387
550.6268
                                                                                 164.57
            164. 7589. 4946
                                                               165. 86608. 9285
583.0167
                            164. 85595. 9726
                                              165. 38602. 4506
                                                                                 166.05
                                              166. 62634. 8404
           166. 25621. 8845
615.4065
                            166. 44628. 3624
                                                               166. 79641. 3184
                                                                                 166, 92
647.7963
           167.03654.2742
                            167. 16660. 7522
                                              167. 28667. 2302
                                                               167. 41673. 7081
                                                                                 167.54
                                                               169.77 706.098
680. 1861
           167. 67686. 6641
                            167.81 693.142
                                              168.64 699.62
                                                                                  170.9
           171. 39719. 0539
                                              172. 18732. 0098
                            171. 85725. 5319
                                                                172. 5738. 4878
712.5759
                                                                                 172.83
744. 9658
777. 3555
809. 7454
                                              174. 83764. 3997
174. 83796. 7894
           174.06751.4437
                                                               174. 83770. 8776
                            174. 83757. 9217
                                                                                 174.83
                                                               174. 83803. 2674
           174. 83783. 8335
                            174. 83790. 3115
                                                                                 174.83
                                              174.83 825.98
           174. 83816. 2233
                            174. 83822. 7013
                                                               175. 22 829. 25
                                                                                 175. 19
    1049
           171. 3 1399. 25
Manning's n Values
                            num=
                       Sta n Val Sta n Val
    Sta n Val
            . 03459. 9354
                            . 025602. 4506
                                             . 07
                                                      Ri ght
Bank Sta: Left Right
                            Lengths: Left Channel
                                                                 Coeff Contr.
                                                                                  Expan.
      459. 9354602. 4506
                                       460 460
                                                      460
                                                                  . 1
                                                                                   . 3
CROSS SECTION OUTPUT Profile #1%
                                   ...
*************************
* E.G. Elev (ft)
Right OB *
                           * 175.25 * Element
                                                                   * Left OB *
                                                                                  Channel *
  Vel Head (ft)
                           * 0.33
                                       * Wt. n-Val.
                                                                       0.030
                                                                                   0.025
  0.070 *
* W.S. Elev (ft)
                           * 174.91 * Reach Len. (ft)
                                                                      460.00
                                                                                  460.00
 460.00 *
* Crit W.S. (ft)
                                       * Flow Area (sq ft)
                                                                   * 2147.85
                                                                               * 1484.76
1501.72 *
* E.G. Slope (ft/ft) *0.000413 * Area (sq ft)
                                                                   * 2147.85
                                                                               * 1484.76
1501. 72
* Q Total (cfs)
                                                                   * 7379.90
                           *17300.00 * Flow (cfs)
                                                                               * 8549.92
1370. 18
 Top Width (ft)
                          * 1037.90
                                       * Top Width (ft)
                                                                      339.83
                                                                                  142. 52
 555. 56 *
                          * 3.37
* Vel Total (ft/s)
                                       * Avg. Vel. (ft/s)
                                                                        3.44
                                                                                    5.76
   0. 91
* Max Chl Dpth (ft)
                          * 11.08
                                       * Hydr. Depth (ft)
                                                                        6.32
                                                                                   10.42
   2.70 *
* Conv. Total (cfs)
                                                                   *363202.1
                           *851420.6
                                       * Conv. (cfs)
                                                                               *420785.0
67433.5
 Length Wtd. (ft) 556.14 *
                           * 460.00
                                       * Wetted Per. (ft)
                                                                   * 340.48
                                                                                  142.60
                                       * Shear (Ib/sq ft)
* Min Ch El (ft)
                           * 163.83
                                                                        0.16
                                                                                    0.27
   0.07
 Al pha
                                1.89
                                       * Stream Power (lb/ft s) *
                                                                        0.56
                                                                                    1.55
   0.06
 Frctn Loss (ft)
                                0.17 * Cum Volume (acre-ft) *
                                                                      348. 01 *
                                                                                  133.86
 592. 22
 C & E Loss (ft)
                                0.02 * Cum SA (acres)
                                                                       10. 52 *
                                                                                    4.53
  19. 51
```

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #Floodway

Existing - 34R LOMR									
********** *****	*****	**********	*******						
* E.G. Elev (ft) Right OB *	* 175.83	* Element	* Left OB * Channel *						
*	* 0. 29	* Wt. n-Val.	* 0.030 * 0.025 *						
* W.S. Elev (ft) 460.00 *	* 175.54	* Reach Len. (ft)	* 460.00 * 460.00 *						
* Cri t W. S. (ft) 878.06 *	*	* Flow Area (sq ft)	* 2207.06 * 1574.05 *						
* E.G. Slope (ft/ft) 878.06 *	*0.000305	* Area (sq ft)	* 2207.06 * 1574.05 *						
* Q Total (cfs) 1262.99 *	*17300.00	* Flow (cfs)	* 7933.71 * 8103.30 *						
* Top Width (ft) 110.55 *	* 510.00	* Top Width (ft)	* 256.94 * 142.52 *						
* Vel Total (ft/s)	* 3.71	* Avg. Vel. (ft/s)	* 3.59 * 5.15 *						
1.44 * * Max Chl Dpth (ft)	* 11.71	* Hydr. Depth (ft)	* 8.59 * 11.04 *						
7.94 * * Conv. Total (cfs)	*990178.8	* Conv. (cfs)	*454091.8 *463798.5 *						
72288.4 * * Length Wtd. (ft)	* 460.00	* Wetted Per. (ft)	* 260.69 * 142.60 *						
114.96 * * Min Ch El (ft)	* 163.83	* Shear (Ib/sq ft)	* 0.16 * 0.21 *						
0. 15 * * Al pha	* 1.34	* Stream Power (Ib/ft s)	* 0.58 * 1.08 *						
0.21 * * Frctn Loss (ft)	* 0.14	* Cum Volume (acre-ft)	* 293.31 * 141.11 *						
567.94 * * C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 8.69 * 4.53 *						
9. 11 *  ********************************									
*****	*****	*****	******						
	******	*********	*******						
**************************************	Profile #10%	**************************							
**************************************	Profile #10%								
**************************************	Profile #10% ******	********	*******						
**************************************	Profile #10% ******  * 170.35	**************************************	**************************************						
**************************************	Profile #10%  *****  * 170.35  * 0.31	************ * Element * Wt. n-Val.	******************  * Left OB * Channel *  * 0.030 * 0.025 *						
**************************************	Profile #10%  *****  * 170.35  * 0.31  * 170.04	*********************  * Element  * Wt. n-Val.  * Reach Len. (ft)	***************  * Left OB * Channel *  * 0.030 * 0.025 *  * 460.00 * 460.00 *						
**************************************	Profile #10% ******  * 170.35  * 0.31  * 170.04	**********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)	*****************  * Left OB * Channel *  * 0.030 * 0.025 *  * 460.00 * 460.00 *  * 864.42 * 789.75 *						
**************************************	***********  * 170. 35  * 0. 31  * 170. 04  *  *0. 000775	**********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)	*****************  * Left OB * Channel *  * 0.030 * 0.025 *  * 460.00 * 460.00 *  * 864.42 * 789.75 *  * 864.42 * 789.75 *						
**************************************	***********  * 170. 35  * 0. 31  * 170. 04  *  *0. 000775  * 7480. 00	<pre>*********** * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)</pre>	******************  * Left 0B * Channel *  * 0.030 * 0.025 *  * 460.00 * 460.00 *  * 864.42 * 789.75 *  * 864.42 * 789.75 *  * 3059.49 * 4090.22 *						
**************************************	***********  * 170. 35  * 0. 31  * 170. 04  *  *0. 000775  * 7480. 00  * 450. 89	*********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)	*******************  * Left 0B * Channel *  * 0.030 * 0.025 *  * 460.00 * 460.00 *  * 864.42 * 789.75 *  * 864.42 * 789.75 *  * 3059.49 * 4090.22 *  * 209.68 * 142.52 *						
**************************************	***********  * 170. 35  * 0. 31  * 170. 04  *  *0. 000775  * 7480. 00  * 450. 89  * 3. 87	*********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)	******************  * Left OB * Channel *  * 0.030 * 0.025 *  * 460.00 * 460.00 *  * 864.42 * 789.75 *  * 864.42 * 789.75 *  * 3059.49 * 4090.22 *  * 209.68 * 142.52 *  * 3.54 * 5.18 *						
**************************************	***********  * 170. 35  * 0. 31  * 170. 04  *  *0. 000775  * 7480. 00  * 450. 89  * 3. 87  * 6. 21	*********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)	*******************  * Left OB * Channel *  * 0.030 * 0.025 *  * 460.00 * 460.00 *  * 864.42 * 789.75 *  * 864.42 * 789.75 *  * 3059.49 * 4090.22 *  * 209.68 * 142.52 *  * 3.54 * 5.18 *  * 4.12 * 5.54 *						
**************************************	************  * 170. 35  * 0. 31  * 170. 04  *  *0. 000775  * 7480. 00  * 450. 89  * 3. 87  * 6. 21  *268700. 0	********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)	*******************  * Left OB * Channel *  * 0.030 * 0.025 *  * 460.00 * 460.00 *  * 864.42 * 789.75 *  * 864.42 * 789.75 *  * 3059.49 * 4090.22 *  * 209.68 * 142.52 *  * 3.54 * 5.18 *  * 4.12 * 5.54 *  *109904.2 *146930.9 *						

```
0. 16
* Frctn Loss (ft)
                           0.31 * Cum Volume (acre-ft) * 154.04 * 79.56 *
234. 99
 C & E Loss (ft)
                           0.02 * Cum SA (acres)
                                                            6. 14 *
                                                                       4.53 *
  7.65
                ********************
*****
CROSS SECTION OUTPUT Profile #2%
                              ***************
* E.G. Elev (ft)
                       * 173.77 * Element
                                                        * Left OB *
                                                                     Channel *
Right OB *
 Vel Head (ft)
                       * 0.35
                                 * Wt. n-Val.
                                                           0.030 *
                                                                      0.025
 0.070
* W.S. Elev (ft)
                       * 173.42 * Reach Len. (ft)
                                                           460.00
                                                                     460.00
 460.00 *
                                 * Flow Area (sq ft)
* Crit W.S. (ft)
                                                        * 1679.04
                                                                  * 1272.01
884. 72
* E.G. Slope (ft/ft)
                       *0.000504
                                * Area (sq ft)
                                                        * 1679.04
                                                                  * 1272.01
884. 72
* Q Total (cfs)
                       *14350.00
                                 * Flow (cfs)
                                                        * 6022.11
                                                                  * 7301.10
1026. 79
 Top Width (ft)
                       * 767.30
                                 * Top Width (ft)
                                                          289. 26
                                                                    142. 52
335.52 *
* Vel Total (ft/s)
                           3.74
                                 * Avg. Vel. (ft/s)
                                                            3.59
                                                                       5.74
  1. 16
* Max Chl Dpth (ft)
                           9.59
                                 * Hydr. Depth (ft)
                                                            5.80
                                                                       8.93
2.64 *
* Conv. Total (cfs)
                                 * Conv. (cfs)
                       *639122.4
                                                        *268213.6
                                                                  *325177.5
45731.4
* Length Wtd. (ft)
                                 * Wetted Per. (ft)
                         460.00
                                                          289.90
                                                                    142.60
335. 96
* Min Ch El (ft)
                                 * Shear (lb/sq ft)
                         163.83
                                                            0.18
                                                                       0.28
  0.08
                           1.59
                                 * Stream Power (lb/ft s) *
 Al pha
                                                            0.65
                                                                       1. 61
  0.10
                                 * Cum Volume (acre-ft)
 Frctn Loss (ft)
                           0. 21
                                                          284. 20 *
                                                                     117. 47
 470. 61
 C & E Loss (ft)
                           0.01 * Cum SA (acres)
                                                            8. 41
                                                                       4. 53
*************************
*****
Warning: Divided flow computed for this cross-section.
CROSS SECTION OUTPUT Profile #0.2%
                               * E.G. Elev (ft)
                         178.89 * Element
                                                          Left OB *
                                                                     Channel *
Right OB *
 Vel Head (ft)
                           0.24
                                 * Wt. n-Val.
                                                           0.030
                                                                      0.025
 0.070
* W.S. Elev (ft)
                       * 178.65 * Reach Len. (ft)
                                                        * 460.00
                                                                     460.00
460.00
                                 * Flow Area (sq ft)
* Crit W.S. (ft)
                                                        * 3664.79
                                                                  * 2016. 79
3903. 96
* E.G. Slope (ft/ft)
                       *0.000228
                                * Area (sq ft)
                                                        * 3664.79
                                                                  * 2016.79
3903. 96
* 0 Total (cfs)
                       *25400.00
                                 * Flow (cfs)
                                                        *10916.87
                                                                  *10591.61
3891. 52
* Top Width (ft)
                                 * Top Width (ft)
                       * 1314.27
                                                        * 459.94
                                                                  * 142.52 *
711.82
                                   Page 130
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*			*	2. 98	*	5. 25	*
*	14. 82	* Hydr. Depth (ft)	*	7. 97	*	14. 15	*
*16	81153. 0	* Conv. (cfs)	7	*722556. 5	*	701028. 6	
*	460.00	* Wetted Per. (ft)	*	461. 45	*	142. 60	*
*	163. 83	* Shear (Ib/sq ft)	*	0. 11	*	0. 20	*
*	2. 20	* Stream Power (lb/ft s)	*	0. 34	*	1. 06	*
*	0. 10	* Cum Volume (acre-ft)	*	520. 88	*	174. 13	*
*	0. 00	* Cum SA (acres)	*	13. 09	*	4. 53	*
****	*****	*******	**	*****	* * *	*****	* *
	* *16 * * * *	* 2.65  * 14.82  *1681153.0  * 460.00  * 163.83  * 2.20  * 0.10  * 0.00	* 14.82 * Hydr. Depth (ft)  *1681153.0 * Conv. (cfs)  * 460.00 * Wetted Per. (ft)  * 163.83 * Shear (Ib/sq ft)  * 2.20 * Stream Power (Ib/ft s)  * 0.10 * Cum Volume (acre-ft)  * 0.00 * Cum SA (acres)	* 2.65 * Avg. Vel. (ft/s) *  * 14.82 * Hydr. Depth (ft) *  *1681153.0 * Conv. (cfs) *  * 460.00 * Wetted Per. (ft) *  * 163.83 * Shear (Ib/sq ft) *  * 2.20 * Stream Power (Ib/ft s) *  * 0.10 * Cum Volume (acre-ft) *  * 0.00 * Cum SA (acres) *	* 2.65 * Avg. Vel. (ft/s) * 2.98  * 14.82 * Hydr. Depth (ft) * 7.97  *1681153.0 * Conv. (cfs) *722556.5  * 460.00 * Wetted Per. (ft) * 461.45  * 163.83 * Shear (Ib/sq ft) * 0.11  * 2.20 * Stream Power (Ib/ft s) * 0.34  * 0.10 * Cum Volume (acre-ft) * 520.88  * 0.00 * Cum SA (acres) * 13.09	* 2.65 * Avg. Vel. (ft/s) * 2.98 *  * 14.82 * Hydr. Depth (ft) * 7.97 *  *1681153.0 * Conv. (cfs) *722556.5 *  * 460.00 * Wetted Per. (ft) * 461.45 *  * 163.83 * Shear (Ib/sq ft) * 0.11 *  * 2.20 * Stream Power (Ib/ft s) * 0.34 *  * 0.10 * Cum Volume (acre-ft) * 520.88 *  * 0.00 * Cum SA (acres) * 13.09 *	* 2.65 * Avg. Vel. (ft/s) * 2.98 * 5.25  * 14.82 * Hydr. Depth (ft) * 7.97 * 14.15  *1681153.0 * Conv. (cfs) *722556.5 *701028.6  * 460.00 * Wetted Per. (ft) * 461.45 * 142.60  * 163.83 * Shear (Ib/sq ft) * 0.11 * 0.20  * 2.20 * Stream Power (Ib/ft s) * 0.34 * 1.06  * 0.10 * Cum Volume (acre-ft) * 520.88 * 174.13

CROSS SECTION

RI VER: RI VER-2 REACH: Reach-1

REACH: Reach-1 RS: 200

I NPUT

Descripti	on: SIDE CHANNEL	XS 200			
	levation Data	num= 388			
Sta	El ev Sta	El ev Sta	El ev Sta	El ev Sta	Elev
*****	******	*****	*****	*****	*****
0	177. 833. 569947	177. 837. 139893	177. 8310. 70984	177. 8314. 27979	177. 83
17. 84973	177. 8321. 41968	177. 8324. 98963	177. 8328. 55957	177. 8332. 12952	177. 83
35. 69947	177. 8339. 26941	177. 8342. 83936	177. 7646. 40931	177. 6649. 97925	177. 55
53. 5492	177. 4457. 11914	177. 3360. 68909	177. 2264. 25904	177. 1267. 82899	177. 01
71. 39893	176. 974. 96888	176. 7878. 53883	176. 6582. 10877	176. 5185. 67872	176. 37
89. 24866	176. 2492. 81861	176. 196. 38856	175. 96 99. 9585	175. 82103. 5285	175. 71
107. 0984	175. 6110. 6683	175. 49114. 2383	175. 38117. 8082	175. 27121. 3782	175. 16
124. 9481	175. 05128. 5181	174. 94 132. 088	174. 83 135. 658	174. 71139. 2279	174. 6
142. 7979	174. 49146. 3678	174. 37149. 9378	174. 26153. 5077	174. 15157. 0777	174. 03
160. 6476	173. 92164. 2175	173. 81167. 7875	173. 72171. 3574	173. 63174. 9274	173. 54
178. 4973	173. 45182. 0673	173. 36185. 6372	173. 27189. 2072	173. 18192. 7771	173. 09
196. 3471	172. 99 199. 917	172. 9 203. 487	172. 81207. 0569	172. 68210. 6268	172. 56
214. 1968	172. 43217. 7667	172. 3221. 3367	172. 18224. 9066	172. 05228. 4766	171. 93
232. 0465	171. 8235. 6165	171. 64239. 1864	171. 49242. 7564	171. 33246. 3263	171. 18
249. 8963	171. 02253. 4662	170. 87257. 0362	170. 54260. 6061	170. 17264. 1761	169. 74
267. 746	168. 81271. 3159	167. 87274. 8859	166. 94278. 4558	166. 01282. 0258	165. 09
285. 5957	164. 17289. 1657	163. 83292. 7356	163. 83296. 3056	163. 9299. 8755	163. 99
303. 4455	164. 08307. 0154	164. 18310. 5854	164. 27314. 1553	164. 35317. 7253	164. 41
321. 2952	164. 48324. 8651	164. 56328. 4351	164. 72 332. 005	164. 83 335. 575	164. 83
339. 1449	164. 83342. 7149	164. 83346. 2848	164. 85349. 8548	164. 87353. 4247	164. 89
356. 9947	164. 91360. 5646	164. 93364. 1346	164. 95367. 7045	164. 97371. 2744	165
374. 8444	165. 01378. 4143	165381. 9843	164. 99385. 5542	164. 98389. 1242	164. 97
392. 6941	164. 96396. 2641	164. 95 399. 834	164. 94 403. 404	164. 93406. 9739	164. 92
410. 5439	164. 91414. 1138	164. 9417. 6837	164. 89421. 2537	164. 88424. 8236	164. 87
428. 3936	164. 86431. 9635	164. 85435. 5335	164. 83439. 1034	164. 83442. 6734	164. 83
446. 2433	164. 83449. 8133	164. 83453. 3832	164. 83456. 9532	164. 83460. 5231	164. 83
464. 093	164. 83 467. 663	164. 83471. 2329	164. 83474. 8029	164. 83478. 3728	164. 76
481. 9428	164. 65485. 5127	164. 54489. 0827	164. 43492. 6526	164. 32496. 2226	164. 21
499. 7925	164. 09503. 3625	163. 98506. 9324	163. 87510. 5023	163. 83514. 0723	163.83
517. 6423	163. 83521. 2122	163. 83524. 7822	163. 83528. 3521	163. 83531. 9221	163. 83
		Pag	e 131		

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Existing - 34R LOMR
                                                        163. 83542. 6319
163. 83560. 4816
  535. 492
                                                                                          163. 83546. 2018 163. 83549. 7718
                     163. 83 539. 062
                                                                                                                                                               163.83
553. 3417
                     163. 83556. 9117
                                                                                          163. 83564. 0516
                                                                                                                            163. 83567. 6215
                                                                                                                                                                163.83
                     163. 83574. 7614
164. 14592. 6111
164. 69610. 4609
166. 08628. 3106
                                                        163. 83578. 3314
164. 25596. 1811
164. 79614. 0308
                                                                                          163. 83581. 9013
164. 36 599. 751
165. 36617. 6008
166. 29635. 4505
                                                                                                                             163. 92585. 4713
164. 47 603. 321
165. 87621. 1707
166. 39639. 0204
571. 1915
589. 0412
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606.8909
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624.7407
                                                        166. 18631. 8806
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642.5904
                     166. 53646. 1603
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166. 83692. 5696
660.4401
                     166. 83664. 0101
                                                        166.83 667.58
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                     166. 83664. 0101
166. 83681. 8598
166. 89699. 7095
167. 32717. 5593
167. 77 735. 409
168. 68753. 2587
170. 88771. 1085
171. 83788. 9582
678. 2899
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167. 9738. 9789
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167. 06706. 8494
167. 5724. 6992
168. 1742. 5489
169. 49760. 3986
171. 48778. 2484
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167. 59728. 2691
168. 3746. 1188
170. 01763. 9686
171. 79781. 8183
171. 88 799. 668
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713. 9893
731. 8391
749. 6888
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767. 5385
785. 3882
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171. 94
                     171. 99806. 8079
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821. 0877
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                     172. 55842. 5074
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838. 9374
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172. 15
172. 55
172. 74
172. 93
173. 18
                                                        172.618
172.06
172.22
172.58
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172.97
173.21
                                                                                          172. 07649. 0473
172. 1 863. 76
172. 36 880. 13
172. 65 896. 5
172. 88 912. 87
173. 05 929. 23
    853. 94
870. 31
                                      857. 21
                                                                                                                             172. 14
                                                                        860. 49
                                                                                                                                              867.03
                                                                                                                                                                172.14
                                     873. 58
889. 95
906. 32
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899. 77
916. 14
                                                                        876.86
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                                                                         893. 22
909. 59
925. 96
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172. 86
173. 15
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172. 89
    886. 68
903. 04
    919. 41
                                       922.69
                                                                                                                                               932. 51
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                                       939. 05
    935.78
                                                                         942.33
                                                                                           173.28
                                                                                                              945.6
                                                                                                                              173.32
                                                                                                                                               948.88
                                                                                                                                                                173.33
                    173. 18 939. 05
173. 37 955. 42
173. 57 971. 79
173. 79 988. 16
174 1004. 53
174. 12 1020. 9
174. 51 1037. 26
174. 97 1053. 63
175. 29 1070
175. 61 1086. 37
                                                                                                            961.97
    952.15
                                                         173.4
                                                                          958.7
                                                                                           173.45
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173. 82 997. 98
                                                                        975.06
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    968.52
                                                        173.62
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    984.89
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                                                                         991.43
                                                                                           173.82
                                                                                                           994.71
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                                                                                        173. 82 994. 71
174. 08 1011. 07
174. 32 1027. 44
174. 66 1043. 81
175. 14 1060. 18
175. 35 1076. 55
175. 6 1092. 92
175. 71 1109. 28
175. 84 1125. 65
176. 04 1142. 02
                                                       173. 84 991. 43
174. 08 1007. 8
174. 23 1024. 17
174. 56 1040. 54
175. 07 1056. 91
175. 28 1073. 27
175. 61 1089. 64
                                                                                                                            173. 82 997. 98
174. 1 1014. 35
174. 39 1030. 72
174. 74 1047. 08
175. 23 1063. 45
175. 47 1079. 82
175. 65 1096. 19
  1001. 25
1017. 62
1033. 99
1050. 36
                                                                                                                                                                 174.13
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175. 56
  1066. 73
1083. 09
                                                                                                                                                                175.69
                    175. 61 1086. 37
175. 68 1102. 74
175. 77 1119. 1
175. 94 1135. 47
176. 17 1151. 84
176. 35 1168. 21
176. 44 1184. 58
176. 66 1200. 95
176. 84 1217. 31
  1099, 46
                                                       175. 72 1106. 01
                                                                                                                            175. 69 1112. 56
                                                                                                                                                                175.74
                                                       175. 72 1106. 01
175. 78 1122. 38
175. 95 1138. 75
176. 21 1155. 11
176. 35 1171. 48
176. 48 1187. 85
176. 72 1204. 22
176. 88 1220. 59
177. 04 1236. 96
                                                                                                                            175. 85 1128. 93
176. 08 1145. 29
  1115.83
                                                                                                                                                                175.87
    1132. 2
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                                                                                          176. 04 1142. 02
176. 27 1158. 39
176. 35 1174. 76
176. 52 1191. 12
176. 74 1207. 49
176. 91 1223. 86
177. 05 1240. 23
                                                                                                                            176. 08 1145. 29
176. 29 1161. 66
176. 35 1178. 03
176. 57 1194. 4
176. 77 1210. 77
176. 96 1227. 13
177. 09 1243. 5
177. 18 1259. 87
  1148. 57
1164. 94
1181. 3
1197. 67
                                                                                                                                                                176.33
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  1214.04
                                                                                                                                                                 177.01
  1230.41
                     177. 03 1233. 68
                                                                                                                                                                177.13
                                                                                          177. 17 1256. 6
177. 32 1272. 97
177. 58 1289. 33
                                                        177. 14 1253. 32
                     177. 13 1250. 05
  1246.78
                                                                                                                                                                 177.21
                    177. 13 1230. 03
177. 21 1266. 42
177. 45 1282. 79
177. 75 1299. 15
178. 24 1315. 52
178. 85 1331. 89
                                                        177. 14 1253. 32
177. 27 1269. 69
177. 51 1286. 06
177. 86 1302. 43
178. 38 1318. 8
178. 91 1335. 16
  1263. 14
1279. 51
                                                                                                                             177. 34 1276. 24
                                                                                                                                                                177.39
                                                                                                                             177. 64 1292. 61
                                                                                                                                                                177.68
                                                                                           177. 96 1305. 7
178. 5 1322. 07
                                                                                                                            178. 05 1308. 98
178. 62 1325. 34
  1295.88
                                                                                                                                                                178. 14
  1312.25
                                                                                                                                                                178. 75
  1328.62
                                                                                           178.94
. 03478. 3728 . 025617. 6008
                                                                                          . 07
                                                       Lengths: Left Channel Right Coeff Contr. Expan. 800 800 890 .1 .3
Bank Sta: Left
                                 Ri ght
             478. 3728617. 6Ŏ08
CROSS SECTION OUTPUT Profile #1%
                                                                         ************
* Left OB *
                                                                                                                                                                  Channel *
Right OB *
* Vel Head (ft) 
* 0.28 * Wt. n-Val.
                                                                                                                                    * 0.030 *
                                                                                                                                                                 0.025
                                                                                  Page 132
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0.070 *	ľ	XISTING - 34R LUWR					
0.070 * * W.S. Elev (ft)	* 174.7	3 * Reach Len. (ft)	*	800.00	*	800.00	*
890.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	*	2368. 65	*	1484. 13	*
1624.43 * * E.G. Slope (ft/ft)	*0.00034	3 * Area (sq ft)	*	2368. 65	*	1484. 13	*
* Q Total (cfs)	*17300.0	) * Flow (cfs)	*	7838. 60	*	7907. 45	*
* Top Width (ft)	* 911.3	* Top Width (ft)	*	344. 72	*	139. 23	*
* Vel Total (ft/s)	* 3.1	b * Avg. Vel. (ft/s)	*	3. 31	*	5. 33	*
* Max Chl Dpth (ft)	* 10.9	5 * Hydr. Depth (ft)	*	6. 87	*	10. 66	*
* Conv. Total (cfs)	*934269.	5 * Conv. (cfs)	* 4	423315. 7	* 4	427033.8	*
* Length Wtd. (ft)	* 810. 9	* Wetted Per. (ft)	*	345. 59	*	139. 34	*
* Min Ch El (ft)	* 163.8	3 * Shear (Ib/sq ft)	*	0. 15	*	0. 23	*
* Al pha	* 1.8	* Stream Power (lb/ft s)	*	0. 49	*	1. 21	*
* Frctn Loss (ft)	* 0.2	2 * Cum Volume (acre-ft)	*	324. 16	*	118. 18	*
575.71 * * C & E Loss (ft) 14.32 *	* 0.0	3 * Cum SA (acres)	*	6. 90	*	3. 05	*
	*****	********	***	*****	**:	*****	**
CROSS SECTION OUTPUT P	'COTITE #FI ******	oodway **********	***	*****	**:	*****	· * *
* E.G. Elev (ft)	* 175.6	9 * Element	*	Left OB	*	Channel	*
Right OB * * Vel_Head (ft)	* 0.2	3 * Wt. n-Val.	*	0. 030	*	0. 025	*
0.070 * * W.S. Elev (ft)	* 175.4	l * Reach Len. (ft)	*	800.00	*	800.00	*
890.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	*	2490. 37	*	1571. 73	*

Flow Area (sq ft) 381. 21 \* \* E.G. Slope (ft/ft) \*0.000286 \* Area (sq ft) \* 2490.37 \* 1571.73 381. 21 \* 0 Total (cfs) \*17300.00 \* Flow (cfs) \* 8823.89 \* 7952.47 523.64 \* Top Width (ft) \* 465.00 \* Top Width (ft) 139.23 283.37 42. 40 Vel Total (ft/s) 3.89 \* Avg. Vel. (ft/s) 3.54 5.06 1.37 Max Chl Dpth (ft) \* Hydr. Depth (ft) 8.79 11. 29 11. 58 8. 99 Conv. Total (cfs) \*1022158.0 \* Conv. (cfs) \*521353.5 \*469865.9 30939. 1 Length Wtd. (ft) 808.90 \* Wetted Per. (ft) 286.60 139. 34 50. <del>9</del>9 Min Ch El (ft) 163.83 \* Shear (lb/sq ft) 0. 16 0. 20 0.13 Al pha 1. 20 \* Stream Power (lb/ft s) \* 0. 55 1.02 0. 18 \* Frctn Loss (ft) 0. 17 \* Cum Volume (acre-ft) 268. 51 124.50 561. 29 \* C & E Loss (ft) 0.05 \* Cum SA (acres) 5.84 3.05 8.30

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

1.4. This may indicate the need for additional cross sections.									
CROSS SECTION OUTPUT									
*****									
* E.G. Elev (ft) Right OB *	* 170.01	* Element	*	Left OB	*	Channel	*		
* Vel Head (ft) 0.070 *	* 0.24	* Wt. n-Val.	*	0. 030	*	0. 025	*		
* W.S. Elev (ft) 890.00 *	* 169.77	* Reach Len. (ft)	*	800.00	*	800.00	*		
* Crit W.S. (ft) 369.18 *	*	* Flow Area (sq ft)	*	1031. 65	*	786. 90	*		
* E.G. Slope (ft/ft) 369.18 *	*0.000588	* Area (sq ft)	*	1031. 65	*	786. 90	*		
* Q Total (cfs) 360.54 *	* 7480.00	* Flow (cfs)	*	3522. 89	*	3596. 58	*		
* Top Width (ft)	* 494.82	* Top Width (ft)	*	214. 44	*	139. 23	*		
141.15 * * Vel Total (ft/s)	* 3.42	* Avg. Vel. (ft/s)	*	3. 41	*	4. 57	*		
0.98 * * Max Chl Dpth (ft)	* 5.94	* Hydr. Depth (ft)	*	4. 81	*	5. 65	*		
* Conv. Total (cfs)	*308475.3	* Conv. (cfs)	* *	145283. 9	* *	148322. 9	*		
14868.6 * * Length Wtd. (ft)	* 803.86	* Wetted Per. (ft)	*	215. 19	*	139. 34	*		
141.27 * * Min Ch El (ft)	* 163.83	* Shear (Ib/sq ft)	*	0. 18	*	0. 21	*		
0. 10 * * Al pha	* 1.33	* Stream Power (Ib/ft s)	) *	0. 60	*	0. 95	*		
0.09 * * Frctn Loss (ft)	* 0.39	* Cum Volume (acre-ft)	*	144. 03	*	71. 24	*		
231.57 * * C & E Loss (ft)	* 0.02	* Cum SA (acres)	*	3. 91	*	3. 05	*		
6.39 *	*****	*****	***:	*****	**:	*****	**		
****									
	Profile #2%	*****					ىك بك		
****	* * * * * * * * * * * * * * * * * * * *	******	~ ~ ~ :	* * * * * * * * * *	~ ~ .		^ ^		
* E.G. Elev (ft) Right OB *	* 173.54	* Element	*	Left OB	*	Channel	*		
* Vel Head (ft) 0.070 *	* 0.30	* Wt. n-Val.	*	0. 030	*	0. 025	*		
* W. S. Elev (ft) 890.00 *	* 173. 24	* Reach Len. (ft)	*	800.00	*	800.00	*		
* Crit W.S. (ft)	*	* Flow Area (sq ft)	*	1877. 80	*	1270. 34	*		
* E.G. Slope (ft/ft)	*0.000422	* Area (sq ft)	*	1877. 80	*	1270. 34	*		
1036.66 * * Q Total (cfs)	*14350.00	* Flow (cfs)	*	6599. 19	*	6768. 09	*		
982.72 * * Top Width (ft)	* 753.80	* Top Width (ft)	*	291. 62	*	139. 23	*		
322.95 * * Vel Total (ft/s)	* 3.43	* Avg. Vel. (ft/s)	*	3. 51	*	5. 33	*		
0.95 * * Max Chl Dpth (ft)	* 9.41	* Hydr. Depth (ft) Page 134	*	6. 44	*	9. 12	*		

* Conv. Total (cfs)	*698650.8	* Conv. (cfs)	*321291.4	*329514.4 *
47845.0 * * Length Wtd. (ft)	* 808.47	* Wetted Per. (ft)	* 292.47	* 139.34 *
323.35 * * Min Ch El (ft)	* 163.83	* Shear (Ib/sq ft)	* 0.17	* 0. 24 *
0. 08 * * Al pha	* 1.63	* Stream Power (lb/ft s)	* 0.59	* 1.28 *
0.08 * * Frctn Loss (ft)	* 0. 26	* Cum Volume (acre-ft)	* 265.42	* 104.04 *
460.47 * * C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 5.34	* 3.05 *
11.77 * **********************************	*****	*******	*****	*****
	Profile #0.2%	*******	*****	*****
********* * E.G. Elev (ft)	* 178.78	* Element	* Left OB	* Channel *
Right OB * * Vel Head (ft)	* 0.23	* Wt. n-Val.	* 0.030	* 0.025 *
0.070 * * W.S. Elev (ft)	* 178.55	* Reach Len. (ft)	* 800.00	* 800.00 *
890.00 *	*	* Flow Area (sq ft)	* 3908.00	* 2009. 79 *
3798. 31 * ` ´	±0.000010			
* E.G. Slope (ft/ft) 3798.31 *	*0. 000213	* Area (sq ft)	* 3908.00	* 2009.79 *
* Q Total (cfs) 3624.88 *	*25400.00	* Flow (cfs)	*11439.06	*10336.06 *
* Top Width (ft) 702.65 *	* 1320. 25	* Top Width (ft)	* 478.37	* 139. 23 *
* Vel Total (ft/s) 0.95 *	* 2.61	* Avg. Vel. (ft/s)	* 2.93	* 5.14 *
* Max Chl Dpth (ft) 5.41 *	* 14.72	* Hydr. Depth (ft)	* 8. 17	* 14.44 *
* Conv. Total (cfs)	*1739423.0	* Conv. (cfs)	*783360.3	*707826.0
*248236.3 * * Length Wtd. (ft)	* 815.34	* Wetted Per. (ft)	* 480.02	* 139.34 *
703.11 * * Min Ch El (ft)	* 163.83	* Shear (Ib/sq ft)	* 0.11	* 0.19 *
* Al pha	* 2.16	* Stream Power (lb/ft s)	* 0.32	* 0.99 *
* Frctn Loss (ft)	* 0.13	* Cum Volume (acre-ft)	* 480. 90	* 152.86 *
904.75 * * C & E Loss (ft) 20.12 *	* 0.03	* Cum SA (acres)	* 8. 13	* 3.05 *
*****	*****	*******	*****	*****
*****				

Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION

3. 21 \*

RIVER: RIVER-2 REACH: Reach-1

REACH: Reach-1 RS: 190

I NPUT

Description: SIDE CHANNEL XS 190 ( LETTERED CROSS SECTION T)THE CHANNEL Page 135

ROUGHNESS IS ESSENTIALLY THE SAME AS OB SINCE IT IS NOT NATURAL 487 Station Elevation Data num= , Sta El ev \*\*\*\*\*\* Sta Sta El ev El ev Sta Sta El ev Elev 174. 574. 474503 174. 568. 949005 174.57 174. 5713. 42351 174. 5617. 89801 22. 37251 174. 5131. 32152 174. 5335. 79602 174. 5340. 27052 174. 5326. 84702 174.52 174. 453. 69403 173. 793. 96455 174. 2958. 16853 173. 5298. 43906 44.74503 174. 4849. 21953 174. 271. 59204 173.96 173. 7885. 01555 173. 44125. 2861 80.54105 172.9 171.98 129.7606 172. 79134. 2351 172. 6138. 7096 172. 39143. 1841 172. 19147. 6586 172. 6138. 7096 171. 34170. 0311 168. 6214. 7761 165. 97237. 1486 163. 3259. 5211 164. 83299. 7917 164. 52322. 1642 172. 39143. 1641 170. 88178. 9801 168. 29219. 2506 164. 82241. 6231 163. 9263. 9957 164. 83304. 2662 152. 1331 205. 8271 171. 78161. 0821 168. 89210. 3016 170. 38183. 4546 167. 99223. 7251 170.14 167.47 163. 43246. 0976 164. 12272. 9447 164. 81308. 7407 164. 31331. 1132 228. 1996 250. 5721 166. 78232. 6741 161. 91255. 0466 161. 83 164. 58 277. 4192 313. 2152 164. 8281. 8937 164. 63317. 6897 164. 74 164. 42326. 6387 164. 2 163. 98344. 5367 163. 83366. 9092 163. 83389. 2817 163. 87349. 0112 335. 5877 163. 83353. 4857 164.09340.0622 163.83 163. 83371. 3837 163. 83393. 7562 163. 83375. 8582 357.9602 163. 83362. 4347 163.83 163. 83375. 8582 163. 83398. 2307 163. 7420. 6032 163. 31442. 9758 162. 94465. 3483 162. 83487. 7208 162. 83510. 0933 163. 83384. 8072 380. 3327 163.83 402. 7052 425. 0778 447. 4503 469. 8228 163. 83407. 1797 163. 55429. 5522 163. 16451. 9248 162. 83474. 2973 163. 78416. 1288 163. 39438. 5013 163. 83411. 6542 163.62 163. 47434. 0268 163. 09456. 3993 162. 83478. 7718 162. 83501. 1443 163.24 163. 01460. 8738 162. 83483. 2463 162. 86 162. 83 162. 83496. 6698 162. 83519. 0423 162. 83505. 6188 162. 83527. 9913 492. 1953 162.83 514. 5678 162. 83523. 5168 162. 83532. 4658 162.83 536.9403 162. 83541. 4148 162. 93545. 8893 163.07550.3638 163. 2554. 8383 163.34 163. 2554. 8383 163. 88577. 2108 164. 6599. 5834 165. 05621. 9559 165. 38644. 3284 165. 7666. 7009 168. 72689. 0734 167. 84778. 5635 168. 55 800. 936 163. 47563. 7874 164. 2586. 1599 163. 74572. 7363 164. 46595. 1088 559. 3128 163. 61568. 2618 164.04 163. 61568. 2618 164. 34590. 6343 164. 91613. 0068 165. 24635. 3794 165. 57657. 7519 167. 06680. 1244 167. 83769. 6144 168. 12791. 9869 581.6854 164.73 164. 2586. 1599 164. 85608. 5323 165. 18630. 9048 165. 5653. 2774 165. 91675. 6499 169. 83702. 4969 167. 98787. 5125 164. 98617. 4814 165. 31639. 8539 604.0579 165.11 626. 4304 165.44 648. 8029 671. 1754 693. 5479 165. 63662. 2264 167. 87684. 5989 167. 83774. 0889 168. 34796. 4615 165. 77 169. 59 167.88 783.038 168.77 168. 54 819. 19 168. 57 814. 19 804.2 168.43 809. 2 168. 6 832. 79 168.71 819. 19 855. 74 888. 53 911. 48 931. 15 954. 1 973. 77 996. 72 168. 7 168. 96 169. 15 169. 11 169. 13 849. 18 881. 97 904. 92 924. 59 168. 75 168. 87 168. 68 169. 03 168. 68 169. 03 842.62 845.9 334.02 891.8 169.12 914.76 169.21 937.71 169.1 960 47 859.02 168.72 865. 58 878.69 169.06 168. 87 878. 69 169. 08 901. 64 169. 18 921. 31 169. 19 947. 54 169. 14 967. 21 169. 13 986. 89 169. 34 1013. 12 901. 64 921. 31 947. 54 967. 21 169. 16 169. 13 169. 07 169. 08 895.08 169.14 918. 03 940. 98 963. 94 169.24 169. 1 960. 66 169. 14 977. 05 169. 15 1006. 56 950. 82 970. 49 169.12 169. 07 169. 08 973. 77 169. 1 169. 1 169. 1 169. 32 169. 32 1039. 35 169. 29 1059. 02 169. 39 1078. 69 169. 6 1114. 76 169. 59 1134. 43 169. 68 1154. 1 169. 85 1177. 05 169. 97 1206. 56 170 1229. 51 170. 27 1255. 74 170. 78 1291. 81 171. 14 1314. 76 171. 39 1331. 15 171. 79 1357. 38 172. 06 1377. 05 172. 45 1396. 73 169. 13 169. 1 990. 17 169. 36 1016. 39 983.61 169. 26 169. 45 1026. 23 1009.84 169.43 169. 34 1013. 12 169. 37 1032. 79 169. 22 1049. 18 169. 35 1068. 85 169. 36 1088. 53 169. 46 1104. 92 169. 67 1124. 59 169. 49 1144. 26 169. 79 1163. 94 169. 33 1036. 07 169. 26 1055. 74 169. 4 1072. 13 169. 42 1091. 81 169. 55 1108. 2 169. 61 1127. 87 169. 6 1147. 54 169. 85 1167. 22 169. 93 1203. 28 169. 97 1226. 23 170. 19 1252. 46 170. 54 1272. 13 170. 83 1288. 53 171. 06 1308. 2 171. 38 1327. 87 171. 69 1350. 82 172. 05 1373. 78 169. 28 1042. 62
169. 33 1062. 3
169. 34 1081. 97
169. 38 1098. 36
169. 68 1118. 03
169. 46 1137. 71
169. 76 1157. 38
169. 88 1180. 33
170. 03 1209. 84
170. 04 1236. 07
170. 3 1259. 02
170. 7 1278. 69
170. 8 1295. 09
171. 25 1318. 04
171. 49 1334. 43
171. 85 1363. 94
172. 13 1383. 61 169. 33 1036. 07 169. 28 1042. 62 1029.51 169.23 169.33 1045.9 1065. 58 169.34 1085.25 169.41 1101.64 169.67 1121. 31 1140. 99 169.44 169. 79 1160.66 169.88 1193. 45 1200 169. 92 170.03 1216. 4 1213.12 170.01 170. 1 170. 13 1249. 18 170. 43 1268. 86 170. 79 1285. 25 170.36 1242.63 1242. 63 1262. 3 1281. 97 1298. 36 1321. 32 1337. 71 1367. 22 170.77 170.91 171. 04 1301. 64 171. 35 1324. 59 171. 62 1344. 27 171.29 171. 57 172. 06 171. 65 1303. 74 172. 13 1383. 61 172. 5 1400. 01 172. 87 1419. 68 172.08 1370.5 172.05 1373.78 172.35 1386.89 172.44 1390.17 172. 48 1393. 45 172. 45 1396. 73 172.58 172. 76 1413. 12 172. 67 1409. 84 1403.28 172.64 1406.56 173 173. 02 1429. 51 173. 52 1445. 91 173. 07 1432. 79 173. 54 1449. 19 173.03 1426.23 173. 15 1436. 07 173.21 1422.96 173. 38 1442. 63 173. 58 1455. 74 1439.35 173.77

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Existing - 34R LOMR
                                                                      173. 81 1465. 58
173. 98 1485. 25
174. 2 1514. 76
174. 24 1534. 43
174. 26 1550. 83
174. 51 1573. 78
                           173. 81 1462. 3
173. 99 1481. 97
174. 19 1511. 48
174. 25 1531. 15
174. 26 1547. 55
174. 43 1570. 5
                                                                                                                       173. 82 1468. 86 173. 85 1475. 42
   1459.02
                                                                                                                                                                                                                    173.97
                                                                                                                       174. 03 1491. 81
                                                                                                                                                                     174.08 1498.37
                                                                                                                                                                                                                     174. 1
   1478.69
  1504. 92
1527. 88
1544. 27
1567. 22
                                                                                                                       174. 21 1518. 04
174. 25 1537. 71
174. 3 1557. 38
174. 64 1577. 06
                                                                                                                                                                     174. 2 1524. 6
174. 28 1540. 99
174. 4 1563. 94
174. 74 1580. 33
                                                                                                                                                                                                                    174. 22
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                                                                                                                                                                                                                     174.37
                                                                                                                      174. 64 1577. 06
174. 83 1596. 73
174. 9 1616. 4
175. 08 1632. 79
175. 46 1649. 19
175. 96 1672. 14
176. 03 1688. 53
176. 14 1708. 2
176. 41 1727. 88
176. 78 1744. 27
177. 08 1760. 66
177. 2 1777. 06
177. 45 1796. 73
177. 78 1816. 4
177. 98 1839. 35
178. 24 1855. 75
178. 69 1875. 42
179. 26 1891. 81
179. 48 1911. 49
179. 85 1931. 16
                                                                                                                                                                                                                     174.78
                                                                                                                                                                      174. 92 1600. 01
174. 9 1619. 68
                            174. 79 1590. 17
174. 95 1609. 84
                                                                           174. 79 1593. 45
   1583.61
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                                                                         174. 79 1593. 45
174. 89 1613. 12
175. 04 1629. 52
175. 42 1645. 91
175. 91 1668. 86
175. 98 1685. 25
176. 16 1704. 93
176. 32 1724. 6
176. 74 1740. 99
   1603.29
                                                                                                                                                                                                                     174.92
  1622. 96
1639. 35
1659. 02
                           174. 97 1626. 24

175. 3 1642. 63

175. 75 1665. 58

175. 95 1681. 98

176. 1 1698. 37

176. 29 1721. 32

176. 64 1737. 71

177 1754. 11

177. 13 1770. 5

177. 32 1790. 17

177. 64 1809. 84

177. 85 1832. 8

178. 21 1849. 19

178. 38 1868. 86

179. 1 1885. 26

179. 39 1904. 93

179. 7 1924. 6
                             174. 97 1626. 24
                                                                                                                                                                    175. 08 1636. 07
175. 48 1652. 47
175. 96 1675. 42
176. 06 1691. 81
176. 18 1714. 76
176. 46 1731. 16
176. 87 1747. 55
177. 11 1763. 94
177. 26 1780. 34
177. 49 1800. 01
177. 8 1819. 68
178. 05 1842. 63
178. 26 1859. 03
178. 82 1878. 7
179. 25 1895. 09
179. 55 1914. 76
179. 93 1937. 72
                                                                                                                                                                       175.08 1636.07
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  1678. 7
1695. 09
1718. 04
1734. 43
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                                                                                                                                                                                                                     176.97
                                                                         176. 74 1740. 99
177. 01 1757. 39
177. 12 1773. 78
177. 39 1793. 45
177. 72 1813. 12
177. 93 1836. 07
178. 25 1852. 47
178. 58 1872. 14
179. 23 1888. 53
179. 43 1908. 21
   1750.83
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   1767. 22
   1783.62
                                                                                                                                                                                                                     177.52
   1806.57
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  1806. 37
1822. 96
1845. 91
1862. 3
1881. 98
1898. 37
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                             179. 7 1924. 6
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   1918.04
                                                                         179. 76 1927. 88
180. 16 1950. 83
180. 61 1967. 22
181. 16 1990. 17
181. 66 2013. 13
182. 31 2039. 36
182. 99 2062. 31
183. 68 2085. 26
184. 4 2104. 93
185. 22 2121. 32
186. 27 2144. 27
187. 5 2173. 78
188. 49 2200. 01
189. 34 2216. 4
                                                                           179.76 1927.88
                                                                                                                        179. 85 1931. 16

      179. 85
      1931. 16
      179. 93
      1937. 72

      180. 25
      1954. 11
      180. 31
      1957. 39

      180. 75
      1970. 5
      180. 84
      1973. 78

      181. 32
      1996. 73
      181. 5
      2000. 01

      181. 85
      2019. 68
      181. 92
      2029. 52

      182. 48
      2042. 63
      182. 61
      2045. 91

      183. 09
      2068. 86
      183. 34
      2072. 14

      183. 75
      2088. 54
      183. 84
      2091. 81

      184. 69
      2108. 21
      184. 81
      2111. 49

      185. 39
      2127. 88
      185. 63
      2131. 16

      186. 4
      2147. 55
      186. 52
      2150. 83

      187. 62
      2180. 34
      187. 94
      2183. 62

      188. 79
      2203. 29
      188. 92
      2206. 57

      189. 41
      2219. 68
      189. 51
      2222. 96

                                                                                                                                                                                                                     180.06
                            180. 09 1947. 55
180. 48 1963. 95
   1944.27
                                                                                                                                                                                                                     180.38
   1960.67
                                                                                                                                                                                                                     180.89
                            180. 48 1963. 95
181. 06 1983. 62
181. 58 2006. 57
182. 21 2036. 08
182. 77 2055. 75
183. 5 2081. 98
184. 18 2098. 37
   1980. 34
2003. 29
                                                                                                                                                                                                                     181.56
                                                                                                                                                                                                                     182.13
   2032. 8
2049. 19
                                                                                                                                                                                                                     182.71
                                                                                                                                                                                                                     183.43
   2075. 42
2095. 09
                                                                                                                                                                                                                     183.99
                                                                                                                                                                                                                     184. 9
                            185. 04 2118. 04
185. 98 2140. 99
   2114.77
                                                                                                                                                                                                                    185.79
   2134.44
                                                                                                                                                                                                                     186.66
   2160.67
                             187. 11
                                                 2170. 5
                                                                                                                                                                                                                     188.07
                            188. 36 2193. 45
189. 23 2213. 12
189. 91 2232. 8
   2190. 17
2209. 85
                                                                                                                                                                                                                     189.06
                                                                                                                                                                                                                    189.63
   2229.52
                                                                           190.06
Manning's n Values
 num=
                            . 03407. 1797 . 025599. 5834 . 1
Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 407. 1797599. 5834 1760 1760 1760 .1 .3
CROSS SECTION OUTPUT Profile #1%
                                                                                                **********
                                                   * 174.81
 * E.G. Elev (ft)
                                                                                                       * Element
                                                                                                                                                                               * Left OB *
                                                                                                                                                                                                                       Channel *
Right OB *
                                                             * 0.17 * Wt. n-Val.
     Vel Head (ft)
                                                                                                                                                                                          0.030 *
                                                                                                                                                                                                                          0.025
 0.100 *
* W.S. Elev (ft)
                                                                   * 174.63 * Reach Len. (ft)
                                                                                                                                                                            * 1760.00
                                                                                                                                                                                                               * 1760.00
1760.00 *
* Cri t W.S. (ft)
                                                                                                                                                                               * 2393.40
                                                                                                       * Flow Area (sq ft)
                                                                                                                                                                                                               * 2181.83
4525.18 *
* E.G. Slope (ft/ft) *0.000199 * Area (sq ft)
                                                                                                                                                                               * 2393.40
                                                                                                                                                                                                               * 2181.83
4525. 18 *
* Q Total (cfs)
2638. 58 *
                                                   *17300.00 * Flow (cfs)
                                                                                                                                                                               * 5432.94 * 9228.49
```

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Existing - 34R LOMR
                       * 1573.58 * Top Width (ft)
* Top Width (ft)
                                                            407. 18
                                                                      192. 40
 973. 99
 Vel Total (ft/s)
                            1.90 * Avg. Vel. (ft/s)
                                                              2.27
                                                                        4. 23
  0.58
 Max Chl Dpth (ft)
                                 * Hydr. Depth (ft)
                           12.80
                                                              5.88
                                                                       11.34
  4. 65
* Conv. Total (cfs)
                       *1226894.0 * Conv. (cfs)
                                                          *385296.8
                                                                     *654472.4
*187124.6
* Length Wtd. (ft)
                       * 1760.00
                                  * Wetted Per. (ft)
                                                            408.47
                                                                       192.44
 974. 73 *
* Min Ch El (ft)
                          162.83
                                  * Shear (lb/sq ft)
                                                              0.07
                                                                        0.14
  0.06
                            3. 10
                                  * Stream Power (lb/ft s) *
                                                              0.17
                                                                        0.60
 Al pha
  0.03
                            0.22
 Frctn Loss (ft)
                                  * Cum Volume (acre-ft)
                                                            280.43
                                                                       84. 52
 512.89 *
* C & E Loss (ft)
                            0.05
                                 * Cum SA (acres)
*************************
Warning: The cross-section end points had to be extended vertically for the computed
water surface.
CROSS SECTION OUTPUT Profile #Floodway
*****
* E.G. Elev (ft)
Right OB *
                       * 175.47 * Element
                                                            Left OB *
                                                                      Channel *
                                  * Wt. n-Val.
                                                             0.030
                                                                       0.025
 Vel Head (ft)
                            0.13
  0.100
* W.S. Elev (ft)
                          175. 34
                                  * Reach Len. (ft)
                                                         * 1760.00
                                                                    * 1760.00
1760.00
* Crit W.S. (ft)
                                  * Flow Area (sq ft)
                                                          * 2636.53
                                                                    * 2318.32
4863.35
* E.G. Slope (ft/ft)
                       *0.000139
                                 * Area (sq ft)
                                                          * 2636.53
                                                                    * 2318.32
4863. 35
* Q Total (cfs)
                       *17300.00
                                 * Flow (cfs)
                                                          * 5865.16
                                                                    * 8535.37
2899. 47
 Top Width (ft)
                                 * Top Width (ft)
                       * 1315.00
                                                            352. 18
                                                                      192. 40
 770. 42
 Vel Total (ft/s)
                           1. 76
                                  * Avg. Vel. (ft/s)
                                                              2.22
                                                                        3.68
  0.60
 Max Chl Dpth (ft)
                           13. 51
                                  * Hydr. Depth (ft)
                                                              7.49
                                                                       12.05
  6. 31
* Conv. Total (cfs)
                       *1467692.0
                                  * Conv. (cfs)
                                                          *497586.6
                                                                     *724121.2
*245983.9
 Length Wtd. (ft)
                       * 1760.00
                                  * Wetted Per. (ft)
                                                            354.48
                                                                      192.44
 774. 41
                                  * Shear (lb/sq ft)
* Min Ch El (ft)
                          162.83
                                                              0.06
                                                                        0. 10
  0.05
                            2.71
                                  * Stream Power (lb/ft s) *
 Al pha
                                                              0. 14
                                                                        0.38
  0.03
* Frctn Loss (ft)
                            0. 17
                                 * Cum Volume (acre-ft)
                                                            221. 43
                                                                       88. 78
 507.71
                            0.04 * Cum SA (acres)
* C & E Loss (ft)
CROSS SECTION OUTPUT Profile #10%
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169. 60
* E.G. Elev (ft)
                                    * Element
                                                                  Left OB *
                                                                              Channel *
Right OB *
 Vel Head (ft)
                               0. 18
                                    * Wt. n-Val.
                                                                    0.030
                                                                               0.025
  0.100
* W.S. Elev (ft)
                                     * Reach Len. (ft)
                                                                * 1760.00
                             169. 42
                                                                           * 1760.00
1760.00
 Crit W.S. (ft)
                                      * Flow Area (sq ft)
                                                                   977.89
                                                                           * 1179.42
 575. 57
* E.G. Slope (ft/ft)
                          *0.000381
                                     * Area (sq ft)
                                                                   977.89
                                                                           * 1179.42
 575. 57
* Q Total (cfs)
                          * 7480.00
                                     * Flow (cfs)
                                                                * 2618.66
                                                                           * 4580.48
 280.85
* Top Width (ft)
                             887.38
                                      * Top Width (ft)
                                                                   210.87
                                                                              192.40
 484. 10 *
                               2.74
                                     * Avg. Vel. (ft/s)
* Vel Total (ft/s)
                                                                     2.68
                                                                                3.88
   0.49
 Max Chl Dpth (ft)
                               7.59
                                     * Hydr. Depth (ft)
                                                                     4.64
                                                                                6.13
   1. 19
* Conv. Total (cfs)
                          *383379.6
                                     * Conv. (cfs)
                                                                *134216.8
                                                                           *234767.8
14394. 9
 Length Wtd. (ft) 484.71 *
                          * 1760.00
                                     * Wetted Per. (ft)
                                                                   212.00
                                                                              192.44
                                     * Shear (lb/sq ft)
* Min Ch El (ft)
                             162.83
                                                                     0.11
                                                                                0. 15
   0.03
                               1.57
 Al pha
                                     * Stream Power (lb/ft s) *
                                                                     0.29
                                                                                0.57
   0.01
* Frctn Loss (ft)
                               0.43
                                     * Cum Volume (acre-ft)
                                                                   125.58
                                                                               53. 18
 221. 92
* C & E Loss (ft)
                               0.05
                                     * Cum SA (acres)
Warning: Divided flow computed for this cross-section.
CROSS SECTION OUTPUT Profile #2%
                                    ***********
* E.G. Elev (ft)
Right OB *
                             173.24 * Element
                                                                  Left OB *
                                                                              Channel *
 Vel Head (ft)
                              0. 18
                                     * Wt. n-Val.
                                                                   0.030
                                                                               0.025
 0.100
* W.S. Elev (ft)
                             173.06
                                     * Reach Len. (ft)
                                                                * 1760.00
                                                                           * 1760.00
1760.00 *
* Crit W.S. (ft)
                                      * Flow Area (sq ft)
                                                                * 1871.27
                                                                           * 1879.44
3133. 97
                                     * Area (sq ft)
* E.G. Slope (ft/ft)
                          *0.000231
                                                                * 1871.27
                                                                           * 1879.44
3133. 97
* 0 Total (cfs)
                          *14350.00
                                     * Flow (cfs)
                                                                * 4872.53
                                                                           * 7760.55
1716. 93
* Top Width (ft)
                          * 1311.56
                                     * Top Width (ft)
                                                                   289.86
                                                                              192.40
 829. 29 *
* Vel Total (ft/s)
                               2.08
                                     * Avg. Vel. (ft/s)
                                                                     2.60
                                                                                4.13
   0.55
 Max Chl Dpth (ft)
                                     * Hydr. Depth (ft)
                              11. 23
                                                                     6.46
                                                                                9.77
   3.78
* Conv. Total (cfs)
*112918.2 *
                          *943766.7
                                     * Conv. (cfs)
                                                                *320455.1
                                                                           *510393.4
 Length Wtd. (ft)
                          * 1760.00
                                     * Wetted Per. (ft)
                                                                   291.07
                                                                              192.44
 830. 01
* Min Ch El (ft)
                            162.83
                                      * Shear (lb/sq ft)
                                                                     0.09
                                                                                0.14
   0.05
* Al pha
                               2.66
                                     * Stream Power (lb/ft s) *
                                                                                0.58
                                                                     0. 24
```

**Frctn Loss (ft)	
* C & E Loss (ft)	** * * * * *
********  CROSS SECTION OUTPUT Profile #0.2%  ************  * E. G. Elev (ft)	* * * * * *
**************************************	* * *
* E.G. Elev (ft)	*
Ri ght 0B *  * Vel Head (ft)	*
0.100 *  * W.S. Elev (ft)	*
* Crit W.S. (ft)	
* E. G. Slope (ft/ft) *0.000109 * Area (sq ft) * 3964.85 * 2924.38	*
	*
8877. 46 * * 0 Total (cfs)	
5033.09 * * Top Width (ft)	*
1266.37 * * Vel_Total (ft/s) * 1.61 * Avg. Vel. (ft/s) * 2.33 * 3.80	*
0.57 * * Max Chl Dpth (ft)	*
7. 01 *  * Conv. Total (cfs) *2437383.0 * Conv. (cfs) *888024.7 *1066383.0  *482975.1 *	0
* Length Wtd. (ft)	*
* Min Ch El (ft)	*
* Alpha * 3.22 * Stream Power (lb/ft s) * 0.15 * 0.39 0.03 *	*
* Frctn Loss (ft)	*
* C & E Loss (ft)	*
**************************************	**
Warning: The cross-section end points had to be extended vertically for the compute water surface.	ed
******************	
SUMMARY OF MANNING'S N VALUES	
Ri ver: RI VER-1 ************************************	**
* Reach * River Sta. * n1 * n2 * n3 * n4 * n5	
* ************************************	**
* *Reach-1 * 350 * .1* .045* .1* *	
* *Reach-1	
*Reach-1 * 331.6 * .1* .045* .1* * Page 140	

*			Ū					
*Reach-1	*	320	*	. 1*	. 045*	. 1*	*	
*Reach-1	*	314. 4	*	. 1*	. 045*	. 1*	*	
*Reach-1	*	300	*	. 1*	. 045*	. 1*	*	
*Reach-1	*	285	*	. 1*	. 045*	. 1*	*	
*Reach-1	*	280. 55	*	. 1*	. 045*	. 1*	*	
*Reach-1	*	270	*	. 1*	. 045*	. 1*	*	
*Reach-1	*	264	*	. 1*	. 045*	. 1*	*	
*Reach-1	*	250. 12	*	. 07*	. 045*	. 07*	*	
*Reach-1 *Reach-1	*	250. 06 250	*Bri dge *	. 07*	. 045*	* . 07*	*	*
*Reach-1	*	246	*	. 07*	. 045*	. 07*	*	
*Reach-1	*	245	*	. 07*	. 045*	. 07*	*	
*Reach-1 *Reach-1	*	244. 19 243. 38	*Bri dge *	. 07*	. 045*	* . 07*	*	*
*Reach-1	*	243. 2	*	. 07*	. 045*	. 07*	*	
*Reach-1	*	243	*	. 07*	. 045*	. 07*	*	
*Reach-1	*	190	*	. 1*	. 045*	. 1*	*	
*Reach-1 . 1*	*	182	*	. 1*	. 045*	. 03*	. 025*	
*Reach-2	*	180	*	. 1*	. 045*	. 1*	*	
*Reach-2	*	170	*	. 1*	. 045*	. 1*	*	
*****	****	*****	*****	*****	*****	*****	*****	****

Ri ver: RI VER-2

*****	*****	*********	*****	******	******	*****
* Reach	*	Ri ver Sta.	*	n1 *	n2 *	n3 *
*****	******	*********	****	******	*****	*****
*Reach-1	*	250. 12	*	. 03*	. 025*	. 07*
*Reach-1	*	225	*	. 03*	. 025*	. 07*
*Reach-1	*	200	*	. 03*	. 025*	. 07*
*Reach-1	*	190	*	. 03*	. 025*	. 1*
*********	******	**********	****	********	*******	·*******

\*

## SUMMARY OF REACH LENGTHS

River: RIVER-1

*****	*****	*****	*****	*****	******	*****
* Reach	* *****	Ri ver Sta.				
*Reach-1	*	350	*	505*	505*	505*
*Reach-1	*	344. 95	*	700*	1400*	1400*
*Reach-1	*	331. 6	*	980*	980*	980*
				Page 141		

			Exi st	ina - 34R	LOMR	
*Reach-1	*	320	*	860*	860*	550*
*Reach-1	*	314. 4	*	600*	1120*	600*
*Reach-1	*	300	*	1000*	1840*	1840*
*Reach-1	*	285	*	220*	295*	320*
*Reach-1	*	280. 55	*	1140*	1140*	1140*
*Reach-1	*	270	*	515*	515*	515*
*Reach-1	*	264	*	1330*	1300*	1000*
*Reach-1	*	250. 12	*	620*	620*	620*
*Reach-1	*	250.06	*Br	i dge *	*	*
*Reach-1	*	250	*	10*	13*	35*
*Reach-1	*	246	*	5*	10*	35*
*Reach-1	*	245	*	230*	230*	230*
*Reach-1	*	244. 19	*Br	i dge *	*	*
*Reach-1	*	243. 38	*	585*	585*	585*
*Reach-1	*	243. 2	*	760*	760*	200*
*Reach-1	*	243	*	4920*	3930*	1480*
*Reach-1	*	190	*	735*	735*	735*
*Reach-1	*	182	*	635*	635*	635*
*Reach-2	*	180	*	700*	700*	700*
*Reach-2	*	170	*	0*	0*	0*
*****	****	*****	*****	*****	*****	*****

Ri ver: RI VER-2	_	****	*****	*****	*****	****
* Reach	*			eft * Ch		Ri ght *
*Reach-1	*	250. 12	*	515*	515*	515*
*Reach-1	*	225	*	460*	460*	460*
*Reach-1	*	200	*	800*	*008	890*
*Reach-1 ******	*	190	* *****	1760*	1760*	1760*

\*

# SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS River: RIVER-1

*****	****	*****	*****	*****	*****
* Reach ******	* ****	River St	a. * Co	ontr.	* Expan. *
*Reach-1	*	350	*	. 1*	. 3*
*Reach-1	*	344. 95	*	. 1*	. 3*
*Reach-1	*	331. 6	*	. 1*	. 3*
*Reach-1	*	320	*	. 1*	. 3*
*Reach-1	*	314. 4	*	. 1*	. 3*
*Reach-1	*	300	*	. 1*	. 3*
*Reach-1	*	285	*	. 1*	. 3*
*Reach-1	*	280. 55	*	. 1*	. 3*
*Reach-1	*	270	*	. 1*	. 3*
*Reach-1	*	264	*	. 1*	. 3*
*Reach-1	*	250. 12	*	. 3*	. 5*
*Reach-1	*	250.06	*Bri dge	*	*
*Reach-1	*	250	*	. 3*	. 5*
*Reach-1	*	246	*	. 3*	. 5*
*Reach-1	*	245	*	. 3*	. 5*
*Reach-1	*	244. 19	*Bri dge	*	*
*Reach-1	*	243.38	*	. 3*	. 5*
*Reach-1	*	243. 2	*	. 1*	. 3*
*Reach-1	*	243	*	. 1*	. 3*
*Reach-1	*	190	*	. 1*	. 3*
*Reach-1	*	182	*	. 1*	. 3*
*Reach-2	*	180	*	. 1*	. 3*
*Reach-2	*	170	*	. 1*	. 3*
				Page 1	142

River: RIVER-2 Ri ver Sta. \* Contr. \* Expan. \*Reach-1 250. 12 \* . 1\* . 3\* . 1\* 225 \*Reach-1 . 3\* . 1\* \*Reach-1 200 190 Profile Output Table - Standard Table 1 \*\*\*\*\*\*\*\*\*\*\* Froude # Chl \* (ft) \* (cfs) \* (ft) \* (ft) \* (ft/ft) \* (ft/s) \* (sq ft) \* \* RI VER-2 175. 14 \* 0.31 \* \* RI VER-2 175. 55 \* 0.41 \* \* RI VER-2 170. 45 \* 0.45 \* \* 14350.00 \* 164.83 \* 5.76 \* 4163.39 \* 741.10 \* \* RIVER-2 173. 68 \* 0.35 \* \* 25400.00 \* 164.83 \* 5.52 \* 8101.73 \* 824.79 \* \* RI VER-2 178.73 \* 0. 26 \* \* 1% \* 17300.00 \* 163.83 \* 5.76 \* 5134.33 \* 1037.90 \* \* Reach-1 \* 225 \* RI VER-2 0.000413 \* 174. 91 \* 0.31 \* \* 225 175. 83 \* \* FI oodway \* 17300.00 \* 163.83 \* 15 \* 5.15 \* 4659.16 \* 510.00 \* \* RI VER-2 \* Reach-1 175.54 \* 0.000305 \* 0.27 \* \* 7480.00 \* 163.83 \* 5.18 \* 1933.74 \* 450.89 \* \* RI VER-2 \* Reach-1 \* 225 \* 10% \* 170.35 \* 0.000775 \* 170.04 \* 0.39 \* \* RI VER-2 \* 14350.00 \* 163.83 \* 5.74 \* 3835.78 \* 767.30 \* 173. 77 \* 0.000504 \* 173. 42 \* 0.34 \* \* 25400.00 \* 163.83 \* 5.25 \* 9585.54 \* 1314.27 \* \* RI VER-2 \* Reach-1 \* 225 \* 0.2% \* 178.89 \* 0.000228 \* 178.65 \* 0. 25 \* \* 17300.00 \* 163.83 \* 5.33 \* 5477.21 \* 911.39 \* \* 1% 0. 000343 \* \* Reach-1 \* 200 \* RI VER-2 \* 175.06 \* 174. 78 \* Page 143

0 20 *		E	xisting -	34K LUWK		
0. 29 * * RI VER-2 175. 41 *	* Reach-1	* 200 175. 69 *	* 0. 000286	FI oodway * * 5.06	17300. 00 * * 4443. 31 *	163.83 * 465.00 *
0. 27 * * RI VER-2 169. 77 * 0. 34 *	* Reach-1	* 200 170. 01 *	* 0. 000588	10% * * 4.57	7480. 00 * * 2187. 73 *	163. 83 * 494. 82 *
* RI VER-2 173. 24 * 0. 31 *	* Reach-1	* 200 173. 54 *	* 0. 000422	2% * * 5. 33	14350.00 * * 4184.79 *	163. 83 * 753. 80 *
* RI VER-2 178. 55 * 0 24 *	*	178. 78 *	0. 000213	* 5.14	25400.00 * * 9716.10 *	163. 83 * 1320. 25 *
*	*	*	*	*	*	*
* RI VER-2 174. 63 * 0. 22 *	* Reach-1	* 190 174. 81 *	* 0. 000199	1% * 4. 23	17300. 00 * * 9100. 40 *	162. 83 * 1573. 58 *
* RI VER-2 175. 34 * 0. 19 *	* Reach-1	* 190 175. 47 *	* 0. 000139	FI oodway * * 3.68	17300. 00 * * 9818. 19 *	162.83 * 1315.00 *
* RI VER-2 169. 42 * 0. 28 *	* Reach-1	* 190 169. 60 *	v 0. 000381	10% * * 3.88	7480.00 * * 2732.88 *	162.83 * 887.38 *
* RI VER-2 173. 06 * 0. 23 *					14350.00 * * 6884.68 *	
* RI VER-2 178. 49 * 0. 17 *					25400. 00 * * 15766. 68 *	
*	*	*	*	*	*	*
* RI VER-1 181. 46 * 0. 28 *	* Reach-1	* 350 181. 92 *	o. 000898	1% * 6. 42	17700. 00 * * 6312. 63 *	160.00 * 1094.81 *
* RI VER-1 181. 80 * 0. 29 *	*		0. 000980	* 6.80	17700.00 * * 4413.49 *	440.00 *
* RI VER-1 177. 59 * 0. 26 *					8780.00 * * 2769.64 *	
* RI VER-1 180. 42 * 0. 28 *	* Reach-1	* 350 180. 88 *	* 0. 000924	2% * 6. 24	15000. 00 * * 5207. 48 *	160.00 * 1034.56 *
* RI VER-1 184. 17 * 0. 27 *	* Reach-1	* 350 184. 60 *	0. 000812	0. 2% * * 6. 75	25700. 00 * * 9489. 20 *	160. 00 * 1251. 96 *
* * *	*	*	*	*	*	*
* RI VER-1 181. 29 * 0. 20 *	* Reach-1	* 344. 181. 51 *	95 * 0. 000440	1% * * 4. 96	17700. 00 * * 9113. 30 *	159. 00 * 1196. 15 *
* RI VER-1 181. 71 * 0. 19 *	* Reach-1	* 344. 181. 91 *	95 * 0. 000391	FI oodway * * 4.74	17700.00 * * 8567.00 *	159. 00 * 850. 00 *
* RI VER-1 177. 43 * 0. 17 *	* Reach-1		0.000366	* 3. 90	8780.00 * * 4944.21 *	901.34 *
* RI VER-1 180. 26 *	* Reach-1	* 344. 180. 47 *	95 * 0. 000435 Page	2% * * 4. 75	15000. 00 * * 7889. 68 *	159. 00 * 1167. 15 *

```
0.20 *
                                                   * 25700.00 * 159.00 *
* RIVER-1
              183. 99 *
                      184. 22 * 0. 000442 * 5. 42 * 12448. 04 *
                                                                     1271.81 *
  0. 20 *
    *
              * 17700.00 * 159.60 * 7.43 * 5759.62 * 906.87
* RIVER-1
                       180. 67 * 0. 001100 *
180. 11 *
   0.31 *
                                         * Floodway * 17700.00 *     159.60 *
/3 *     6.78 *   6262.90 *     840.00
* RI VER-1
                           * 331.6
              * Reach-1
                        181. 20 * 0. 000873 *
180. 75 *
                                                                     840.00 *
    0.28 *
                                                 * 8780.00 * 159.60 * 5.86 * 2918.25 * 629.93
* RI VER-1
                          * 331.6
                                      * 10%
               Reach-1
176. 43 *
                       176.86 * 0.000932 *
                                                                       629.93 *
    0.27 *
* RI VER-1
              * Reach-1 * 331.6
                                                   * 15000.00 * 159.60 *
                                         * 2%
                       179.62 * 0.001100 *
                                                         4854.63 *
179. 07 *
                                                  7.14 *
   0.31 *
                                      * 0.2%
                                                                   159. 60 *
* RI VER-1
              * Reach-1 * 331.6
                                                   * 25700.00 *
                                                  7. 74 * 8383. 11 *
182. 93 *
                       183. 45 * 0. 000981 *
                                                                     954.88 *
  0.30 *
                                                 4. 88 * 10026. 93 * 159. 40 * 1920 84
* RIVER-1
                           * 320
                                          * 1%
              * Reach-1
                       179.77 *
                                   0.000519 *
                                                                     1920.86 *
179. 56 *
    0.21 *
                         * 320
                                          * Floodway * 17700.00 * 159.40 *
* RIVER-1
              * Reach-1
                        180. 43 *
                                   0.000615 *
                                                 5. 43 * 6275. 93 * 600. 00 *
180. 12 *
    0.23 *
                                                 * 8780.00 * 159.40 * 4.24 * 4067.48 * 1104.02
                       * 320
176. 07 *
* RI VER-1
                                          * 10%
              * Reach-1
175.86 *
                                   0.000541 *
                                                                     1104.02 *
   0.20 *
                                         * 2%
* RI VER-1
                                                   * 15000.00 * 159.40 *
                         * 320
              * Reach-1
                                   0.000574 *
                                                  4. 92 *
                                                          8024.00 *
178. 47 *
                       178.71 *
                                                                     1758. 41 *
   0. 22 *
                       * 320
182. 67 *
                                          * 0.2%
                                                  * 25700.00 * 159.40 * 4.75 * 16566.98 * 2427.25
* RIVFR-1
              * Reach-1
182.50 *
                                  0.000397 *
                                                                     2427, 25 *
  0.19 *
              * 17700.00 * 159.10 * 3.47 * 15257.87 * 2043.68
* RI VER-1
179. 40 *
            173. 46 * 179. 46 * 0. 000248 *
                                                                     2043.68 *
   0.15 *
                                         * FI oodway * 17700.00 * 159.10 * 59 * 3.62 * 13420.01 * 1385.00 *
* RI VER-1
                         * 314.4
             * Reach-1
179. 97 *
            173.38 *
                       180.04 * 0.000259 *
    0.15 *
                                                 * 8780.00 * 159.10 * 3.29 * 8441.24 * 1747.59
* RI VER-1
             * Reach-1 * 314.4
                                      * 10%
175. 64 *
            169. 10 * 175. 71 * 0. 000308 *
                                                                     1747.59 *
    0.16 *
             * RI VER-1
                                                   * 15000.00 *
                                                                   159. 10 *
178. 29 *
                                                  3. 46 * 13214. 07 *
                                                                      1941.57 *
            172.88 *
   0.15 *
            * 0.2%
                                                  * 25700.00 * 159.10 * 3.56 * 21006.51 * 2959.11 *
* RI VER-1
182. 37 *
  0.14 *
                                  * 1%
0. 000313 *
* RIVER-1
             * Reach-1 * 300
                                                    * 17700.00 * 158.70 *
                                                 3. 85 * 12517. 01 * 2661. 90 *
            172. 30 * 179. 25 *
179. 16 *
                                      Page 145
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0. 16 *			a o ti ng	o iii Loiiii		
* RI VER-1 179. 71 * 0. 17 *	* Reach-1 172. 28 *	* 300 179. 82 *	* 0. 000328	FI oodway * * 4.03	17700.00 * * 10871.79 *	158. 70 * 1080. 00 *
* RI VER-1 175. 38 *	* Reach-1 168.44 *	* 300 175. 46 *	* 0. 000315	10% * * 3. 29	8780. 00 * * 7127. 12 *	158. 70 * 1328. 79 *
0. 16 * * RI VER-1 178. 03 *	* Reach-1 171.87 *	* 300 178. 12 *	* 0. 000331	2% * * 3. 79	15000. 00 * * 10628. 32 *	158. 70 * 2241. 16 *
182. 17 *	* Reach-1 173.33 *	* 300 182. 25 *	* 0. 000263	0. 2% * * 3. 92	25700.00 * * 17761.07 *	158. 70 * 3956. 14 *
0. 15 * * *	*	*	*	*	*	*
* RI VER-1 178. 12 * 0. 25 *	* Reach-1 171. 92 *	* 285 178. 46 *	* 0. 000763	1% * * 6. 10	17700.00 * * 7149.43 *	158. 20 * 1547. 03 *
* RI VER-1 178. 62 * 0. 26 *	* Reach-1 171. 93 *	* 285 179. 00 *	* 0. 000778	FI oodway * 6. 28	17700. 00 * * 5974. 20 *	158. 20 * 605. 00 *
* RI VER-1 174. 41 * 0. 23 *	* Reach-1 166. 72 *	* 285 174. 68 *	* 0. 000666	10% * * 4.89	8780. 00 * * 3907. 04 *	158. 20 * 826. 30 *
* RI VER-1 176. 98 * 0. 25 *	* Reach-1 171.13 *	* 285 177. 30 *	* 0. 000765	2% * * 5. 85	15000. 00 * * 6084. 97 *	158. 20 * 1241. 40 *
* RI VER-1 181. 32 * 0. 24 *	* Reach-1 173. 49 *	* 285 181. 62 *	* 0. 000634	0. 2% * * 6. 20	25700. 00 * * 11226. 45 *	158. 20 * 3292. 26 *
U. 24						
*	*	*	*	*	*	*
*					17700.00 * * 7607.46 *	*
*  * RI VER-1 177. 95 *  0. 25 *  * RI VER-1 178. 42 *	* Reach-1 171.78 * * Reach-1	* 280. 178. 25 * * 280.	55 * 0.000707 55 *	1% * 5. 94		* 158.00 * 1586.14 * 158.00 *
*  * RI VER-1 177. 95 * 0. 25 *  * RI VER-1 178. 42 * 0. 26 *  * RI VER-1 174. 24 *	* Reach-1 171. 78 * * Reach-1 171. 95 *	* 280. 178. 25 * * 280. 178. 78 *	55 * 0. 000707 55 * 0. 000771	1% * 5.94 FI oodway * 6.31	17700.00 * * 7607.46 * 17700.00 *	* 158.00 * 1586.14 * 158.00 * 600.00 *
* * * * * * * * * * * * * * * * * * *	* Reach-1 171. 78 * * Reach-1 171. 95 * * Reach-1 166. 65 *	* 280. 178. 25 * * 280. 178. 78 * * 280. 174. 49 *	55 * 0. 000707 55 * 0. 000771 55 * 0. 000617	1% * 5.94 FI oodway * 6.31 10% * 4.77	17700.00 * * 7607.46 * 17700.00 * * 6083.25 *	* 158.00 * 1586.14 * 158.00 * 600.00 * 158.00 * 864.43 *
* * * * * * * * * * * * * * * * * * *	* Reach-1 171. 78 *  * Reach-1 171. 95 *  * Reach-1 166. 65 *  * Reach-1 171. 01 *  * Reach-1	* 280. 178. 25 * * 280. 178. 78 * * 280. 174. 49 * * 280. 177. 09 * * 280.	55 * 0.000707  55 * 0.000771  55 * 0.000617  55 * 0.000720	1%	17700.00 * * 7607.46 * 17700.00 * * 6083.25 * 8780.00 * * 4201.51 *	* 158.00 * 1586.14 * 158.00 * 600.00 * 158.00 * 864.43 * 158.00 * 1338.78 * 158.00 *
* * * * * * * * * * * * * * * * * * *	* Reach-1 171. 78 *  * Reach-1 171. 95 *  * Reach-1 166. 65 *  * Reach-1 171. 01 *  * Reach-1	* 280. 178. 25 * * 280. 178. 78 * * 280. 174. 49 * * 280. 177. 09 * * 280.	55 * 0.000707  55 * 0.000771  55 * 0.000617  55 * 0.000720	1%	17700.00 * * 7607.46 *  17700.00 * * 6083.25 *  8780.00 * * 4201.51 *  15000.00 * * 6474.28 *	* 158.00 * 1586.14 * 158.00 * 600.00 * 158.00 * 864.43 * 158.00 * 1338.78 * 158.00 *
* * * * * * * * * * * * * * * * * * *	* Reach-1 171. 78 *      * Reach-1 171. 95 *      * Reach-1 166. 65 *      * Reach-1 171. 01 *      * Reach-1 173. 73 *      *      * Reach-1	* 280. 178. 25 * * 280. 178. 78 * * 280. 174. 49 * * 280. 177. 09 * * 280. 181. 44 * *	55	1%	17700.00 * * 7607.46 *  17700.00 * * 6083.25 *  8780.00 * * 4201.51 *  15000.00 * * 6474.28 *  25700.00 * * 11664.80 *	* 158.00 * 1586.14 * 158.00 * 600.00 * 158.00 * 864.43 * 158.00 * 1338.78 * 158.00 * 1338.78 * 158.00
* * * * * * * * * * * * * * * * * * *	* Reach-1 171. 78 *  * Reach-1 171. 95 *  * Reach-1 166. 65 *  * Reach-1 171. 01 *  * Reach-1 173. 73 *  * *  * Reach-1 171. 46 *	* 280. 178. 25 * * 280. 178. 78 * * 280. 174. 49 * * 280. 177. 09 * * 280. 181. 44 * * * * * 270. * 270.	55	1%	17700.00 *	* 158.00 * 158.00 * 600.00 * 158.00 * 864.43 * 158.00 * 158.00 * 158.00 * 158.00 * 158.00 * 158.00 * 158.00 * 158.00 * 158.00 * 157.70 * 898.81 *
* * RI VER-1 177. 95 * 0. 25 * 178. 42 * 0. 26 * 174. 24 * 0. 22 * 176. 79 * 0. 24 * 181. 18 * 0. 23 * 176. 52 * 176. 52 * 0. 34 * RI VER-1	* Reach-1 171. 78 *      * Reach-1 171. 95 *      * Reach-1 166. 65 *      * Reach-1 171. 01 *      * Reach-1 173. 73 *      *      * Reach-1 171. 46 *      * Reach-1	* 280. 178. 25 *	55	1%	17700.00 *	* 158.00 * 158.00 * 600.00 * 158.00 * 864.43 * 158.00 * 158.00 * 158.00 * 158.00 * 158.00 * 157.70 * 898.81 * 157.70 * 449.00 * 157.70 *

0 04 +		E.7	xisting -	34K LUWK		
0. 34 * * RI VER-1 179. 72 * 0. 35 *	* Reach-1 173.05 *	* 270 180. 44 *	* 0. 001466	0. 2% * * 8. 38	25700. 00 * * 5702. 49 *	157. 70 * 1592. 99 *
*	*	*	*	*	* *	*
175. 98 *	* Reach-1 170. 99 *	* 264 176. 36 *	* 0. 001202	1% * 6. 79	17700.00 * * 5551.56 *	157. 50 * 1664. 30 *
0. 30 * * RI VER-1 176. 73 * 0. 27 *	* Reach-1 170. 99 *	* 264 177. 05 *	* 0. 000962	FI oodway * * 6. 27	17700. 00 * * 5990. 98 *	157. 50 * 652. 90 *
	* Reach-1 168. 90 *	* 264 173. 03 *	° 0. 000920	10% * * 5. 11	8780. 00 * * 3689. 84 *	157. 50 * 839. 81 *
* RI VER-1 174. 81 *	* Reach-1 170. 48 *	* 264 175. 18 *	* 0. 001257	2% * * 6. 60	15000. 00 * * 4867. 78 *	157. 50 * 1215. 93 *
0. 30 * * RI VER-1 179. 30 * 0. 29 *	* Reach-1 172. 29 *	* 264 179. 70 *	* 0. 001042	0. 2% * 7. 19	25700. 00 * * 7491. 52 *	157. 50 * 3321. 91 *
*	*	*	*		*	*
* RI VER-1 175. 41 *	* Reach-1 160.81 *	* 250. 175. 44 *	12 * 0. 000035	1% * * 1. 29	800.00 * * 691.77 *	157. 00 * 2947. 76 *
0. 05 * * RI VER-1 176. 29 *	* Reach-1 160.81 *	* 250. 176. 31 *	12 * 0. 000030	FI oodway * 1.23	800. 00 * * 731. 01 *	157. 00 * 45. 00 *
0. 05 * * RI VER-1 172. 10 *	* Reach-1 162.04 *	* 250. 172. 23 *	12 * 0. 000241	10% * * 2.93	1450.00 * * 542.84 *	157. 00 * 242. 11 *
0. 14 * * RI VER-1 174. 17 *	* Reach-1 161.11 *	* 250. 174. 21 *	12 * 0. 000064	2% * * 1.66	950. 00 * * 635. 72 *	157. 00 * 2298. 34 *
178. 89 *	* Reach-1 160. 59 *	* 250. 178. 89 *	12 * 0. 000000	0. 2% * * 0. 15	700. 00 * * 16640. 42 *	157. 00 * 3387. 88 *
	*	*	*	*	* *	* *
	* Reach-1	* 250.	06 *	*	Bri dge *	* *
* * *	*	*	*	*	*	*
* RI VER-1 174. 71 *	* Reach-1 160.74 *	* 250 174. 72 *	* 0. 000025	1% * * 1. 01	800.00 * * 795.09 *	
0. 04 * * RI VER-1 175. 58 *	* Reach-1 160.74 *		* 0. 000037	FI oodway * * 0.95	800.00 * * 838.60 *	156. 84 * 50. 00 *
0. 04 * * RI VER-1 169. 81 *	* Reach-1 161.78 *	* 250 169. 92 *	* 0. 000276	10% * * 2.64	1450. 00 * * 550. 24 *	156. 84 * 128. 52 *
0. 14 * * RI VER-1 173. 18 *	* Reach-1 161.00 *	* 250 173. 20 *	* 0. 000049	2% * * 1. 32	950. 00 * * 718. 60 *	156. 84 * 2722. 11 *
0. 06 * * RI VER-1 178. 48 *	* Reach-1 160.54 *	* 250 178. 48 *	0. 000000 Page	* 0.08	700.00 * * 25802.58 *	156. 84 * 4642. 40 *

0.00 *		_,	a string	o ne zome		
*	*	*	*	*	*	*
* RI VER-1 174. 71 * 0. 03 *	* Reach-1 161.57 *	* 246 174. 72 *	* 0. 000015	1% * * 0. 72	800. 00 * * 1114. 41 *	156. 80 * 3899. 97 *
* RI VER-1 175. 58 * 0. 03 *	* Reach-1 161.57 *	* 246 175. 59 *	* 0. 000017	FI oodway * * 0.68	* 800.00 * * 1183.98 *	156. 80 * 80. 00 *
* RI VER-1 169. 83 * 0. 12 *	* Reach-1 162.57 *	* 246 169. 89 *	* 0. 000203	10% * * 2.00	1450.00 * * 723.93 *	156. 80 * 134. 52 *
* RI VER-1 173. 18 * 0. 05 *	* Reach-1 161.84 *	* 246 173. 20 *	* 0. 000030	2% * 0. 96	950.00 * * 992.20 *	156. 80 * 2341. 40 *
* RI VER-1	* Reach-1 161.39 *	* 246 178. 48 *	* 0. 000005	0. 2% * * 0. 49	700.00 * * 1415.49 *	156. 80 * 4616. 67 *
*	*	*	*	*	*	*
* RI VER-1 174. 68 *	* Reach-1 161. 20 *	* 245 174. 71 *	* 0. 000048	1% * * 1.43	800. 00 * * 560. 75 *	156. 80 * 3240. 13 *
0. 06 * * RI VER-1 175. 55 *	* Reach-1 161.19 *	* 245 175. 58 *	* 0. 000092	FI oodway * 1.35	800.00 * * 591.28 *	156. 80 * 35. 00 *
0. 06 *  * RI VER-1 169. 62 * 0. 20 *	* Reach-1 162.42 *	* 245 169. 84 *	* 0. 000558	10% * * 3. 78	1450.00 * * 383.62 *	156. 80 * 136. 26 *
* RI VER-1 173. 13 * 0. 09 *	* Reach-1 161.50 *	* 245 173. 18 *	* 0. 000095	2% * * 1.88	950. 00 * * 506. 51 *	156. 80 * 2117. 41 *
* RI VER-1 178. 48 * 0. 00 *	* Reach-1 160. 98 *	* 245 178. 48 *	o. 000000	0. 2% * * 0. 09	700.00 * * 24443.18 *	156. 80 * 4650. 76 *
*	*	*	*		*	*
	* Reach-1	* 244.	19 *	*	Bri dge *	*
* * *	*	*	*	*	*	*
* RI VER-1 174. 57 *	* Reach-1 160.45 *	* 243. 174. 58 *	38 * 0. 000020	1% * * 0. 92	800.00 * * 865.13 *	156. 70 * 3749. 91 *
0. 04 * * RI VER-1 175. 43 * 0. 04 *	* Reach-1 160. 45 *	* 243. 175. 45 *	38 * 0. 000030	FI oodway * * 0.88	800.00 * * 912.71 *	156. 70 * 55. 00 *
* RI VER-1 169. 38 * 0. 14 *	* Reach-1 161.55 *	* 243. 169. 47 *	38 * 0. 000252	10% * * 2.50	1450.00 * * 579.53 *	156. 70 * 510. 13 *
* RI VER-1 172. 98 * 0. 06 *	* Reach-1 160. 74 *	* 243. 173. 01 *	38 * 0. 000041	2% * * 1. 22	950.00 * * 777.85 *	156. 70 * 3037. 64 *
* RI VER-1 178. 47 * 0. 00 *	* Reach-1 160. 25 *	* 243. 178. 47 *	38 * 0. 000000	0. 2% * * 0. 07	700. 00 * * 29117. 13 *	156. 70 * 4533. 10 *
* *	*	*	*	*	*	*

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* RI VER-1 174. 57 * 0. 01 *	* Reach-1 158.78 *	* 243. 174. 57 *	2 * 0. 000001	1% * * 0. 26	800.00 * * 5903.05 *	155. 10 * 2573. 90 *
* RI VER-1 175. 43 * 0. 02 *	* Reach-1 158. 78 *	* 243. 175. 43 *	2 * 0. 000009	FI oodway * 0.60	800.00 * * 1345.31 *	155. 10 * 75. 30 *
* RI VER-1 169. 33 *	* Reach-1 159.77 *	* 243. 169. 34 *	2 * 0. 000049	10% * * 1. 17	1450. 00 * * 2240. 86 *	155. 10 * 1726. 67 *
0. 06 * * RI VER-1 172. 98 *	* Reach-1 159.05 *	* 243. 172. 98 *	2 * 0. 000004	2% * * 0. 39	950.00 * * 4790.80 *	155. 10 * 2176. 15 *
178. 47 *	158. 60  *	* 243. 178. 47 *	2 * 0. 000000	0. 2% * * 0. 15	700.00 * * 8636.32 *	155. 10 * 2779. 42 *
*	*	*	*	*	*	*
* * RI VER-1 174. 57 *	* Reach-1 159. 29 *	* 243 174. 57 *	* 0. 000003	1% * * 0.41	2665. 00 * * 13390. 99 *	153. 20 * 2774. 92 *
0. 02  * *   RI VER-1 175. 38  *	* Reach-1	* 243	*	FI oodway *	2665. 00 * * 1770. 26 *	153. 20 *
169. 31 *	* Reach-1 159.60 *	* 243 169. 32 *	* 0. 000042	10% * * 1.12	3015. 00 * * 5871. 21 *	153. 20 * 2656. 52 *
172. 98 *					2805. 00 * * 11116. 88 *	
0. 02  * *   RI VER-1 178. 47  *	* Reach-1 158.77 *				2100. 00 * * 18976. 26 *	
() () (	*					*
*						
* RI VER-1 174. 56 * 0. 02 *	* Reach-1	* 190 174. 56 *	0. 000006	1% * * 0. 55	2665.00 * * 12443.90 *	153. 80 * 1068. 78 *
* RI VER-1 175. 29 * 0. 03 *	*	175. 30 *	0. 000012	* 0.84	2665. 00 * * 6724. 83 *	488. 00 *
* RI VER-1 169. 18 * 0. 06 *	* Reach-1	* 190 169. 19 *	* 0. 000044	10% * * 1. 24	3015. 00 * * 6714. 25 *	153. 80 * 1062. 51 *
* RI VER-1 172. 96 *	* Reach-1	* 190 172. 96 *	* 0. 000010	2% * * 0. 68	2805. 00 * * 10735. 03 *	153. 80 * 1066. 83 *
0. 03 * * RI VER-1 178. 47 *	* Reach-1	* 190 178. 47 *			2100.00 * * 17166.59 *	
0.01 *	*	*	*	*	*	* *
* RI VER-1 174. 54 *	* Reach-1	* 182 174. 55 *	* 0. 000018	1% * * 0. 96	19965. 00 * * 32769. 91 *	154. 83 * 3419. 79 *
0. 04 * * RI VER-1 175. 28 *	* Reach-1	* 182 175. 28 *	* 0. 000015	FI oodway * 0.93	19965. 00 * * 29361. 91 *	154. 83 * 2380. 00 *
0. 04 * * RI VER-1 169. 15 *	* Reach-1	* 182 169. 16 *	0. 000033 Page	* 1.05	10495.00 * * 15832.40 *	154. 83 * 2823. 72 *
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0.05 *
                                              * 17155.00 * 154.83 *
                                 * 2%
* RIVER-1
            * Reach-1 * 182
                     172. 95 *
                               0.000021 *
                                            0. 98 * 27426. 74 * 3253. 64 *
172.94 *
   0.04 *
                       * 182
                                            * 27500.00 * 154.83 * 0.92 * 46765.81 * 3694.00 *
* RIVER-1
                                     * 0.2%
            * Reach-1
178.46 *
                               0.000013 *
                     178. 47 *
  0.03 *
                                            * 19965.00 * 153.30 * 1.77 * 34352.70 * 3408.33
            * Reach-2 * 180
                                     * 1%
* RIVER-1
                  174.53 *
                               0.000056 *
174. 52 *
   0.07 *
              Reach-2 * 180
* 175. 27 *
                                    * Fl oodway * 19965.00 * 153.30 * 051 * 1.75 * 30669.10 * 2384.00 *
* RI VER-1
175. 26 *
                               0.000051 *
   0.07 *
            * RIVER-1
                                    * 10%
                                              * 10495.00 * 153.30 *
                               0.000106 *
                                            1. 98 * 17100. 62 *
169. 11 *
                                                              2877.45 *
  0.09 *
                                              * 17155.00 * 153.30 *
* RI VER-1
                       * 180
                                    * 2%
            * Reach-2
                 * 172. 93 *
                               0.000067 *
                                            1.84 * 28952.08 * 3300.79 *
172. 91 *
   0.08 *
            * RI VER-1
                                     * 0.2%
                                            * 27500.00 * 153.30 * 1.67 * 48158.45 * 3620.41 *
178. 45 *
                               0.000039 *
 0.06 *
                                 * 1%
          * 19965.00 * 152.70 * 2.09 * 29916.54 * 3122.88
* RIVER-1
174.47 *
                               0.000072 *
   0.08 *
                                     * FI oodway * 19965. 00 * 152. 70 * 5 * 2. 02 * 27665. 11 * 2300. 00 *
          * RIVER-1
                       * 170
175. 21 *
                               0.000065 *
   0.08 *
          * 10%
* RI VER-1
                                              * 10495.00 * 152.70 *
                                            2. 48 * 13935. 40 *
                               0.000153 *
169.00 *
                                                              2632.32 *
  0.11 *
          * RI VER-1
                                    * 2%
                                            * 17155.00 * 152.70 * 2.20 * 24921.49 * 3039.49
                               0.000090 *
172.85 *
                                                              3039, 49 *
   0.09 *
                                            * 27500.00 * 152.70 * 1.93 * 42607.82 * 3306.87 *
* RI VER-1
           * Reach-2
                       * 170
                                     * 0.2%
          164. 95 * 178. 42 *
                               0.000049 *
178. 41 *
  *************************
Profile Output Table - Encroachment 1
* Ri ver           * Reach
                         Q Left * Q Channel * Q Right * Enc Sta L * Ch Sta L *
E.G. Elev * Top Wdth Act *
Ch Sta R * Enc Sta R *
                                                      (ft) *
                        (cfs) * (cfs) * (cfs) *
   (ft) *
                 (ft) *
*
                                                          (ft) *
            (ft)
 342.34 *
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* RI VER-2 176. 20 *		530.00	*	* 250.12	ting - 34R L0 * Flood 11988.62 *	dway *	, 175. *	55 * 169. 00		0. 41 * 189. 51 *
342. 34 * * RI VER-2 170. 84 * 342. 34 *		00 * Reach-1 574.48		* 250. 12 2106. 67 *	* 10% 4750. 30 *	* 623. 03	, 170. *	45 *	*	-4. 69 * 189. 51 *
* RI VER-2 174. 04 * 342. 34 *	*	Reach-1 741. 10 *	*	* 250.12 4764.24 *	* 2% 7517. 01 *	* 2068. 75	*173.	68 *	*	-1. 45 * 189. 51 *
* RI VER-2 179. 03 * 342. 34 *	*	Reach-1 824. 79 *	*	* 250.12 8628.69 *	* 0.2% 11454.53 *	* 5316. 77	,178. *	73 *	*	3. 59  * 189. 51  *
* * *	*	*	*	*	*	*	*	*	*	*
* RI VER-2 175. 25 * 602. 45 *	*	Reach-1 1037. 90	*	* 225 7379. 90 *	* 1% 8549. 92 *	* 1370. 18	, 174. *	91 *	*	459. 94 *
* RI VER-2 175. 83 * 602. 45 *		Reach-1 510.00 00 *	*	* 225 7933.71 *	* FI ood 8103. 30 *	dway * 1262.99	,175. *	54 * 203. 00	*	0. 63 * 459. 94 *
* RI VER-2 170. 35 * 602. 45 *		Reach-1 450.89		* 225 3059.49 *	* 10% 4090. 22 *	* 330. 29	*170.	04 *	*	-4.88 * 459.94 *
* RI VER-2 173. 77 * 602. 45 *	*	Reach-1 767.30 *	*	* 225 6022.11 *	* 2% 7301. 10 *	* 1026. 79	, 173. *	42 *	*	-1. 49 * 459. 94 *
* RI VER-2 178. 89 * 602. 45 *	*	Reach-1 1314. 27 *	*	* 225 10916.87 *	* 0.2% 10591.61 *	* 3891. 52	,178. *	65 *	*	3. 73 * 459. 94 *
* *	*	*	*	*	*	*	*	*	*	*
* RI VER-2 175. 06 * 617. 60 *	*	Reach-1 911.39 *		* 200 7838.60 *	* 1% 7907. 45 *	* 1553. 96			*	478.37 *
* RI VER-2 175. 69 * 617. 60 *		Reach-1 465.00 00 *	*	* 200 8823.89 *	* FI ood 7952. 47 *	dway * 523.64	, 175. *	41 * 195. 00	*	0. 63 * 478. 37 *
* RI VER-2 170. 01 * 617. 60 *	*	Reach-1 494.82		* 200 3522.89 *	* 10% 3596.58 *	* 360. 54	, 169. *	77 *	*	-5. 01 * 478. 37 *
* RI VER-2 173. 54 * 617. 60 *	*	Reach-1 753.80	*	* 200 6599. 19 *	* 2% 6768. 09 *	* 982. 72	, 173. *	24 *	*	-1.54 * 478.37 *
		*				702. 72				
* RI VER-2 178. 78 *	*	* Reach-1	*	* 200 11439.06 *	* 0.2% 10336.06 *	*	178.	55 *	*	3. 78 * 478. 37 *
* RI VER-2 178. 78 * 617. 60 * *	*	* Reach-1 1320. 25	*	* 200	* 0. 2% 10336. 06 * *	*	178.	55 *	*	
* RI VER-2 178. 78 * 617. 60 * * * RI VER-2 174. 81 *	*	* Reach-1 1320. 25	*	* 200 11439.06 *	10336.06 *	* 3624. 88 *	178. *  *  174.			478. 37 *
* RI VER-2 178. 78 * 617. 60 * * * * RI VER-2 174. 81 * 599. 58 * * RI VER-2 175. 47 *	*	* Reach-1 1320. 25  * Reach-1 1573. 58 Reach-1 1315. 00	*	* 200 11439.06 * * * *	10336.06 * * * * 1%	* 3624.88  * 2638.58  dway *	* 178.  * 174.  *	* 63 *	*	478. 37 * * *
* RI VER-2 178. 78 * 617. 60 * * * * RI VER-2 174. 81 * 599. 58 * * RI VER-2 175. 47 * 599. 58 * * RI VER-2 169. 60 *	* * 1370	* Reach-1 1320. 25  * Reach-1 1573. 58 Reach-1	* *	* 200 11439.06 * * * 190 5432.94 * * 190	* * * * * * * * * * * * * * * * * * *	* 3624.88  * 2638.58	178.  *  174.  *  175.  169.	* 63 * 34 * 55.00	*	478. 37 *  *  407. 18 *  0. 71 *
* RI VER-2 178. 78 * 617. 60 * * * * RI VER-2 174. 81 * 599. 58 * * RI VER-2 175. 47 * 599. 58 * * RI VER-2	* * 1370	* Reach-1 1320. 25  * Reach-1 1573. 58 Reach-1 1315. 00 00 * Reach-1 887. 38	* * *	* 200 11439.06 * * * * 190 5432.94 * * 190 5865.16 * * 190 2618.66 *	* * * * * * * * * * * * * * * * * * *	* 3624. 88  * 2638. 58 dway * 2899. 47  * 280. 85	* 178.  * 174.  * 175.  * 169.	* 63 * 34 * 55.00	* *	478. 37 *  *  407. 18 *  0. 71 * 407. 18 *  -5. 21 *

Existing - 34R LOMR \* 190 \* 0.2% \* RI VER-2 \* Reach-1 178.49 \* 3.86 \* 1865.95 \* 11112. 79 \* 5033.09 \* 9254.12 \* 407.18 \* 178.62 \* 599.58 \* RI VER-1 \* 350 \* 1% 181.46 \* Reach-1 2858.28 \* 1094.81 \* 181.92 \* 2441.78 \* 12399. 94 \* 758.00 \* 873.00 \* \* Floodway \* \* 350 181.80 \* 0.34 \* RI VER-1 Reach-1 440.00 \* 2436.86 \* 182.36 \* 1867.46 \* 13395.68 \* 658.00 \* 758.00 \* 873.00 \* 1098.00 \* \* 350 \* 10% RI VER-1 Reach-1 177.59 \* -3.87 \* 389.65 \* 177.96 \* 653.08 \* 628.52 \* 7761.83 \* 758.00 \* 873.00 \* \* 2% \* 350 RI VER-1 \* Reach-1 -1.04 \* 180. 42 \* 1867. 21 \* 11309.93 \* 758.00 \* 180.88 \* 1034.56 \* 1822.86 \* 873.00 \* \* 350 RI VER-1 \* Reach-1 \* 0.2% 2.71 \* 184. 17 \* 15128.72 \* 6014.25 \* 184.60 \* 1251.96 \* 4557.03 \* 758.00 \* 873.00 \* 181. 29 \* RI VER-1 Reach-1 \* 344.95 \* 1% 1196.15 \* 5479.02 \* 768.00 \* 181. 51 2656.86 \* 9564.12 \* 868.00 \* \* 344.95 0.42 \* RI VER-1 \* Reach-1 \* Floodway \* 181. 71 \* 181. 91 5781.16 \* 768.00 \* 850.00 \* 2573.98 \* 9344.85 \* 418.00 \* 868.00 \* 1268.00 \* \* 344.95 \* 10% -3.86 \* RI VER-1 Reach-1 177.43 \* 2278.19 \* 901.34 \* 768.00 \* 177.60 \* 486.19 \* 6015.61 \* 868.00 \* \* 2% \* 344.95 RI VER-1 \* Reach-1 -1.04 \* 180. 26 \* 4515.16 \* 1167.15 \* 768.00 \* 180.47 \* 1812.83 \* 8672.01 \* 868.00 \* \* 344.95 \* 0.2% 183.99 \* 2.70 \* RI VER-1 \* Reach-1 11927. 97 \* 8354. 92 \* 768.00 \* 184. 22 \* 1271.81 \* 5417.10 \* 868.00 \* 180.11 \* \* 331.6 \* 1% \* RIVER-1 Reach-1 906.87 \* 3739.84 \* 11321.37 \* 2638.79 \* 180.67 \* 769.81 \* 855.37 \* \* 331.6 \* Floodway \* 180.75 \* 0.64 \* RI VER-1 \* Reach-1 181.20 \* 840.00 \* 4296.15 \* 10699.60 \* 27Ó4. 25 \* 215.00 \* 769.81 \* 855.37 \* 1055.00 \* \* 331.6 RI VER-1 \* 10% -3.68 \* Reach-1 176. 43 \* 629.93 \* 845.23 \* 7085.26 \* 849.51 \* 769.81 \* 176.86 \* 855.37 \* \* 2% RI VER-1 \* 331.6 -1.04 \* Reach-1 179.07 \* 2677.12 \* 10244.80 \* 2078.08 \* 769.81 \* 179.62 \* 833.67 \* 855.37 \* \* 331.6 \* 0.2% 2.82 \* RI VER-1 \* Reach-1 182. 93 \* 954.88 \* 7765.95 \* 13659.35 \* 4274.70 \* 769.81 \* 183.45 \* 855.37 \* RI VER-1 \* 320 \* 1% 179.56 \* Reach-1 179.77 \* 3168.38 \* 4670.61 \* 1740.65 \* 1920.86 \* 9861.01 \* 1858. 13 \*

Existing - 34R LOMR \* 320 \* Floodway \* 180. 12 \* \* RI VER-1 Reach-1 0.56 \* 3606.61 \* 1536.00 \* 180.43 \* 600.00 \* 2763.10 \* 11330. 29 \* 1740.65 \* 1858. 13 \* 2136.00 \* 175.86 \* 1024.21 \* \* 320 Reach-1 \* 10% -3.70 \* RI VER-1 6724.37 \* 176.07 \* 1031.42 \* 1740.65 \* 1104.02 \* 1858. 13 \* RI VER-1 \* 320 \* 2% -1.09 \* Reach-1 178. 47 \* 3245. 20 \* 1758.41 \* 9299.95 \* 2454.85 \* 1740.65 \* 178. 71 1858. 13 \* 2.94 \* \* Reach-1 \* 320 \* 0.2% RI VER-1 182.50 \* 182.67 \* 5422.44 \* 9050.81 \* 2427.25 \* 11226.75 \* 1740.65 \* 1858. 13 \* \* 1% 179.40 \* \* RI VER-1 \* Reach-1 \* 314.4 245.11 \* 4891.40 \* 12563.50 \* 179.46 \* 1859. 29 \* 1135.36 \* 1215.54 \* \* 314.4 \* FI oodway \* 179. 97 \* 5269. 14 \* 12230. 52 \* 1110. 00 \* 0.57 \* RI VER-1 \* Reach-1 1385.00 \* 180.04 \* 200.34 \* 1135.36 \* 1215.54 \* 2495.00 \* RI VER-1 Reach-1 \* 314.4 \* 10% 175.64 \* -3.76 \* 5063.04 \* 175.71 \* 1747.59 \* 1135.36 \* 68.33 \* 3648.63 \* 1215.54 \* RI VER-1 \* 2% -1.11 \* Reach-1 \* 314.4 178. 29 \* 4570. 54 \* 10257. 80 \* 178.36 \* 171.66 \* 1135.36 \* 1837.68 \* 1215.54 \* 2. 97 \* \* 314.4 RI VER-1 Reach-1 \* 0.2% 182. 37 \* 182.42 \* 492.98 \* 5862.21 \* 19344.81 \* 1135.36 \* 2009.11 \* 1215.54 \* \* RIVER-1 \* Reach-1 \* 300 \* 1% 179. 16 3 1740.00 \* 5783.96 \* 11369.87 \* 179.25 \* 546.17 \* 2520.00 \* 2605. 04 \* \* 300 \* Floodway \* 179.71 \* 0.56 \* RI VER-1 Reach-1 6238.78 \* 11039.70 \* 2520.00 \* 179.82 \* 1080.00 \* 421.53 \* 2363.00 \* 2605.04 \* 3443.00 \* \* 300 \* 10% -3.78 \* RI VER-1 Reach-1 175.38 \* 1172.90 \* 3884. 20 \* 4826.71 \* 2520.00 \* 175.46 \* 69.09 \* 2605.04 \* RI VER-1 Reach-1 \* 300 \* 2% 178.03 \* -1.12 \* 9453.80 \* 1612.74 \* 2520.00 \* 178.12 \* 214.54 \* 5331.66 \* 2605.04 \* 3.01 \* \* 300 \* 0.2% RI VER-1 \* Reach-1 182. 17 \* 182.25 \* 1740.00 \* 6891.09 \* 16575.86 \* 2520.00 \* 2233.05 \* 2605.04 \* \* RIVER-1 \* 285 \* 1% \* Reach-1 178.12 \* 9937.50 \* 2708.51 \* 178.46 \* 1076.39 \* 5053.99 \* 3076.79 \* 3167. 03 \* \* FI oodway \* 178.62 \* 10500.80 \* 1809.31 \* 2664.00 \* \* 285 0.50 \* RI VER-1 \* Reach-1 179.00 \* 5389.89 \* 3076.79 \* 605.00 \* 3167.03 \* 3269.00 \* \* 285 \* 10% -3.72 \* Reach-1 RI VER-1 174.41 \* 1081.07 \* 174.68 \* 807.64 \* 1376.79 \* 6322.14 \* 3076.79 \* 3167. 03 \* \* 285 \* 2% 176.98 \* RI VER-1 Reach-1 -1.15 \* 8917. 19 \* 2169.41 \* 177.30 \* 3913.41 \* 3076. 79 \* 886.57 \* 3167.03 \*

Existing - 34R LOMR \* Reach-1 \* 285 \* 0.2% 3.20 \* \* RI VER-1 181.32 \* 11888.61 \* 4017.10 \* 1297.68 \* 9794.29 \* 3076. 79 \* 181.62 \* 3167.03 \* RI VER-1 \* 280.55 \* 1% Reach-1 177. 95 \* 3909.75 \* 1072.49 \* 9125.33 \* 178.25 \* 4664.93 \* 3083. 19 \* 3167.11 \* \* 280.55 \* Floodway \* 178. 42 \* 0.47 \* RI VER-1 \* Reach-1 600.00 \* 2964.59 \* 178.78 \* 4796.61 \* 9938.80 \* 2714.00 3083.19 \* 3167. 11 \* 3314.00 \* \* 10% RI VER-1 \* Reach-1 \* 280.55 174. 24 \* -3.70 \* 1697.01 \* 174.49 \* 836.70 \* 5845.91 \* 3083.19 \* 1237.09 \* 3167. 11 \* \* 2% RI VER-1 Reach-1 \* 280.55 176. 79 \* -1.16 \* 3217.18 \* 948.69 \* 3083. 19 \* 177.09 \* 3527.90 \* 8254.92 \* 3167. 11 \* \* Reach-1 RI VER-1 \* 280.55 \* 0.2% 3.23 \* 181. 18 \* 10926.00 \* 5705.60 \* 181.44 \* 3083. 19 \* 1511.27 \* 9068.40 \* 3167.11 \* \* 270 RI VER-1 \* Reach-1 \* 1% 176. 52 \* 177.12 \* 446.60 \* 5996.77 \* 11699.69 \* 3570.65 \* 3675. 10 \* \* 270 0.64 \* RI VER-1 \* Reach-1 \* Floodway \* 177. 16 \* 177.68 \* 449.00 \* 4.62 \* 3229.00 \* 6227.21 \* 11468.17 \* 3570.65 \* 3675. 10 \* 3678.00 \* \* 270 \* 10% -3.30 \* RI VER-1 \* Reach-1 173. 23 \* 0.08 \* 173.58 \* 431.03 \* 2163.27 \* 3570.65 \* 6616.65 \* 3675. 10 \* \* 270 \* 2% RI VER-1 \* Reach-1 175. 39 \* -1.13 \* 1.62 \* 10309.74 \* 175.95 \* 441.44 \* 4688.64 \* 3570.65 \* 3675. 10 \* \* 270 3.20 \* \* 0.2% RI VER-1 \* Reach-1 179.72 \* 500.98 \* 9728.57 \* 15. 19 \* 180.44 \* 15956. 24 \* 3570.65 \* 3675. 10 \* \* 1% \* RI VER-1 \* Reach-1 \* 264 175. 98 3 9.79 \* 176.36 \* 582.69 \* 9296.63 \* 8393.59 \* 3676.58 \* 3754.88 \* \* 264 \* Floodway \* 0.75 \* 176. 73 \* RI VER-1 \* Reach-1 582.90 \* 9569.99 \* 11. 56 \* 3106. 10 \* 3676.58 \* 177.05 \* 8118.45 \* 3754.88 \* 3759.00 \* \* 10% \* 264 -3.20 \* RI VER-1 \* Reach-1 172. 78 \* 1.65 \* 580.85 \* 5034.12 \* 173.03 \* 3744.23 \* 3676.58 \* 3754.88 \* RI VER-1 \* 264 \* 2% -1.17 \* Reach-1 174.81 \* 6.09 \* 582.00 \* 7548.27 \* 3676.58 \* 175.18 \* 7445.65 \* 3754.88 \* \* 264 \* 0.2% 179.30 \* 3.32 \* RI VER-1 \* Reach-1 584.62 \* 14925.76 \* 10748.04 \* 26.20 \* 3676.58 \* 179.70 \* 3754.88 \* 175.41 \* RI VER-1 \* 250.12 \* 1% Reach-1 175.44 \* 45.00 \* 12.17 \* 3660.00 \* 13. 23 \* 774.60 \* 3695.00 \*

* RIVER-1		* 250. 12	ting - 34R LOI * Flood	dway *	176. 29_*	0.87 *
176. 31 * 3695. 00 *	45. 00 3700. 00 *		776. 43 *	11. 44	* 3655.00	
* RI VER-1 172. 23 * 3695. 00 *	* Reach-1 44.44 *	* 250. 12 * 17. 29 *	* 10% 1417. 00 *	* 15. 71	172. 10 * *	-3. 31 * * 3660. 00 *
* RI VER-1 174. 21 *	* Reach-1 45.00	* 250.12 * 14.12 *	* 2% 923.06 *	* 12. 82	174. 17 * *	-1. 25 * * 3660. 00 *
* RI VER-1 178. 89 *	* Reach-1 3387.88	* 250.12 * 558.65 *	* 0.2% 109.85 *	* 31. 51	178. 89  * *	3. 48 * * 3660. 00 *
3695.00 *	*	* *	*	*	*	* *
* RI VER-1 175. 42 *	* Reach-1	* 250.06 *	BR U * 1% 796.16 *			* 3660.00 *
3695. 00 * * RI VER-1 176. 29 *	* Reach-1	* 250.06 *	BR U * Flood 796.16 *			
3695. 00 * * RI VER-1 172. 18 *	3700.00 * * Reach-1	* 250.06 *	BR U * 10% 1443.03 *		171. 88 *	-3. 45 * * 3660. 00 *
3695.00 * * RI VER-1	* Reach-1		BR U * 2%	*	174 06 *	-1. 27 *
174. 18 * 3695. 00 *	* Doods 1	* * 250.0/	945. 43 *	4. 57		* 3660.00 *
* RI VER-1 178. 88 *	* Reach-1 1334.17		BR U * 0.2% 576.01 *	21. 92	178. 85 * *	3. 52 * * 3660. 00 *
3695.00 *	*	* *	*	*	*	* *
*	*					^
* RI VER-1 174. 82 * 4057. 61 *	* Reach-1	* 250.06	BR D * 1% 800.00 *	*	174.63 * *	* 3966.32 *
* RI VER-1 175. 69 *	* Reach-1	* 250.06 *	BR D * Flood 800.00 *	dway *	175. 50 * * 3985. 00	0.87 * * 3966.32 *
4057. 61 * * RI VER-1 170. 20 *	4035.00 * * Reach-1	* 250.06 *	BR D * 10% 1450.00 *	*	169. 58 * *	-5. 05 * * 3966. 32 *
4057. 61 * * RI VER-1 173. 33 *	* Reach-1	* 250.06 *	BR D * 2% 950.00 *	*	173. 07 *	-1.56 * * 3966.32 *
4057. 61 * * RI VER-1 178. 50 *	* Reach-1 1874.73	* 250.06 * 25.42 *	BR D * 0.2% 500.42 *	* 174. 16		3. 84 * * 3966. 32 *
4057. 61 *	*	*	*	*	*	*
*	*	* *	*		*	* *
* RI VER-1 174. 72 *	* Reach-1 50.00	* 250	* 1% 800. 00 *	*	174. 71 * *	* 3966.32 *
4057. 61 * * RI VER-1 175. 59 *	* Reach-1 50.00	* 250 *	* Flood 800.00 *	dway *	175. 58 * * 3985. 00	0. 87 * * 3966. 32 *
4057. 61 * * RI VER-1	4035.00 * * Reach-1	* 250	* 10% 1450. 00 *	*	169. 81 * *	-4. 90 * * 3966. 32 *
169. 92 *	50.00	* *	1430.00			0,00.0=
169. 92 * 4057. 61 * * RI VER-1 173. 20 *	50.00 * Reach-1 50.00	* 250	* 2% 950.00 *	*	173. 18 * *	-1. 53 * * 3966. 32 *

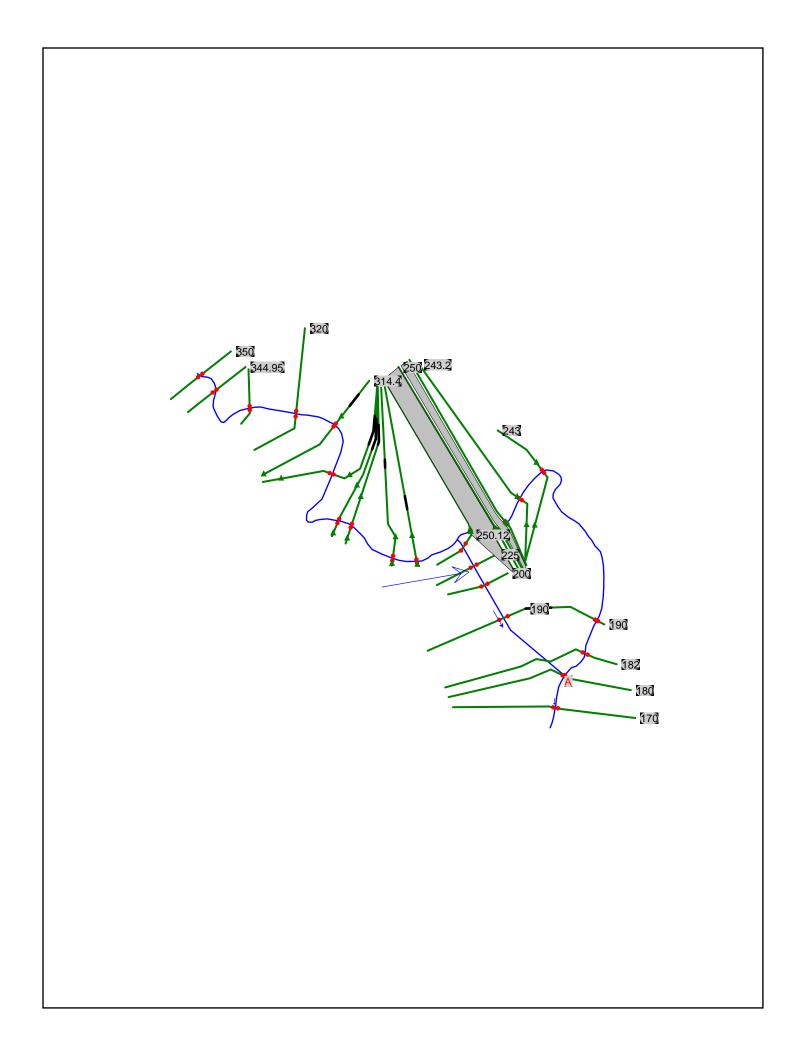
		F: - 4	-: 24D LO	4D			
* RI VER-1 178. 48 *	* Reach-1 4642.40 *	* 250	ting - 34R LON * 0.2% 127.32 *	/IR * 140. 22		*	3. 77 * 3966. 32 *
4057. 61 * *	* *	*	*	*	*	*	*
* RI VER-1 174. 72 *	* Reach-1 80.00 *	* 246	* 1% 800. 00 *	*	174.71 *	*	* 3964. 48 *
4055. 27 * * RI VER-1 175. 59 *	* Reach-1 80.00 *	* 246	* Flood 800.00 *	way *	175. 58 * * 3972. 00	*	0. 87 *
4055. 27 * * RI VER-1 169. 89 *	4052.00 *     * Reach-1     80.00 *	* 246	* 10% 1450. 00 *	*	169.83 *	*	-4. 88 * 3964. 48 *
4055. 27 * * RI VER-1	* * Reach-1	* 246	* 2% 950.00 *	*	173.18 *	*	-1.53 *
173. 20 * 4055. 27 * * RIVER-1	80.00 * * Reach-1	* 246	* 0.2%	*			3964. 48 *
178. 48 * 4055. 27 * *	80.00 * *	*	700. 00  * *	*	*	*	3964.48 *
*	*	*	*		*	*	*
* RI VER-1 174. 71 * 4052. 15 *	* Reach-1 35.00 *	* 245	* 1% 800. 00 *	*	174.68 *	*	3970. 91 *
* RI VER-1 175. 58 * 4052. 15 *	* Reach-1 35.00 * 4031.00 *	* 245	* FI ood 800. 00 *	way *	175. 55 * * 3996. 00	*	0. 87 * 3970. 91 *
* RI VER-1 169. 84 *	* Reach-1 35.00 *	* 245	* 10% 1450. 00 *	*	169.62 *	*	-5. 06 * 3970. 91 *
4052. 15 * * RI VER-1 173. 18 *	* Reach-1 35.00 *	* 245	* 2% 950. 00 *	*	173. 13 *	*	-1. 55  * 3970. 91  *
4052. 15 * * RI VER-1 178. 48 *	* Reach-1 4650.76 *	* 245 488.63 *	* 0.2% 127.44 *	* 83. 93	178.48 *	*	3. 80 * 3970. 91 *
4052. 15 * *	* *	*	*	*	*	*	*
* * RI VER-1 174. 69 *	* Reach-1 *	* 244. 19 *	BR U * 1% 800.00 *	*	174.62 *	*	* 3970. 91 *
4052. 15 * * RI VER-1 175. 56 *	* Reach-1	* 244.19	BR U * Flood 800.00 *	way *	175. 49 * * 3996. 00		0. 86 * 3970. 91 *
4052. 15 * * RI VER-1 169. 78 *	4031.00 *     * Reach-1     30.00 *	* 244. 19 *	BR U * 10% 1450.00 *	*	169. 47 *	*	-5. 15 * 3970. 91 *
4052. 15 * * RI VER-1 173. 16 *	* Reach-1	* 244. 19 *	BR U * 2% 950.00 *	*	173. 06 *	*	-1. 56 * 3970. 91 *
4052. 15 * * RI VER-1	* Reach-1	* 244.19 422.15 *	BR U * 0.2%	*	178.48 *	*	3. 85 * 3970. 91 *
178. 48 * 4052. 15 * *	4650. 74 * *	*	116. 43 * *	161. 43	*		3970. 91 *
*	*	*	*		*	*	*
* RI VER-1 174. 62 * 4009. 75 *	* Reach-1 *	* 244.19	BR D * 1% 800.00 *	*	174. 56 *	*	3930. 35 *
			D 15/				

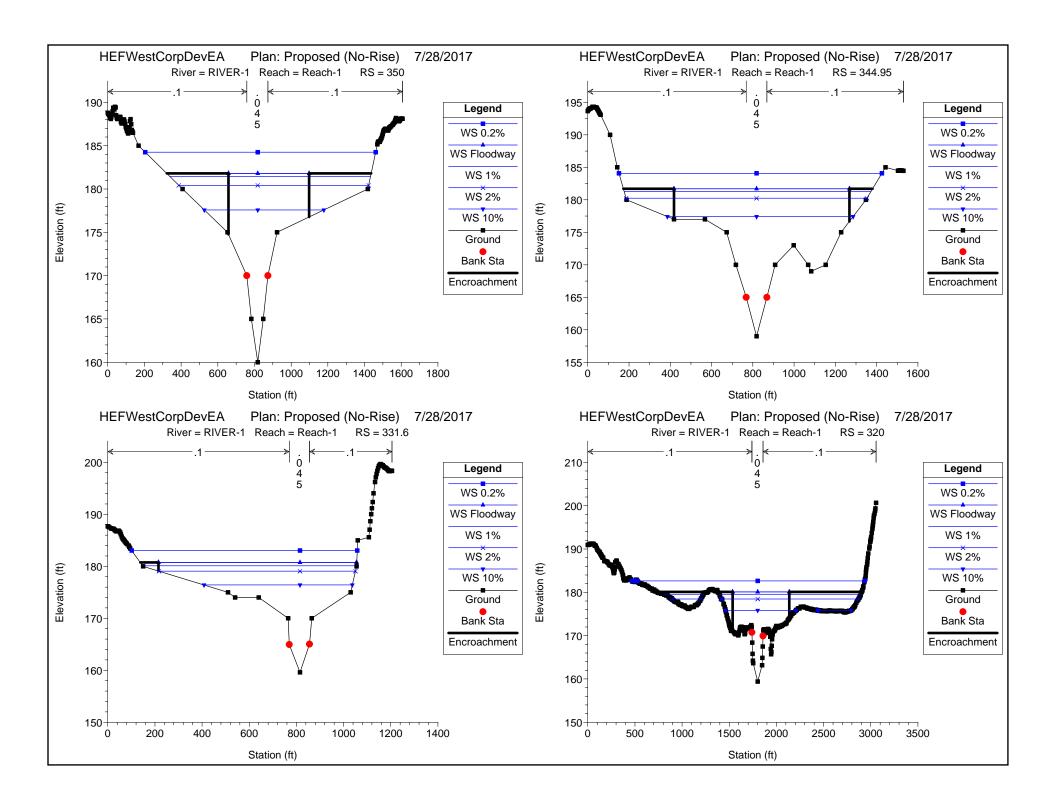
* RI VER-1 175. 48 *	* Reach-1	Exi s <sup>1</sup> * 244. 19 *	ting - 34R LOMR BR D * Floodway * 800.00 *			0. 86 * 3930. 35 *
4009. 75 * * RI VER-1 169. 60 *	* Reach-1 30.00 *	* 244.19 *	BR D * 10% * 1450.00 *	169. 32 * *	*	-5. 23 * 3930. 35 *
4009. 75 * * RI VER-1 173. 06 * 4009. 75 *	* Reach-1	* 244.19 *	BR D * 2% * 950.00 *	172. 97 * *	*	-1.59 * 3930.35 *
* RI VER-1 178. 47 * 4009. 75 *	* Reach-1 4513. 96 *	* 244.19 416.28 *	BR D * 0.2% * 127.80 * 155.	178. 47 * 92 *	*	3. 92 * 3930. 35 *
4009. 75 ** *	* *	*	* *	* *	*	*
* RI VER-1 174. 58 * 4009. 75 *	* Reach-1 55.00 *	* 243.38	* 1% 800. 00 *	174. 57 * *	*	3930. 35 *
* RI VER-1 175. 45 * 4009. 75 *	* Reach-1 55.00 * 4009.00 *	* 243.38	* Floodway * 800.00 *	* 175.43 * * 3954.00		0. 87 * 3930. 35 *
* RI VER-1 169. 47 * 4009. 75 *	* Reach-1 55.00 *	* 243.38	* 10% * 1450.00 *	169. 38 * *	*	-5. 19 * 3930. 35 *
* RI VER-1 173. 01 * 4009. 75 *	* Reach-1 55.00 *	* 243.38	* 2% 950.00 *	* 172. 98 * *	*	-1. 59 * 3930. 35 *
* RI VER-1 178. 47 * 4009. 75 *	* Reach-1 4533.10 *	* 243.38 414.40 *	* 0.2% * 105.66 * 179.	178. 47 * 93 *	*	3. 90 * 3930. 35 *
*	*	*	* *	*		*
*	*	*	*	*	*	*
* RI VER-1 174. 57 *	* Reach-1 700.00 *	* * 243.2 54.76 *	* 1%	* 174.57 * 43 *	*	* 3496.00 *
* RI VER-1 174. 57 * 3575. 79 * * RI VER-1 175. 43 *	* Reach-1 700.00 * * Reach-1 75.30 *	* 243.2	* 1%	* 174.57 * 43 *		3496. 00 * 0. 86 *
* RI VER-1 174. 57 * 3575. 79 * * RI VER-1 175. 43 * 3575. 79 * * RI VER-1 169. 34 *	* Reach-1 700.00 * * Reach-1 75.30 * 3571.10 * * Reach-1 646.09 *	* 243.2 54.76 * * 243.2 0.07 *	* 1% * * 349.80 * 395. * Floodway * 799.93 *	174. 57 * 43 * 175. 43 * 3495. 80	*	3496. 00 * 0. 86 *
* RI VER-1 174. 57 * 3575. 79 * * RI VER-1 175. 43 * 3575. 79 * * RI VER-1 169. 34 * 3575. 79 * * RI VER-1 172. 98 *	* Reach-1 700.00 * * Reach-1 75.30 * 3571.10 * * Reach-1 646.09 * * Reach-1 700.00 *	* 243.2 54.76 * * 243.2 0.07 * * 243.2	* 1%	174. 57 * 43 * 175. 43 * 3495. 80	*	3496.00 *  0.86 * 3496.00 *  -5.24 * 3496.00 *
* RI VER-1 174. 57 * 3575. 79 * * RI VER-1 175. 43 * 3575. 79 * * RI VER-1 169. 34 * 3575. 79 * * RI VER-1 172. 98 * 3575. 79 * * RI VER-1 178. 47 *	* Reach-1 700.00 * * Reach-1 75.30 * 3571.10 * * Reach-1 646.09 * * Reach-1 700.00 *	* 243.2 54.76 * * 243.2 0.07 * * 243.2 105.28 * * 243.2	* 1%	174. 57 * 43 * 175. 43 * 175. 43 * 169. 33 * 29 * 172. 98 *	*	3496.00 *  0.86 * 3496.00 *  -5.24 * 3496.00 *  -1.59 *
* RI VER-1 174. 57 * 3575. 79 * * RI VER-1 175. 43 * 3575. 79 * * RI VER-1 169. 34 * 3575. 79 * * RI VER-1 172. 98 * 3575. 79 * * RI VER-1 178. 47 * 3575. 79 *	* Reach-1 700.00 * * Reach-1 75.30 * 3571.10 * * Reach-1 646.09 * * Reach-1 700.00 * * Reach-1 700.00 *	* 243.2 54.76 * * 243.2 0.07 * * 243.2 105.28 * * 243.2 66.88 *	* 1%	174. 57 * 43 * 175. 43 * 175. 43 * 175. 43 * 169. 33 * 29 * 172. 98 * 27 * 178. 47 *	, * *	3496.00 *  0.86 * 3496.00 *  -5.24 * 3496.00 *  -1.59 * 3496.00 *
* RI VER-1 174. 57 * 3575. 79 * * RI VER-1 175. 43 * 3575. 79 * * RI VER-1 169. 34 * 3575. 79 * * RI VER-1 172. 98 * 3575. 79 * * RI VER-1 178. 47 * 3575. 79 * * RI VER-1 178. 47 *	* Reach-1 700.00 *  * Reach-1 75.30 * 3571.10 *  * Reach-1 646.09 *  * Reach-1 700.00 *  * Reach-1 700.00 *  * Reach-1 1700.00 *	* 243.2 54.76 * * 243.2 0.07 * * 243.2 105.28 * * 243.2 66.88 * * 243.2 45.43 *	* 1%	174. 57 * 43 * 175. 43 * 175. 43 * 175. 43 * 169. 33 * 29 * 172. 98 * 27 * 178. 47 * 4 * 4 * 4 * 174. 57 *	* * * * *	* 3496.00 *  0.86 * 3496.00 *  -5.24 * 3496.00 *  -1.59 * 3496.00 *  3.90 * 3496.00 *
* RI VER-1 174. 57 * 3575. 79 * * RI VER-1 175. 43 * 3575. 79 * * RI VER-1 169. 34 * 3575. 79 * * RI VER-1 172. 98 * 3575. 79 * * RI VER-1 178. 47 * 3575. 79 *  * RI VER-1 178. 47 * 3575. 79 *  * RI VER-1 174. 57 * 1334. 49 * * RI VER-1 175. 42 *	* Reach-1 700.00 *  * Reach-1 75.30 * 3571.10 *  * Reach-1 646.09 *  * Reach-1 700.00 *  * Reach-1 700.00 *  * Reach-1 1430.00 *  * Reach-1 100.00 *	* 243. 2 54. 76 * * 243. 2 0. 07 * * 243. 2 105. 28 * * 243. 2 66. 88 * * 243. 2 45. 43 * *	* 1%	174. 57 * 43 * 175. 43 * 175. 43 * 175. 43 * 169. 33 * 29 * 172. 98 * 27 * 178. 47 * 4 * 4 * 4 * 174. 57 *	* * *	3496.00 *  0.86 * 3496.00 *  -5.24 * 3496.00 *  -1.59 * 3496.00 *  3.90 * 3496.00 *
* RI VER-1 174. 57 * 3575. 79 * RI VER-1 175. 43 * 3575. 79 * RI VER-1 169. 34 * 3575. 79 * RI VER-1 172. 98 * 3575. 79 * * RI VER-1 178. 47 * 3575. 79 *  * RI VER-1 178. 47 * 3575. 79 *  * RI VER-1 178. 47 * 3575. 79 *  * RI VER-1 174. 57 * 1334. 49 * * RI VER-1 175. 42 * 1334. 49 * * RI VER-1 169. 32 *	* Reach-1 700.00 *  * Reach-1 75.30 * 3571.10 *  * Reach-1 646.09 *  * Reach-1 700.00 *  * Reach-1 700.00 *  * Reach-1 700.00 *  * Reach-1 700.00 *  * Reach-1 700.00 *	* 243. 2 54. 76 * * 243. 2 0. 07 * * 243. 2 105. 28 * * 243. 2 66. 88 * * 243. 2 45. 43 * *  * 243 570. 20 *	* 1%	174. 57 *  175. 43 *  175. 43 *  175. 43 *  175. 43 *  169. 33 *  172. 98 *  172. 98 *  174. 57 *  174. 57 *  175. 38 *  175. 38 *  175. 38 *  175. 38 *  175. 38 *  175. 38 *	* * *	* 3496.00 *  0.86 * 3496.00 *  -5.24 * 3496.00 *  -1.59 * 3496.00 *  3.90 * 3496.00 *  *  *  1254.82 *
* RI VER-1 174. 57 * 3575. 79 * RI VER-1 175. 43 * 3575. 79 * RI VER-1 169. 34 * 3575. 79 * RI VER-1 172. 98 * 3575. 79 * * RI VER-1 178. 47 * 3575. 79 *  * RI VER-1 178. 47 * 3575. 79 *  * RI VER-1 174. 57 * 1334. 49 * * RI VER-1 175. 42 * 1334. 49 * * RI VER-1	* Reach-1 700.00 *  * Reach-1 75.30 * 3571.10 *  * Reach-1 646.09 *  * Reach-1 700.00 *  * Reach-1 700.00 *  * Reach-1 1430.00 *  * Reach-1 100.00 *  1335.00 *  * Reach-1 1387.92 *	* 243.2 54.76 * * 243.2 0.07 * * 243.2 105.28 * * 243.2 66.88 * * 243.2 45.43 * * * * 243 570.20 * * 243 150.19 *	* 1%	174. 57 * 43 * 175. 43 * 175. 43 * 175. 43 * 175. 80 * 169. 33 * 29 * 172. 98 * 174. 57 * 82 * 175. 38 * 175. 38 * 175. 38 * 175. 38 * 175. 38 * 175. 38 * 175. 38 * 175. 38 * 175. 38 * 175. 38 * 175. 38 * 175. 38 * 175. 38 * 175. 38 * 175. 38 * 175. 38 *	* * * * * *	* 3496.00 *  0.86 * 3496.00 *  -5.24 * 3496.00 *  -1.59 * 3496.00 *  3.90 * 3496.00 *  *  *  1254.82 *  0.81 * 1254.82 *  -5.26 *

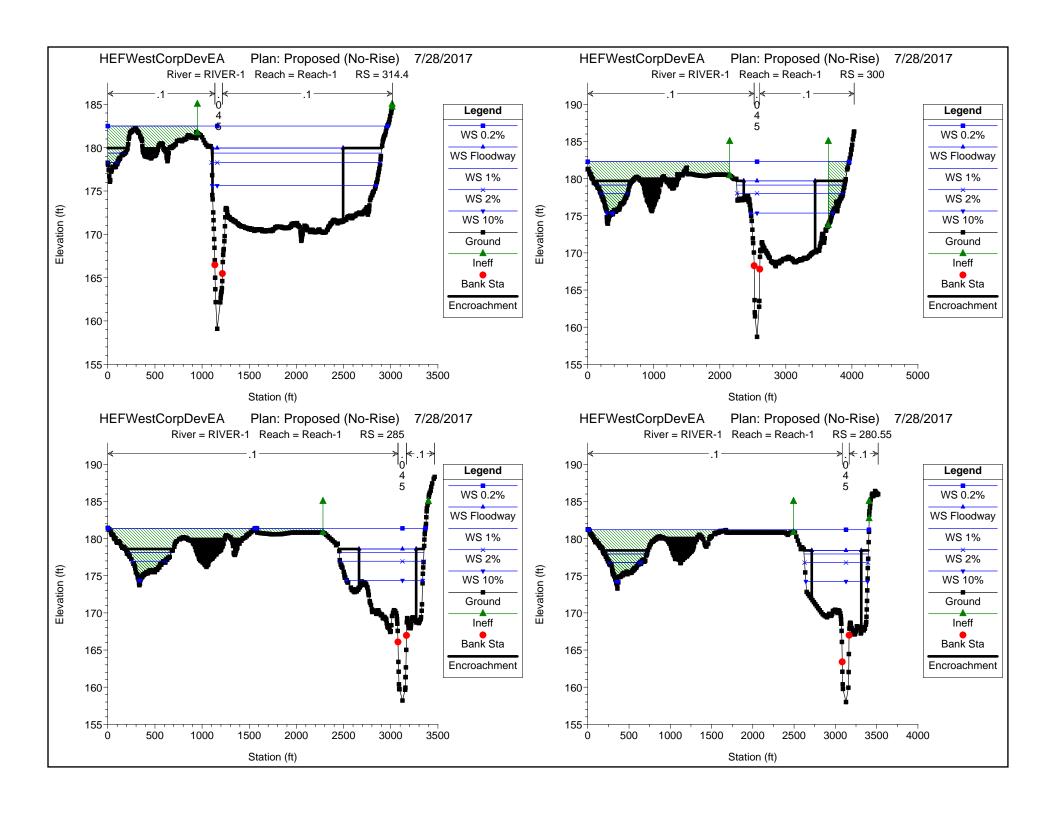
				Γv	: -+	:	240 1	OMD					
* RIVER-1	*	Reach-1		* 243		ing -	* 0.2%	6	*	178	47 *		3. 91 *
178. 47 * 1334. 49 *		1430. 00	^		^	3/3.	73 *	1329	. 02	^		*	1254. 02
* *	*	4	*	*	*	,	*		*	*	*	*	*
* RI VER-1 174. 56 *	*	Reach-1 1068. 78		* 190 11.55	*	, 743.	* 1% .81 *	1909	* 9. 64	* 174.	56 *	*	* 147. 22  *
217. 68 * * RI VER-1 175. 30 *		Reach-1 488.00	*	* 190 4. 29	*	, 1182.	* Floo 80 *	odway 1477	* 7. 91	*175	29 * 144.00	) *	0. 73  * 147. 22  *
217. 68 * * RI VER-1 169. 19 *		. 00 * Reach-1 1062. 51		* 190 8.77	*	, 1207.	* 10% 30 *	1798		,169. *	18 *	*	-5. 38  * 147. 22  *
217. 68 * * RI VER-1 172. 96 *	*	Reach-1 1066.83	*	* 190 10. 98	*	847.	* 2% 79 *	1946	* 5. 23	* 172.	96 *	*	-1.60 * 147.22 *
217. 68 * * RI VER-1 178. 47 *	*	* Reach-1 1609. 35		* 190 13. 39	*	601.	* 0. 2% 21 *	4 1485	* 5. 40	* 178	47 *	*	3. 91  * 147. 22  *
217. 68 *	*	*	*	*	*	,	*		*	*	*	*	*
* RI VER-1 174. 55 *	*	Reach-1 3419. 79		* 182 962. 12	*	2040.	* 1% 88 *	16962	* 2. 00	* 174.	54 *	*	639. 94 *
754. 21 * * RI VER-1 175. 28 *		* Reach-1 2380.00	*	* 182 338. 54	*	2047.	* Floo 59 *	odway 17578	* 8. 87	*175	28 * 546.00	) *	0. 73 * 639. 94 *
754. 21 * * RI VER-1 169. 16 *	2926	. 00 * Reach-1 2823. 72	*	* 182 342. 94	*		* 10% .42 *	8562		,169. *	15 *	*	-5. 39 * 639. 94 *
754. 21 * * RI VER-1 172. 95 *	*	Reach-1 3253. 64		* 182 747. 98	*	, 1914.	* 2% .05 *	14492	* 2. 97	* 172.	94 *	*	-1.60 * 639.94 *
754. 21 * * RI VER-1 178. 47 *	*	Reach-1 3694.00		* 182 1562. 89	*	2382.	* 0. 2% 47 *	6 23554	* 1. 64	, 178. *	46 *	*	3. 92 * 639. 94 *
754. 21 *	*		*	*	*	7	*		*	*	*	*	*
* RI VER-1 174. 53 *	*		*	* 180 5726. 09	*		* 1% .64 *		* 3. 27	* 174.	52 *	*	1363. 83 *
1465. 19 * * RI VER-1 175. 27 * 1465. 19 *		Reach-2 2384.00 0.00 *	*	* 180 4714. 23	*	3624.	* Floo 49 *	odway 1162 <i>6</i>	* 5. 28	* 175	26 * 696. 00	) *	0. 73 * 1363. 83 *
* RI VER-1 169. 13 * 1465. 19 *		Reach-2 2877, 45		* 180 2338. 71	*		* 10% 50 *	5282	* 2. 79	* 169.	11 *	*	-5. 41 * 1363. 83 *
* RI VER-1 172. 93 * 1465. 19 *	*	Reach-2 3300.79		* 180 4694. 70	*	3391.	* 2% 42 *	9068	* 3. 88	* 172.	91 *	*	-1. 61 * 1363. 83 *
* RI VER-1 178. 46 * 1465. 19 *	*	Reach-2 3620. 41		* 180 8428. 02	*	4018.	* 0. 2% . 63 *	15053	* 3. 35	*178	45 *	*	3. 92 * 1363. 83 *
1403. 19 *	*		*	*	*	,	*		*	*	*	*	*
* RI VER-1 174. 49 *	*	* Reach-2 3122, 88		* 170 8014. 20	*	, 4393.	* 1% .02 *				47 *	*	* 1627.88 *
1729. 19 *		*				Page 1	158						

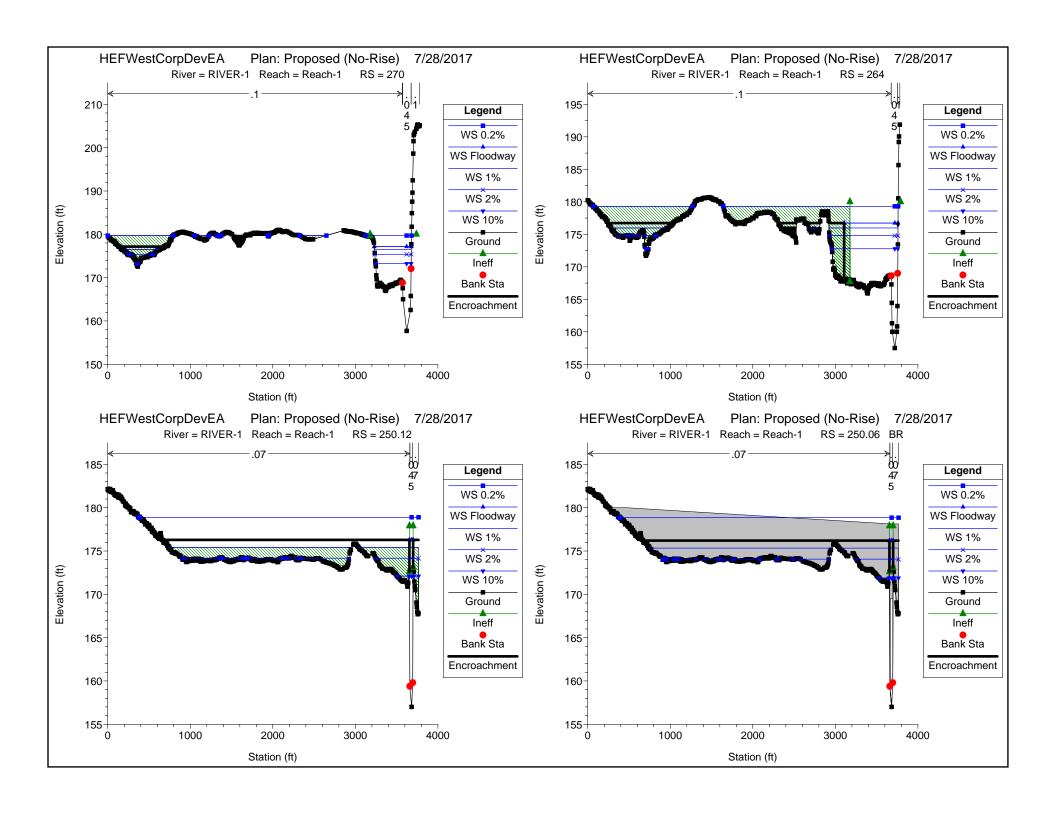
\* 170 \* RI VER-1 \* Reach-2 0.74 \* 2300.00 \* 7803.99 \* 175. 23 \* 1729. 19 \* 2961.00 \* \* 170 \* Reach-2 RI VER-1 -5.47 \* 2632. 32 \* 3902.63 \* 169.04 \* 1729. 19 \* \* RI VER-1 \* Reach-2 \* 170 -1.62 \* \* 1627.88 \* 172.87 \* 3039.49 \* 6843.31 \* 1729. 19 \* \* 170 3. 94 \* \* 1627. 88 \* \* RI VER-1 \* Reach-2 178.42 \* 3306.87 \* 10988.85 \* 1729. 19 \* \*

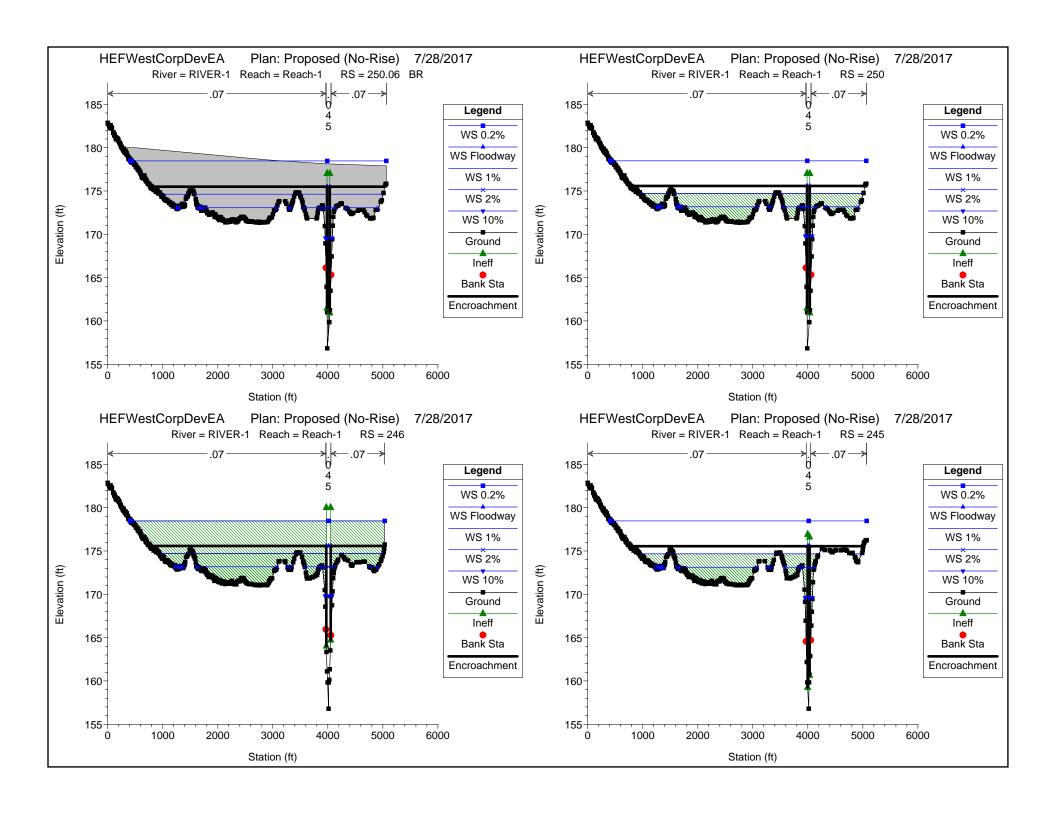
# APPENDIX E BROAD RUN PROPOSED CONDITIONS MODEL

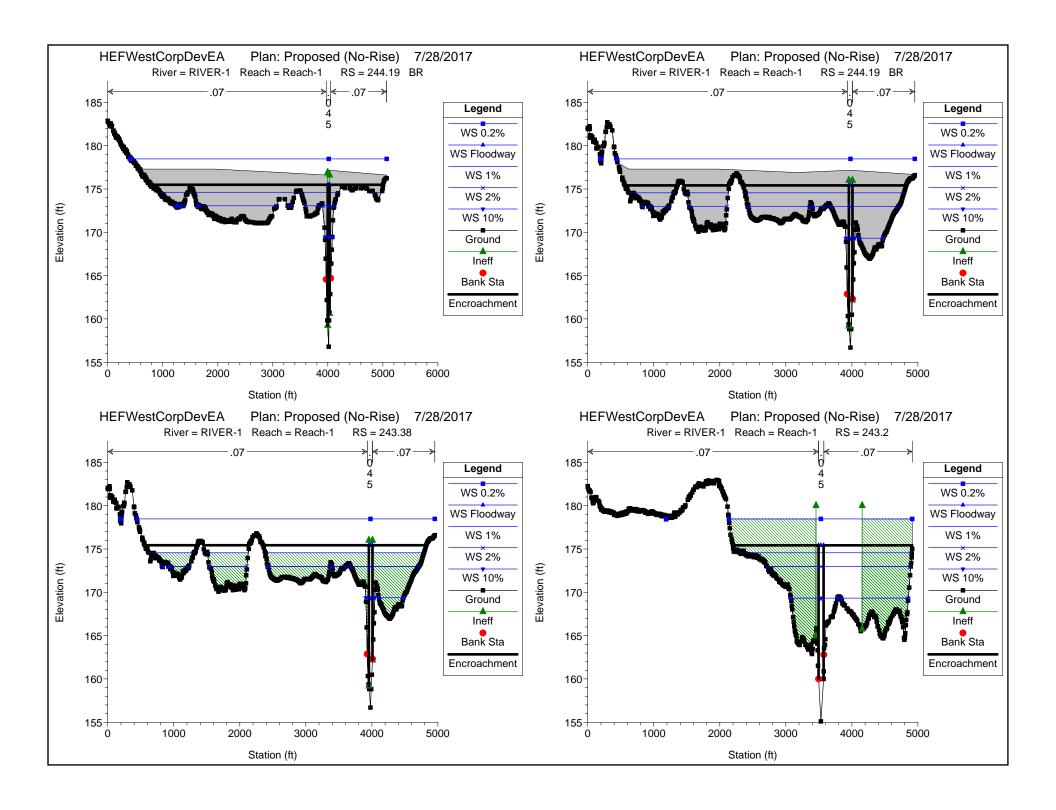


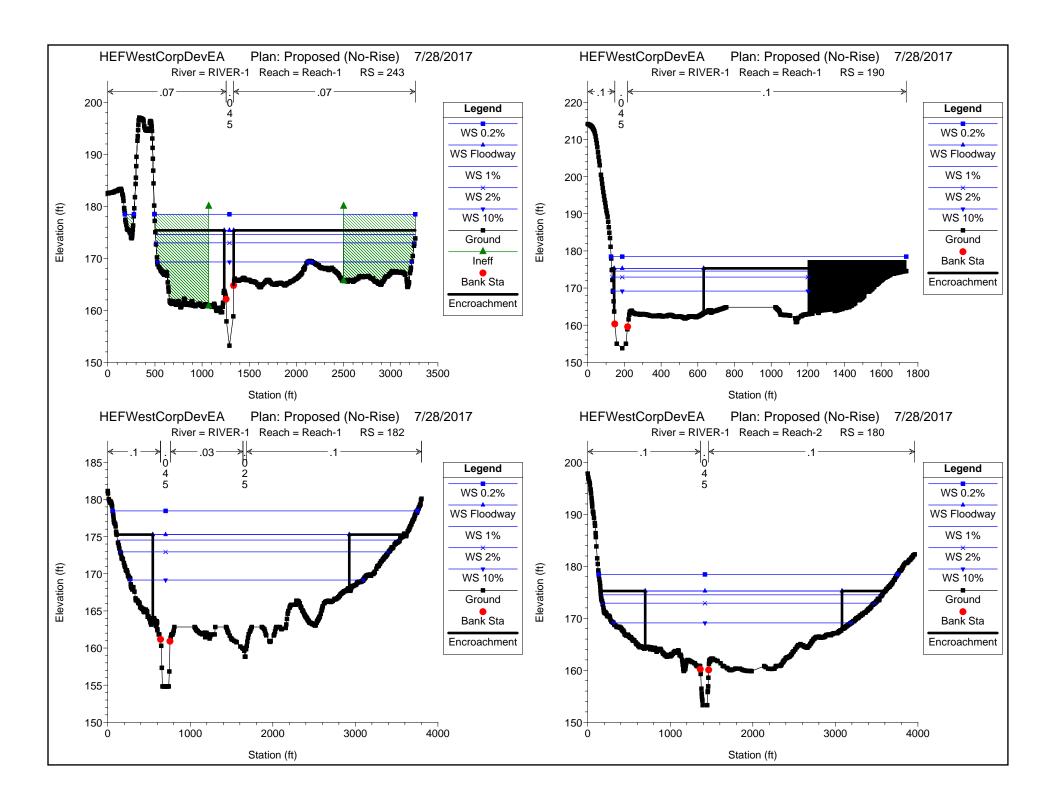


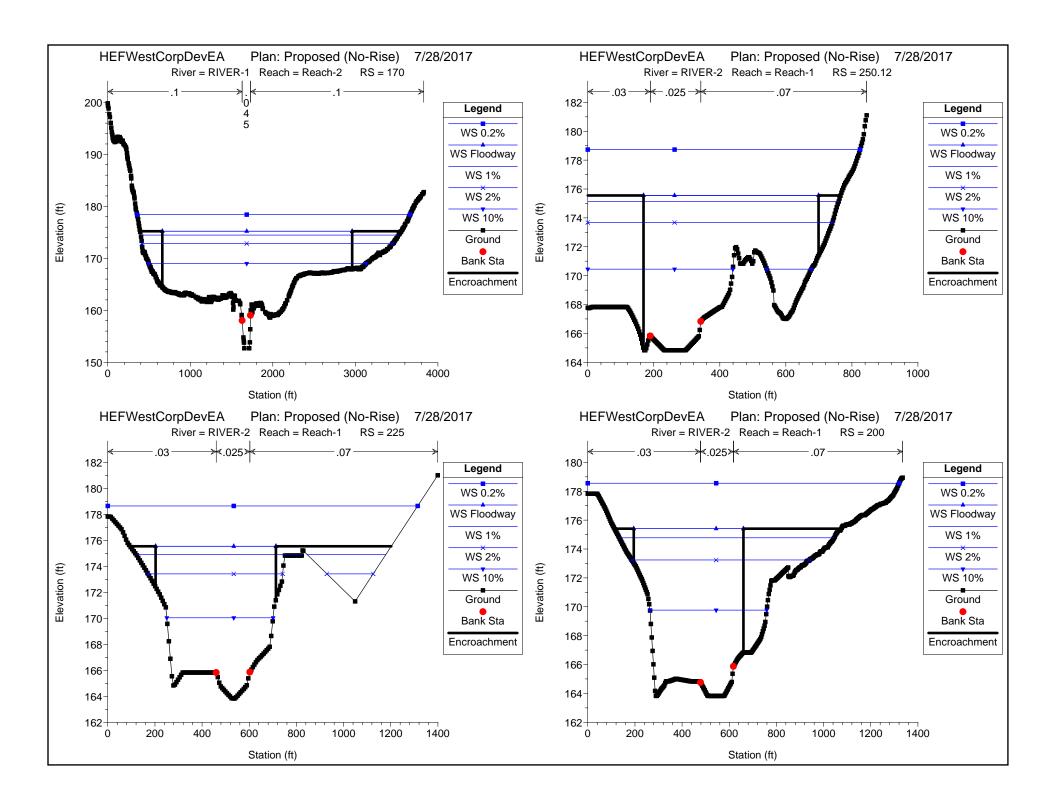


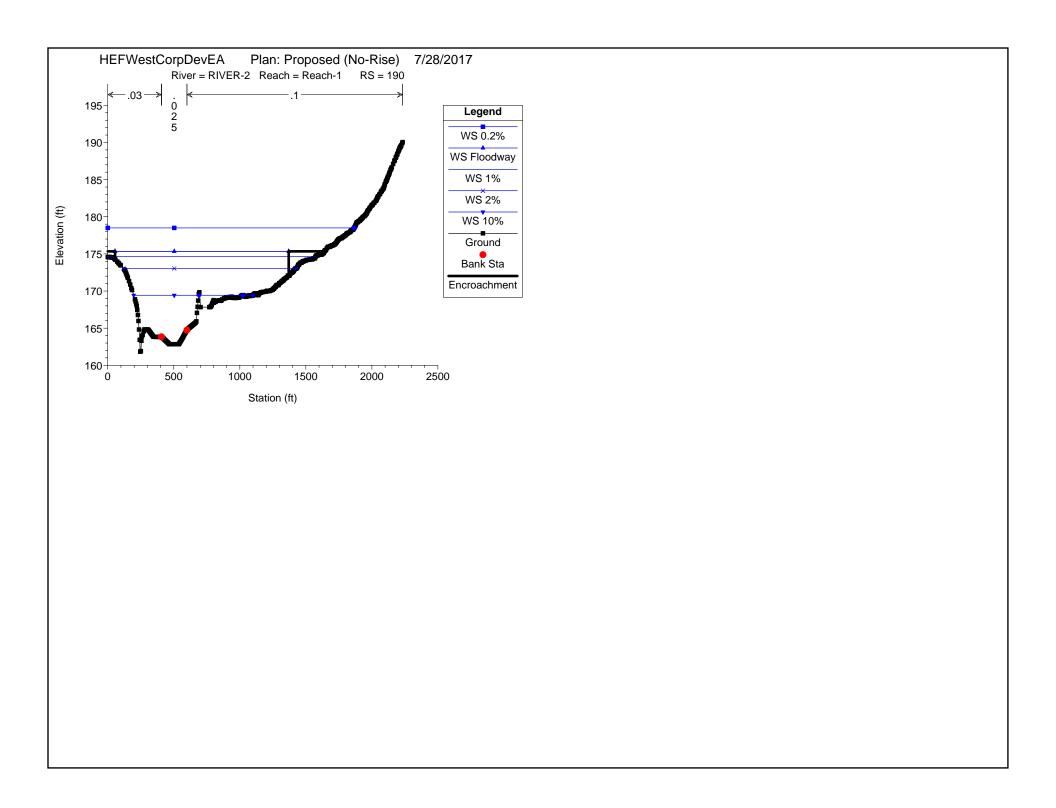












#### Proposed - No-Rise

HEC-RAS HEC-RAS 5.0.1 April 2016 U.S. Army Corps of Engineers Hydrologic Engineering Center 609 Second Street Davis, California

Χ	Χ	XXXXXX	XXXX		XXXX XXXX		Х	Χ	XXXX	
Χ	Χ	Χ	Χ	Χ		Χ	Χ	Χ	Χ	Χ
Χ	Χ	Χ	Χ			Χ	Χ	Χ	Χ	Χ
XXXX	(XXX	XXXX	Χ		XXX	XX	XX	XXX	XXX	XXXX
Χ	Χ	Χ	Χ			Χ	Χ	Χ	Χ	X
Χ	Χ	Χ	Χ	Χ		Χ	Χ	Χ	Χ	Х
Χ	Χ	XXXXXX	XX	XX		Χ	Χ	Χ	Χ	XXXXX

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

PROJECT DATA

Project Title: HEFWestCorpDevEA
Project File: HEFWestCorpDevEA.prj
Run Date and Time: 7/28/2017 11:37:07 AM

Project in English units

Project Description: All Elevations in NGVD 29 NGVD29 = NAVD88 + 0.827

Manassas, Prince William County, Virginia

Manassas Regional Airport - West Corporate Development and

East Side Parcel CLOMR

Broad Run

Model beings at FEMA X/S "R" STA. 170

Model

ends at FEMA X/S "Z" STA. 350

Duplicate Effective Model:

Effecti ve

including FEMA issued LOMRS - divided flow reach

Existing Conditions

2017 Manassas Regional Airport Runway 34R Extension Program LOMR -

Ongoing with FEMĂ

Proposed Conditions Model: West Corporate Development

Proposed Layout

Revisions to X/S 314.4 through X/S 264

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

PLAN DATA

Plan Title: Proposed (No-Rise)

Plan File: C:\Users\wilsons\Desktop\HEF EA\Broad Run HEC-RAS\HEFWestCorpDevEA.p05

Geometry Title: Proposed (No-Rise)

Geometry File: C:\Users\wilsons\Desktop\HEF EA\Broad Run HEC-RAS\HEFWestCorpDevEA. g05

Flow Title : Existing (34R LOMR)
Flow File : C:\Users\wilsons\Desktop\HEF EA\Broad Run

HEC-RAS\HEFWestCorpDevEA. f03

Plan Summary Information:

Cross Sections = 25 Number of: Multiple Openings = 0 Cul verts = 0 Inline Structures = 0 Bri dges 2 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01 Critical depth calculation tolerance = 0.01 Maximum number of iterations 20 0.3 Maximum difference tolerance Flow tolerance factor 0.001

Computation Options

Critical depth computed only where necessary

Conveyance Calculation Method: At breaks in n values only Friction Slope Method: Program Selects Appropriate method Friction Slope Method: Computational Flow Regime:

Subcritical Flow

Encroachment Data

Equal Conveyance = True Left Offset

0 0 Right Offset =

Ri ver = RS 350 344. 95 331. 6 320 314. 4 300 285 280. 55 270 264 250. 12 250 246 245 243. 38 243. 2 243 190 182	RIVER-1 Profile Floodway	Reach = Method	Reach-1 Val ue1 658 418 215 1536 1110 2363 2664 2714 3229 3106. 1 3655 3985 3972 3996 3954 3495. 8 1235 144 546	Val ue2 1098 1268 1055 2136 2495 3443 3269 3314 3678 3759 3700 4035 4052 4031 4009 3571.1 1335 632 2926
Ri ver = RS 180 170	RIVER-1 Profile Floodway Floodway	Reach = Method 1	Reach-2 Val ue1 696 661	Val ue2 3080 2961
Ri ver = RS 250. 12 225 200 190	RIVER-2 Profile Floodway Floodway Floodway Floodway	Reach = Method 1 1 1 1	Reach-1 Val ue1 169 203 195 55 Pa	Val ue2 699 713 660 1370 ge 2

******	* * * * * * * * * * * * * * * * * *	******	* * * * * * * * * * * * * * * *	*****
FLOW DATA				
Flow Title: Exist Flow File: C:\Us	ing (34R LOMR) ers\wilsons\Desl	ktop\HEF EA\Broad	Run HEC-RAS\H	EFWestCorpDevEA. f03
Flow Data (cfs) ****************			******	******
* River	Reach	RS *	1%	Floodway
10% * RI VER-1	2% Reach-1	0. 2% * 350 *	17700	17700
8780 * RI VER-1	15000 Reach-1	25700 * 250. 12 *	800	800
1450 * RI VER-1	950 Reach-1 2805	700 * 243 * 2100 *	2665	2665
3015 * RI VER-1	Reach-1	182 *	19965	19965
10495 * RI VER-1	17155 Reach-2	180 *	19965	19965
10495 * RI VER-2	17155 Reach-1	27500 * 250.12 *	17300	17300
7480	14350		*****	******
Boundary Condition	*****		******	******
* River Downstream	Reach *	Profile	*	Upstream
******				
* RIVER-1 Known WS = 174.47	Reach-2	1%	*	
* RI VER-1 Known WS = 175.21	Reach-2	FI oodway	*	
* RI VER-1 Known WS = 169	Reach-2	10%	*	
* RI VER-1 Known WS = 172.85	Reach-2	2%	*	
* RI VER-1 Known WS = 178.41	Reach-2	0. 2%	*	
	*****	******	*****	******
		* * * * * * * * * * * * * * * * *	* * * * * * * * * * * * * * * * * * *	*****
GEOMETRY DATA				
Geometry Title: F Geometry File : C HEC-RAS\HEFWestCo	:: \Ūsers\wi I sons`	e) \Desktop\HEF EA\B	road Run	
Reach Connection		*****	*****	*****
* Ri ver	Reach	* Upstream B	oundary * Dowr	nstream Boundary *
* RI VER-1 * RI VER-1	Reach-1 Reach-2	* * A	* A	*
NI VLN-I	NGACII-Z	Page 3		

#### Proposed - No-Rise \* RI VER-2 Reach-1 JUNCTION INFORMATION Name: A Description: Energy computation Method Length across Junction Tri butary Length Angl e Ri ver Reach Ri ver Reach RI VER-1 Reach-1 to RIVER-1 Reach-2 635 RI VER-2 Reach-1 to RIVER-1 Reach-2 1760 CROSS SECTION RIVER: RIVER-1 REACH: Reach-1 RS: 350 I NPUT Description: XS 350 (LETTERED CROSS-SECTION Z) SOUTHERN RAILROAD Station Elevation Data num= El ev Sta Elev Sta Elev Sta Elev Sta Elev Sta Sta El ev 0 188. 79 3. 27 188. 68 6. 54 188. 56 9. 82 188. 42 13.09 188.22 188. 09 189. 24 188. 29 189. 21 22. 91 39. 27 188. 6 189.37 16. 36 19. 63 26. 18 188. 97 29. 45 36 52. 36 68. 72 42.54 32.72 189. 48 189. 41 45.81 188. 5 188. 28 187. 56 187. 79 188. 17 187. 74 49.09 188. 2 188.08 55.63 58. 9 188. 23 187. 75 62. 18 75.27 65.45 188.33 188.3 71.99 78. 54 187.83 85.08 81.81 187.95 88.36 188.03 91.63 94. 9 187.51 98.17 187. 16 101.45 186.96 104. 72 186. 72 107. 99 186. 57 111. 26 186.41 188.06 114.54 186. 57 117.81 187. 13 121. 08 187.84 124.35 127.63 187.48 134. 17 758 180 130.9 186. 81 186. 66 137.44 186.49 168 185 408 653 175 170 783 165 818 160 848 165 175 756 170 923 185. 49 1479. 58 185. 89 1495. 96 186. 84 1512. 34 186. 75 1528. 72 187. 21 1545. 11 185. 15 1473. 03 185. 61 1489. 41 186. 63 1505. 79 186. 9 1522. 17 175 180 1469.75 873 1418 185. 4 185. 45 1482. 86 186. 11 1499. 24 186. 92 1515. 62 186. 76 1532 187. 26 1551. 66 185. 45 1486. 13 186. 35 1502. 51 186. 96 1518. 9 186. 92 1535. 28 187. 4 1554. 94 1476.3 185.76 1492.68 186.79 1509.07 186.8 1525.45 187.09 1538.55 187.11 187. 45 1558. 21 187.58 1541.83 187. 77 1568. 04 187. 95 1584. 42 1561.49 187.63 1564.76 187. 96 1571. 32 188. 19 1574. 59 188.09 187. 81 1590. 98 188. 01 1581. 15 188. 01 1597. 53 1577.87 187. 84 1587. 7 187.88 188. 14 1604. 08 1594. 25 188. 1 1600. 8 188. 13 1607. 36 188. 11 Manning's n Values num= n Val Sťa n Val Sta n \ \*\*\*\*\*\*\*\*\* Sta n Val . 1 758 . 045 873 . 1 Lengths: Left Channel Right Coeff Contr. Ri ght Bank Sta: Left Expan. 873 505 505 505 . 1 . 3 CROSS SECTION OUTPUT Profile #1% \* E.G. Elev (ft) \* 181.91 \* Element Left OB \* Channel \* Right OB \* Vel Head (ft) 0.46 \* Wt. n-Val. 0. 100 0.045 0.100 \* \* W.S. Elev (ft) \* 181.45 \* Reach Len. (ft) \* 505.00 \* 505.00 \* 505.00 \*

	Pr	oposed - No-Rise					
* Crit W.S. (ft) 2414.61 *	*	* Flow Area (sq ft)	*	1958. 93	*	1929. 52	*
* E.G. Slope (ft/ft)	*0.000901	* Area (sq ft)	*	1958. 93	*	1929. 52	*
2414. 61 * * Q Total (cfs) 2853. 16 *	*17700.00	* Flow (cfs)	*	2439. 38	*1	2407. 46	*
* Top Width (ft) 559.59 *	* 1094.31	* Top Width (ft)	*	419. 71	*	115. 00	*
* Vel Total (ft/s) 1.18 *	* 2.81	* Avg. Vel. (ft/s)	*	1. 25	*	6. 43	*
* Max Chl Dpth (ft) 4.31 *	* 21.45	* Hydr. Depth (ft)	*	4. 67	*	16. 78	*
* Conv. Total (cfs) 95055.9 *	*589693.6	* Conv. (cfs)	*	81270. 5	*4	13367. 1	*
* Length Wtd. (ft)	* 505.00	* Wetted Per. (ft)	*	419. 90	*	116. 76	*
* Min Ch El (ft)	* 160.00	* Shear (Ib/sq ft)	*	0. 26	*	0. 93	*
0. 24 *  * Al pha 0. 29 *	* 3.73	* Stream Power (Ib/ft s)	*	0. 33	*	5. 98	*
* Frctn Loss (ft)	* 0.34	* Cum Volume (acre-ft)	*	1523. 30	*	586. 16	*
* C & E Loss (ft) 210.31 *	* 0.07	* Cum SA (acres)		276. 32	*	31. 05	*
*************************	*****	********	* *	*****	***	*****	**

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

# 

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****							
* E.G. Elev (ft) Right OB *	* 182.35	* Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.100 *	* 0.56	* Wt. n-Val.	*	0. 100	*	0.045	*
* W.S. Elev (ft)	* 181.80	* Reach Len. (ft)	*	505.00	*	505. 00	*
505.00 * * Crit W.S. (ft) 1499.51 *	*	* Flow Area (sq ft)	*	941. 54	*	1969. 08	*
* E.G. Slope (ft/ft) 1499.51 *	*0.000982	* Area (sq ft)	*	941. 54	*	1969. 08	*
* Q Total (cfs)	*17700.00	* Flow (cfs)	*	1866. 82	* *	13398. 57	*
* Top Width (ft)	* 440.00	* Top Width (ft)	*	100.00	*	115. 00	*
* Vel Total (ft/s)	* 4.01	* Avg. Vel. (ft/s)	*	1. 98	*	6. 80	*
1.62 * * Max Chl Dpth (ft) 6.66 *	* 21.80	* Hydr. Depth (ft)	*	9. 42	*	17. 12	*
* Conv. Total (cfs) 77696.1 *	*564863.1	* Conv. (cfs)	*	59576. 2	* 4	127590. 8	*
* Length Wtd. (ft) 230.29 *	* 505.00	* Wetted Per. (ft)	*	107. 15	*	116. 76	*
* Min Ch El (ft) 0.40 *	* 160.00	* Shear (Ib/sq ft)	*	0. 54	*	1. 03	*
* Al pha	* 2. 22	* Stream Power (lb/ft s)	*	1. 07	*	7. 03	*
* Frctn Loss (ft)	* 0.35	* Cum Volume (acre-ft)	*	511. 61	*	602. 65	*
1324.78 * * C & E Loss (ft)	* 0.11	* Cum SA (acres) Page 5	*	56. 24	*	30. 76	*

11 0p03cu - N0-K13c	
94. 78   *	
*************************	
+++++	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CDUCC	SECTION	UITDIIT	Profile	#10%
CKUSS	SECTION	UUTPUT	Prome	# 10%

**************************************							
****							
* E.G. Elev (ft) Right OB *	* 177. 96	* Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.100 *	* 0.38	* Wt. n-Val.	*	0. 100	*	0. 045	*
* W.S. Elev (ft) 505.00 *	* 177.58	* Reach Len. (ft)	*	505.00	*	505.00	*
* Cri t W.S. (ft) 583.91 *	*	* Flow Area (sq ft)	*	696. 80	*	1484. 36	*
* E.G. Slope (ft/ft) 583.91 *	*0.000846	* Area (sq ft)	*	696. 80	*	1484. 36	*
* 0 Total (cfs) 388.34 *	* 8780.00	* Flow (cfs)	*	627. 46	*	7764. 20	*
* Top Width (ft) 305.56 *	* 652.04	* Top Width (ft)	*	231. 49	*	115. 00	*
* Vel Total (ft/s) 0.67 *	* 3. 18	* Avg. Vel. (ft/s)	*	0. 90	*	5. 23	*
* Max Chl Dpth (ft) 1.91 *	* 17.58	* Hydr. Depth (ft)	*	3. 01	*	12. 91	*
* Conv. Total (cfs) 13353.6 *	*301914.5	* Conv. (cfs)	*	21576. 2	* 2	266984. 7	*
* Length Wtd. (ft) 305.82 *	* 505.00	* Wetted Per. (ft)	*	231. 63	*	116. 76	*
* Min Ch El (ft) 0.10 *	* 160.00	* Shear (Ib/sq ft)	*	0. 16	*	0. 67	*
* Al pha 0. 07 *	* 2.41	* Stream Power (Ib/ft s)	*	0. 14	*	3. 51	*
* Frctn Loss (ft) 965.44 *	* 0.31	* Cum Volume (acre-ft)	*	660. 56	*	446. 07	*
* C & E Loss (ft) 183.67 *	* 0.06	* Cum SA (acres)	*	120. 68	*	31. 18	*
	*****	******	**	****	***	****	**
*****							
*****							

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

#### CROSS SECTION OUTPUT Profile #2%

******	******	********	*******
*****			
* E.G. Elev (ft) Right OB *	* 180.88	* Element	* Left OB * Channel *
* Vel Head (ft) 0.100 *	* 0.46	* Wt. n-Val.	* 0.100 * 0.045 *
* W.S. Elev (ft) 505.00 *	* 180. 42	* Reach Len. (ft)	* 505.00 * 505.00 *
* Crit W.S. (ft) 1842.44 *	*	* Flow Area (sq ft)	* 1551.34 * 1810.83 *
* E.G. Slope (ft/ft) 1842.44 *	*0.000925	* Area (sq ft)	* 1551.34 * 1810.83 *
* 0 Total (cfs) 1865.62 *	*15000.00	* Flow (cfs)	* 1822. 19 *11312. 19 *

```
Proposed - No-Ri se
* Top Width (ft)
                        * 1034.40 * Top Width (ft)
                                                              370. 17 * 115. 00 *
549. 22
* Vel Total (ft/s)
                             2.88 * Avg. Vel. (ft/s)
                                                                1. 17
                                                                           6. 25
  1.01
* Max Chl Dpth (ft)
                                  * Hydr. Depth (ft)
                                                                4. 19
                                                                          15.75
                            20.42
  3. 35
* Conv. Total (cfs) 61328.3 *
                        *493093.8
                                  * Conv. (cfs)
                                                           * 59900.7
                                                                      *371864.8
 Length Wtd. (ft)
                           505.00
                                   * Wetted Per. (ft)
                                                              370.35
                                                                         116.76
549. 52
                                  * Shear (Ib/sq ft)
* Min Ch El (ft)
                           160.00
                                                                0.24
                                                                           0.90
  0.19
 Al pha
                             3.58
                                   * Stream Power (lb/ft s) *
                                                                0.28
                                                                           5.60
  0. 20
* Frctn Loss (ft)
                             0.34
                                   * Cum Volume (acre-ft)
                                                           * 1172.96
                                                                         544.04
1715.61
                                  * Cum SA (acres)
* C & E Loss (ft)
                             0.08
                                                              228.81
                                                                          31.05
205. 26 *
**************************************
*****
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Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

#### CROSS SECTION OUTPUT Profile #0.2%

*****	****	*****	~ ~ .	~ ~ ~ ~ ~ ~ ~ ~ ~ ~	~ ~ .		^ ^
*****							
* E.G. Elev (ft)	* 184.67	* Element	*	Left OB	*	Channel	*
Right OB *							
* Vel Head (ft)	* 0.42	* Wt. n-Val.	*	0. 100	*	0. 045	*
0. 100 *		d	.1.				*
* W.S. Elev (ft)	* 184. 25	* Reach Len. (ft)	*	505.00	*	505.00	*
505.00 *	*	* [] aw Area (ar ft)	*	2210 / 4	*	2250 7/	*
* Crit W.S. (ft) 4017.00 *		* Flow Area (sq ft)		3318. 64		2250. 76	
* E.G. Slope (ft/ft)	*0.000794	* Area (sq ft)	*	3318. 64	*	2250. 76	*
4017. 00 *	0.000794	Area (Sq Tt)		3310.04		2230.70	
* Q Total (cfs)	*25700.00	* Flow (cfs)	*	4584. 22	* -	15059. 76	*
6056.02 *	20,00.00	11011 (010)		10011.22		10007.70	
* Top Width (ft)	* 1256.46	* Top Width (ft)	*	553.80	*	115.00	*
587. 66 *		•					
* Vel Total (ft/s)	* 2.68	* Avg. Vel. (ft/s)	*	1. 38	*	6. 69	*
1. 51 *							
* Max_Chl_Dpth (ft)	* 24. 25	* Hydr. Depth (ft)	*	5. 99	*	19. 57	*
6. 84 *	*011010 O	* (-5-)	4.	1/2/40 0	<b>4</b> r	-04000 1	
* Conv. Total (cfs)	*911840. 9	* Conv. (cfs)	^	162648. 9	^ (	534323. 1	
*214868.8 * * Length Wtd. (ft)	* 505.00	* Wetted Per. (ft)	*	554. 01	*	116. 76	*
588. 15 *	303.00	wetted Fer. (It)		554.01		110.70	
* Min Ch El (ft)	* 160.00	* Shear (Ib/sq ft)	*	0. 30	*	0. 96	*
0.34 *	100.00	311car (16/34 11)		0. 50		0. 70	
* Al pha	* 3.77	* Stream Power (lb/ft s)	*	0. 41	*	6. 40	*
0. 51 *		(					
<pre>* Frctn Loss (ft)</pre>	* 0.31	* Cum Volume (acre-ft)	*	2866. 48	*	698. 59	*
2972. 87 *		•					
* C & E Loss (ft)	* 0.06	* Cum SA (acres)	*	501. 14	*	32. 28	*
244. 99 *	and an area area area area.			de de de de de de de de Colo			
*******	*****	*******	**:	****	× × )		* *
^^^^^							

CROSS SECTION

RI VER: RI VER-1 RS: 344.95 REACH: Reach-1 Description: XS 344.95 (LETTERED CROSS-SECTION Y) Station Elevation Data num= Elev Sta Elev Sta Elev ELev Sta \*\*\*\*\*\*\*\* 3. 28 22. 94 39. 32 55. 71 193.66 193.86 6. 55 193. 97 9.83 194.05 13. 11 194.06 194. 13 194. 25 194. 25 16.39 194. 31 26. 22 194. 31 29.49 194. 32 32.77 194. 21 42.6 45. 88 62. 26 36.05 49. 16 194. 2 194 193.82 52.43 193.63 193.43 58.99 193. 27 193.09 108 190 418 143 188 180 177 175 185 177 568 673 718 170 818 159 908 170 768 165 868 165 998 173 1068 170 1083 169 1153 170 1228 175 184. 49 1506. 82 184. 48 1510. 08 184. 51 1348 180 1443 185 1503.55 184. 52 1529. 69 184. 46 1513. 35 184. 55 1523. 16 Manning's n Values Sta n Val 768 . 045 868 Bank Sta: Left Lengths: Left Channel Right Coeff Contr. Expan. Ri ght 768 700 1400 1400 868 . 1 CROSS SECTION OUTPUT Profile #1% \* E.G. Elev (ft) \* 181.50 \* Element \* Left OB \* Channel \* Right OB \* Vel Head (ft) \* 0.22 \* Wt. n-Val. 0.100 \* 0.045 \* 0.100 \* \* W.S. Elev (ft) \* 181.28 \* Reach Len. (ft) \* 700.00 \* 1400.00 1400.00 \* \* Crit W.S. (ft) \* Flow Area (sq ft) \* 2928.27 \* 1928.17 \* 4245. 82 \* E.G. Slope (ft/ft) \*0.000441 \* Area (sq ft) \* 2928.27 \* 1928.17 4245.82 \* 0 Total (cfs) 5477.82 \* \*17700.00 \* Flow (cfs) \* 2652.52 \* 9569.66 \* Top Width (ft) \* 1195.89 \* Top Width (ft) 591.54 100.00 504. 35 \* \* Vel Total (ft/s) \* 1.94 \* Avg. Vel. (ft/s) 0.91 4.96 1. 29 \* \* Max Chl Dpth (ft) \* Hydr. Depth (ft) 4.95 22. 28 19. 28 8. 42 \*
\* Conv. Total (cfs)
\*260815.5 \* \* Conv. (cfs) \*842749.5 \*126294.2 \*455639.9 \* Length Wtd. (ft) \* 1273.80 \* Wetted Per. (ft) 592.17 100.72 505. Ĭ2 \* \* Min Ch El (ft) \* Shear (lb/sq ft) \* 159.00 0.14 0.53 0. 23 3.69 \* Stream Power (lb/ft s) \* Al pha 0.12 \* 2.62 0.30 \* Frctn Loss (ft) 0.80 2011. 50 C & E Loss (ft) 0.03 \* Cum SA (acres) \* 270.46 \* 29.80 \*

Page 8

204.14 \*

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Proposed - No-Rise
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Floodwa	CROSS	SECTI ON	OUTPUT	Profile	#FI oodway
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*************************						
*****						
* E.G. Elev (ft) Right OB *	* 181. 90	* Element	* Left (	OB * Channel *		
* Vel Head (ft)	* 0. 20	* Wt. n-Val.	* 0.10	0 * 0.045 *		
* W.S. Elev (ft)	* 181.70	* Reach Len. (ft)	* 700.00	0 * 1400.00 *		
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 2427.9	4 * 1970. 13 *		
4162.17 * * E.G. Slope (ft/ft)	*0.000392	* Area (sq ft)	* 2427.9	4 * 1970. 13 *		
4162.17 * * Q Total (cfs)	*17700.00	* Flow (cfs)	* 2571.79	9 * 9348.31 *		
5779.90 * * Top Width (ft)	* 850.00	* Top Width (ft)	* 350.00	0 * 100.00 *		
400.00 * * Vel Total (ft/s)	* 2.07	* Avg. Vel. (ft/s)	* 1.00	6 * 4.75 *		
1.39 * * Max Chl Dpth (ft)	* 22.70	* Hydr. Depth (ft)	* 6.9	4 * 19.70 *		
10.41 * * Conv. Total (cfs)	*894218.5	* Conv. (cfs)	*129929.	0 *472284.1		
*292005.4 * * Length Wtd. (ft)	* 1264.32	* Wetted Per. (ft)	* 355. 2	5 * 100.72 *		
405.70 * * Min Ch El (ft)	* 159.00	* Shear (lb/sq ft)	* 0.1	7 * 0.48 *		
0. 25 * * * * * * * * * * * * * * * * * *	* 2.97	* Stream Power (lb/ft s)	* 0.1	8 * 2.27 *		
0.35 * * Frctn Loss (ft)	* 0.68	* Cum Volume (acre-ft)	* 492.0	8 * 579.82 *		
1291. 96 * * C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 53.6			
91. 16 *	0.02	******************************	33. 0			
****						

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT **********************************		*******	****	****	* * :	*****	**
* E.G. Elev (ft)	* 177.59	* Element	*	Left OB	*	Channel	*
Right OB *  * Vel Head (ft)	* 0.17	* Wt. n-Val.	*	0. 100	*	0.045	*
* W.S. Elev (ft)	* 177.42	* Reach Len. (ft)	*	700.00	*	1400.00	*
1400.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	*	937. 42	*	1542. 30	*
2457.74 * * E.G. Slope (ft/ft)	*0.000367	* Area (sq ft)	*	937. 42	*	1542. 30	*
2457.74 * * Q Total (cfs)	* 8780.00	* Flow (cfs)	*	484. 82	*	6018. 31	*
2276.87 * * Top Width (ft)	* 900.58	* Top Width (ft)	*	382. 43	*	100. 00	*
418.15 * * Vel Total (ft/s) 0.93 *	* 1.78	* Avg. Vel. (ft/s)	*	0. 52	*	3. 90	*
0.73							

```
Proposed - No-Rise
 Max Chl Dpth (ft)
                           18. 42
                                 * Hydr. Depth (ft)
                                                              2. 45 * 15. 42 *
  5.88
* Conv. Total (cfs) *118811.8 *
                       *458158.2 * Conv. (cfs)
                                                         * 25298.8
                                                                   *314047.7
                       * 1347.09 * Wetted Per. (ft)
                                                            382.98
                                                                      100.72
 Length Wtd. (ft)
418. Š4
 Min Ch El (ft)
                          159.00
                                 * Shear (lb/sq ft)
                                                              0.06
                                                                        0.35
  0.13
                            3.38
                                 * Stream Power (lb/ft s) *
 Al pha
                                                              0.03
                                                                        1.37
  0. 12
* Frctn Loss (ft)
                                 * Cum Volume (acre-ft)
                            0.71
                                                            651.09
                                                                      428.53
947.81
* C & E Loss (ft)
179.47 *
                            0.03 * Cum SA (acres)
                                                            117. 12
                                                                       29.93
*************************
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Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

#### CROSS SECTION OUTPUT Profile #2%

	*****	******	* *	****	* * :	*****	* *
*****							
* E.G. Elev (ft) Right OB *	* 180.46	* Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.100 *	* 0. 21	* Wt. n-Val.	*	0. 100	*	0. 045	*
* W.S. Elev (ft)	* 180. 25	* Reach Len. (ft)	*	700.00	*	1400.00	*
* Crit W.S. (ft)	*	* Flow Area (sq ft)	*	2324. 21	*	1825. 25	*
* E.G. Slope (ft/ft)	*0.000435	* Area (sq ft)	*	2324. 21	*	1825. 25	*
3736.79 * * Q Total (cfs)	*15000.00	* Flow (cfs)	*	1811. 51	*	8673.74	*
4514.75 * * Top Width (ft) 484.80 *	* 1167.07	* Top Width (ft)	*	582. 27	*	100.00	*
* Vel Total (ft/s) 1.21 *	* 1. 90	* Avg. Vel. (ft/s)	*	0. 78	*	4. 75	*
* Max Chl Dpth (ft) 7.71 *	* 21. 25	* Hydr. Depth (ft)	*	3. 99	*	18. 25	*
* Conv. Total (cfs) *216442.4 *	*719117. 9	* Conv. (cfs)	*	86846.0	* 4	415829. 6	
* Length Wtd. (ft) 485.54 *	* 1295.31	* Wetted Per. (ft)	*	582. 85	*	100. 72	*
* Min Ch El (ft) 0.21 *	* 159.00	* Shear (Ib/sq ft)	*	0. 11	*	0. 49	*
* Al pha 0. 25 *	* 3. 75	* Stream Power (lb/ft s)	*	0.08	*	2. 34	*
* Frctn Loss (ft)	* 0.81	* Cum Volume (acre-ft)	*	1150. 49	*	522. 97	*
1683.27 * * C & E Loss (ft) 199.27 *	* 0.03	* Cum SA (acres)	*	223. 29	*	29. 80	*
= .	*****	******	* *	*****	* * :	******	* *
****							

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

This may indicate the need for additional cross sections. 1.4.

CROSS SECTION OUTPUT Profile #0.2%

\*\*\*\*\*\*\*\*\*\*\*\*

* E.G. Elev (ft)	* 184.30	* Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	* 0. 22	* Wt. n-Val.	*	0. 100	*	0. 045	*
0.100 * * W.S. Elev (ft)	* 184.07	* Reach Len. (ft)	*	700.00	*	1400.00	*
1400.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	*	4615. 29	*	2207. 43	*
5728.36 * * E.G. Slope (ft/ft) 5728.36 *	*0.000433	* Area (sq ft)	*	4615. 29	*	2207. 43	*
* Q Total (cfs)	*25700.00	* Flow (cfs)	*	5455. 91	* *	11879. 65	*
* Top Width (ft)	* 1274.08	* Top Width (ft)	*	616. 67	*	100.00	*
557.41 * * Vel_Total (ft/s)	* 2.05	* Avg. Vel. (ft/s)	*	1. 18	*	5. 38	*
1.46 * * Max Chl Dpth (ft)	* 25.07	* Hydr. Depth (ft)	*	7. 48	*	22. 07	*
* Conv. Total (cfs)	*1234963.0	* Conv. (cfs)		*262173. 2	,	*570853. 3	
*401936.5 * * Length Wtd. (ft) 558.26 *	* 1218. 93	* Wetted Per. (ft)	*	617. 46	*	100. 72	*
* Min Ch El (ft)	* 159.00	* Shear (Ib/sq ft)	*	0. 20	*	0. 59	*
* Al pha	* 3.43	* Stream Power (lb/ft s)	*	0. 24	*	3. 19	*
0.41 * * Frctn Loss (ft)	* 0.73	* Cum Volume (acre-ft)	*	2820. 49	*	672. 75	*
2916.38 * * C & E Loss (ft) 238.35 *	* 0.03	* Cum SA (acres)	*	494. 36	*	31. 03	*
	****	********	* * :	*****	* * ;	******	* *

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

#### CROSS SECTION

\*\*\*\*\*

RI VER: RI VER-1 REACH: Reach-1

RS: 331.6

I NPUT

Description: XS 331.6 (LETTERED CROSS-SECTION X) Station Elevation Data num= 70 Sta \*\*\*\*\* El ev Sta El ev Sta El ev Sta El ev Sta El ev 187.26 187.7 3.28 187.6 6.55 187.55 13.1 187.33 16.38 0 19.66 187. 26 22.93 187.16 187.24 26.21 29.49 187 32.76 186.81 186.88 49. 14 36.04 186.76 39.31 186.72 42.59 186.77 45.87 186.72 186. 15 184. 82 52.42 186.52 55.69 58.97 185.73 62.25 185.39 65.52 185.19 185.05 72.07 68.8 75.35 184.62 78. 63 184. 47 81.9 184. 28 88.45 183.74 184 91.73 95.01 183.43 510 150 180 175 540 174 640 174 170 769.81 765 164.96 815 159.6 855. 37 1107. 14 165.04 865 170 1030 175 1055 180 1060 185 185. 59 187.05 1113.69 1110.42 1116.96 190.04 1120.24 191.16 188. 68 1123.51 192. 37 1126.78 194.05 1133.33 196. 21 1136.6 197. 12 1139. 87 197.79 199.68 1146.42 1149.69 199. 31 1152.97 199.53 1156.24 1143.15 198.37 198.88 1159.51 199.58 1162.78 199.44 1166.06 199. 45 1169. 33 199.24 1172.6 199.08 198.79 1175.88 198. 99 1179. 15 198. 94 1182. 42 1185.7 198. 67 1188. 97 198.47 198. 34 1195. 51 198. 31 1198. 79 198. 37 1202. 06 1192.24 198. 41 1205. 33 198.35

Manning's n Values Sta n Val Sta			
0 . 1 769.81	. 045 8	55. 37 . 1	
Bank Sta: Left Right 769.81 855.37	Lengths:	Left Channel Right 980 980 980	Coeff Contr. Expan. .1 .3
CROSS SECTION OUTPUT Pro		******	*******
* E.G. Elev (ft) Right OB *	* 180.66	* Element	* Left OB * Channel *
* Vel Head (ft)	* 0.56	* Wt. n-Val.	* 0.100 * 0.045 *
0.100 * * W.S. Elev (ft) 980.00 *	* 180. 10	* Reach Len. (ft)	* 980.00 * 980.00 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 2784.58 * 1522.69 *
1439.28 * * E.G. Slope (ft/ft) 1439.28 *	*0. 001105	* Area (sq ft)	* 2784.58 * 1522.69 *
* Q Total (cfs)	*17700.00	* Flow (cfs)	* 3729.85 *11333.57 *
2636.59 * * Top Width (ft) 199 73 *	* 906.63	* Top Width (ft)	* 621.34 * 85.56 *
* Vel Total (ft/s)	* 3.08	* Avg. Vel. (ft/s)	* 1.34 * 7.44 *
1.83 * * Max Chl Dpth (ft)	* 20.50	* Hydr. Depth (ft)	* 4.48 * 17.80 *
7.21 * * Conv. Total (cfs)	*532433. 4	* Conv. (cfs)	*112197.5 *340924.8 *
79311.1 * * Length Wtd. (ft)	* 980.00	* Wetted Per. (ft)	* 623.62 * 86.24 *
201.54 * * Min Ch El (ft)	* 159.60	* Shear (Ib/sq ft)	* 0.31 * 1.22 *
* Al pha	* 3.83	* Stream Power (Ib/ft s)	) * 0.41 * 9.07 *
* Frctn Loss (ft)	* 0.80	* Cum Volume (acre-ft)	* 1449.06 * 508.35 *
1920.14 * * C & E Loss (ft) 192.83 *	* 0.11	* Cum SA (acres)	* 260.72 * 26.82 *
	****	******	*******
is less than 0.7 or great	ter than	ream conveyance divided l e need for additional cro	by downstream conveyance) oss sections.
CROSS SECTION OUTPUT Pro	ofile #Floo	dway ********	******
* E.G. Elev (ft)	* 181.19	* Element	* Left OB * Channel *
Right OB * * Vel Head (ft)	* 0.45	* Wt. n-Val.	* 0.100 * 0.045 *
0.100 * * W.S. Elev (ft)	* 180. 74	* Reach Len. (ft)	* 980.00 * 980.00 *
980.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	* 3107.41 * 1577.97 *
1568.26 * * E.G. Slope (ft/ft)	*0.000876	* Area (sq ft)	* 3107.41 * 1577.97 *
1568. 26 * * * * * * * * * * * * * * * * * *	*17700.00	* Flow (cfs) Page 12	* 4289.62 *10707.63 *

	Pr	oposed - No-Rise				
2702.75 * * Top Width (ft)	* 840.00	* Top Width (ft)	*	554. 81	* 85.56	*
199.63 * * Vel_Total (ft/s)	* 2.83	* Avg. Vel. (ft/s)	*	1. 38	* 6.79	*
1.72 * * Max Chl Dpth (ft) 7.86 *	* 21.14	* Hydr. Depth (ft)	*	5. 60	* 18.44	*
* Conv. Total (cfs) 91323.5 *	*598067.5	* Conv. (cfs)	*14	14942. 6	*361801.5	*
* Length Wtd. (ft) 202.14 *	* 980.00	* Wetted Per. (ft)	*	558. 72	* 86. 24	*
* Min Ch El (ft) 0.42 *	* 159.60	* Shear (Ib/sq ft)	*	0. 30	* 1.00	*
* Al pha 0. 73 *	* 3.59	* Stream Power (Ib/ft s)	*	0. 42	* 6.79	*
* Frctn Loss (ft) 1199.88 *	* 0.73	* Cum Volume (acre-ft)	*	447. 60	* 522.80	*
* C & E Loss (ft) 81.52 *	* 0.04	* Cum SA (acres)	*	46. 36	* 26.53	*
	******	*******	****	*****	*****	***
CROSS SECTION OUTPUT F	Profile #10%					
********		*******	****	*****	*****	***
******** * E.G. Elev (ft)	* 176.85	* Element	*	Left OB	* Channe	*
Right OB * * Vel Head (ft)	* 0.44	* Wt. n-Val.	*	0. 100	* 0.045	*
0.100 * * W.S. Elev (ft)	* 176.42	* Reach Len. (ft)	*	980. 00	* 980.00	*
980.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	*	966. 50	* 1207.92	*
736.95 * * E.G. Slope (ft/ft)	*0. 000936	* Area (sq ft)	*	966. 50	* 1207.92	*
736.95 * * * Q Total (cfs)	* 8780.00	* Flow (cfs)	*	842. 36	* 7090.08	*
847.55 * * Top_Width (ft)	* 629.09	* Top Width (ft)	*	361. 81	* 85.56	*
181.71 * * Vel_Total (ft/s)	* 3.02	* Avg. Vel. (ft/s)	*	0. 87	* 5.87	*
1.15 * * Max_Chl_Dpth (ft)	* 16.82	* Hydr. Depth (ft)	*	2. 67	* 14.12	*
4.06 * * Conv. Total (cfs) 27704 6 *	*286998.6	* Conv. (cfs)	* 2	27535. 0	*231759.0	*
* Length Wtd. (ft)	* 980.00	* Wetted Per. (ft)	*	364.06	* 86. 24	*
183.13 * * Min Ch El (ft)	* 159.60	* Shear (Ib/sq ft)	*	0. 16	* 0.82	*
0. 24 *  * Al pha 0. 27 *	* 3.08	* Stream Power (lb/ft s)	*	0. 14	* 4.80	*
* Frctn Loss (ft)	* 0.73	* Cum Volume (acre-ft)	*	635. 79	* 384.33	*
896.47 * * C & E Loss (ft)	* 0.07	* Cum SA (acres)	*	111. 14	* 26.95	*
169. 83 * **********************************	· * * * * * * * * * * * * * * * * * * *	********	****	*****	*****	***
	Profile #2% ******	*******	***	****	*****	***
******** * E.G. Elev (ft)	* 179.62	* Element	*	Left OR	* Channe	*
Right OB *	32	Page 13			2	

* Vel Head (ft)	P * 0. 55	roposed - No-Rise * Wt. n-Val.	*	0. 100	*	0. 045	*
* W.S. Elev (ft)	* 179.07	* Reach Len. (ft)	*	980. 00	*	980.00	*
* Cri t W.S. (ft)	*	* Flow Area (sq ft)	*	2179. 52	*	1434. 87	*
1236.54 * * E.G. Slope (ft/ft)	*0. 001101	* Area (sq ft)	*	2179. 52	*	1434. 87	*
1236.54 * * 0 Total (cfs)	*15000.00	* Flow (cfs)	*	2675. 05	*1	0247. 64	*
* Top Width (ft)	* 833.33	* Top Width (ft)	*	552. 80	*	85. 56	*
194.98 * * Vel Total (ft/s)	* 3.09	* Avg. Vel. (ft/s)	*	1. 23	*	7. 14	*
1.68 * * Max Chl Dpth (ft)	* 19.47	* Hydr. Depth (ft)	*	3. 94	*	16. 77	*
6.34 * * Conv. Total (cfs)	*451988.8	* Conv. (cfs)	*	80606. 2	*3	08788. 1	*
62594.6 * * Length Wtd. (ft)	* 980.00	* Wetted Per. (ft)	*	555. 06	*	86. 24	*
196.66 * * Min Ch El (ft)	* 159.60	* Shear (Ib/sq ft)	*	0. 27	*	1. 14	*
0. 43 * * Al pha	* 3.71	* Stream Power (lb/ft s	) *	0. 33	*	8. 17	*
0.73 * * Frctn Loss (ft)	* 0.82	* Cum Volume (acre-ft)	*	1114. 30	*	470. 58	*
1603.35 * * C & E Loss (ft)	* 0.09	* Cum SA (acres)	*	214. 17	*	26. 82	*
188.35 * ***********************************	*****	******	***	*****	***	****	**
* * * * * * * * * * * * * * * * * * * *							
ADACC CEATLAN AUTOUT D	C'I- "0 0						
******	rofile #0.2	% *********	***	*****	***	****	**
********* *********  * E.G. Elev (ft)		*******	***:	******* Left 0B		******* Channel	**
*********  * E. G. El ev (ft) Ri ght OB *  * Vel Head (ft)	*****	**************************************					* * *
*********  * E.G. Elev (ft) Right OB *  * Vel Head (ft) O. 100 *  * W.S. Elev (ft)	* 183.54	**************************************	*	Left OB	*	Channel	*
*********  * E.G. Elev (ft) Right OB *  * Vel Head (ft) 0.100 *  * W.S. Elev (ft) 980.00 *  * Crit W.S. (ft)	******* * 183. 54 * 0. 51	**************************************	* *	Left 0B 0.100	* *	Channel 0. 045	*
*****************  * E.G. Elev (ft) Right OB *  * Vel Head (ft)     0.100 *  * W.S. Elev (ft)     980.00 *  * Crit W.S. (ft) 2031.46 *  * E.G. Slope (ft/ft)	*******  * 183. 54  * 0. 51  * 183. 04	*******  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)	* *	Left 0B 0.100 980.00	* * *	Channel 0. 045 980. 00	* *
************  * E.G. Elev (ft) Right OB *  * Vel Head (ft)     0.100 *  * W.S. Elev (ft)     980.00 *  * Crit W.S. (ft) 2031.46 *  * E.G. Slope (ft/ft) 2031.46 *  * Q Total (cfs)	********  * 183. 54  * 0. 51  * 183. 04	******  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)	* * * *	Left 0B 0.100 980.00 4682.82	* * * *	Channel 0. 045 980. 00 1774. 52	* *
***************  * E.G. Elev (ft) Right OB *  * Vel Head (ft) 0.100 *  * W.S. Elev (ft) 980.00 *  * Crit W.S. (ft) 2031.46 *  * E.G. Slope (ft/ft) 2031.46 *  * Q Total (cfs) 4286.50 *  * Top Width (ft)	********  * 183. 54  * 0. 51  * 183. 04  *  *0. 000952	******  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)	* * * *	Left 0B 0.100 980.00 4682.82 4682.82 7840.07	* * * *	Channel 0. 045 980. 00 1774. 52 1774. 52	* * * * *
*******************  * E. G. El ev (ft) Right 0B *  * Vel Head (ft) 0.100 *  * W. S. El ev (ft) 980.00 *  * Crit W. S. (ft) 2031.46 *  * E. G. Slope (ft/ft) 2031.46 *  * Q Total (cfs) 4286.50 *  * Top Width (ft) 202.67 *  * Vel Total (ft/s)	********  * 183. 54  * 0. 51  * 183. 04  *  *0. 000952  *25700. 00	******  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)	* * * *	Left 0B 0.100 980.00 4682.82 4682.82 7840.07	*	Channel 0. 045 980. 00 1774. 52 1774. 52 3573. 43	* * * * *
**************  * E.G. Elev (ft) Right OB *  * Vel Head (ft)     0.100 *  * W.S. Elev (ft)     980.00 *  * Crit W.S. (ft) 2031.46 *  * E.G. Slope (ft/ft) 2031.46 *  * Q Total (cfs) 4286.50 *  * Top Width (ft) 202.67 *  * Vel Total (ft/s)     2.11 *  * Max Chl Dpth (ft)	********  * 183. 54  * 0. 51  * 183. 04  *  *0. 000952  *25700. 00  * 956. 76	*******  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)	* * * * * *	Left 0B 0.100 980.00 4682.82 4682.82 7840.07 668.53	*	Channel 0. 045 980. 00 1774. 52 1774. 52 3573. 43 85. 56	* * * * * *
*******************  * E.G. Elev (ft) Right OB *  * Vel Head (ft)	*********  * 183. 54  * 0. 51  * 183. 04  * *  *0. 000952  *25700. 00  * 956. 76  * 3. 03	*******  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)	* * * * * * * * *	Left 0B 0.100 980.00 4682.82 4682.82 7840.07 668.53 1.67	*	Channel 0. 045 980. 00 1774. 52 1774. 52 3573. 43 85. 56 7. 65	* * * * * * * * *
**************************************	*********  * 183. 54  * 0. 51  * 183. 04  * * * * * * * * * * * * * * * * * * *	******  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)  * Conv. (cfs)	* * * * * * * * *	Left 0B 0.100 980.00 4682.82 4682.82 7840.07 668.53 1.67 7.00	*	Channel 0. 045 980. 00 1774. 52 1774. 52 3573. 43 85. 56 7. 65 20. 74	* * * * * * * * *
**************************************	*********  * 183. 54  * 0. 51  * 183. 04  * * **  *0. 000952  *25700. 00  * 956. 76  * 3. 03  * 23. 44  *833073. 3	*******  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)  * Conv. (cfs)  * Wetted Per. (ft)	* * * * * * * * * * * * * * * * * * * *	Left 0B 0.100 980.00 4682.82 4682.82 7840.07 668.53 1.67 7.00	*	Channel 0. 045 980. 00 1774. 52 1774. 52 3573. 43 85. 56 7. 65 20. 74	* * * * * * * * *
******************  * E. G. El ev (ft) Ri ght 0B *  * Vel Head (ft) 0.100 *  * W. S. El ev (ft) 980.00 *  * Crit W. S. (ft) 2031.46 *  * E. G. Slope (ft/ft) 2031.46 *  * Q Total (cfs) 4286.50 *  * Top Width (ft) 202.67 *  * Vel Total (ft/s) 2.11 *  * Max Chl Dpth (ft) 10.02 *  * Conv. Total (cfs) *138948.3 *  * Length Wtd. (ft) 205.70 *  * Min Ch El (ft) 0.59 *  * Al pha	********  * 183. 54  * 0. 51  * 183. 04  * * * * * * * * * * * * * * * * * * *	*******  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)  * Conv. (cfs)  * Wetted Per. (ft)  * Shear (lb/sq ft)	* * * * * * * * * * * * * * * * * * *	Left 0B 0. 100 980. 00 4682. 82 4682. 82 7840. 07 668. 53 1. 67 7. 00 254138. 1 670. 90	*	Channel 0. 045 980. 00 1774. 52 1774. 52 3573. 43 85. 56 7. 65 20. 74 39986. 8 86. 24	*     *    *    *    *    *    *    *
*******************  * E. G. El ev (ft) Ri ght 0B *  * Vel Head (ft) 0.100 *  * W. S. El ev (ft) 980.00 *  * Crit W. S. (ft) 2031.46 *  * E. G. Slope (ft/ft) 2031.46 *  * O Total (cfs) 4286.50 *  * Top Width (ft) 202.67 *  * Vel Total (ft/s) 2.11 *  * Max Chl Dpth (ft) 10.02 *  * Conv. Total (cfs) *138948.3 *  * Length Wtd. (ft) 205.70 *  * Min Ch El (ft) 0.59 *  * Al pha 1.24 *  * Frctn Loss (ft)	*********  * 183. 54  * 0. 51  * 183. 04  * * * * * * * * * * * * * * * * * * *	********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)  * Conv. (cfs)  * Wetted Per. (ft)  * Shear (lb/sq ft)  * Stream Power (lb/ft s	* * * * * * * * * * * * * * * * * * *	Left 0B 0. 100 980. 00 4682. 82 4682. 82 7840. 07 668. 53 1. 67 7. 00 254138. 1 670. 90 0. 41	*     *    *    *    *    *    *    *	Channel 0. 045 980. 00 1774. 52 1774. 52 3573. 43 85. 56 7. 65 20. 74 39986. 8 86. 24 1. 22	* * * * * * * *
*******************  * E. G. El ev (ft) Ri ght 0B *  * Vel Head (ft) 0.100 *  * W. S. El ev (ft) 980.00 *  * Crit W. S. (ft) 2031.46 *  * E. G. Slope (ft/ft) 2031.46 *  * O Total (cfs) 4286.50 *  * Top Width (ft) 202.67 *  * Vel Total (ft/s) 2.11 *  * Max Chl Dpth (ft) 10.02 *  * Conv. Total (cfs) *138948.3 *  * Length Wtd. (ft) 205.70 *  * Min Ch El (ft) 0.59 *  * Al pha 1.24 *	*********  * 183. 54  * 0. 51  * 183. 04  * 183. 04  * *0. 000952  *25700. 00  * 956. 76  * 3. 03  * 23. 44  *833073. 3  * 980. 00  * 159. 60  * 3. 55	**********  * Element  * Wt. n-Val.  * Reach Len. (ft)  * Flow Area (sq ft)  * Area (sq ft)  * Flow (cfs)  * Top Width (ft)  * Avg. Vel. (ft/s)  * Hydr. Depth (ft)  * Conv. (cfs)  * Wetted Per. (ft)  * Shear (lb/sq ft)  * Cum Volume (acre-ft)	* * * * * * * * * * * * * * * * * * *	Left 0B 0. 100 980. 00 4682. 82 4682. 82 7840. 07 668. 53 1. 67 7. 00 254138. 1 670. 90 0. 41 0. 69 2745. 78	*	Channel 0. 045 980. 00 1774. 52 1774. 52 3573. 43 85. 56 7. 65 20. 74 39986. 8 86. 24 1. 22 9. 35	* * * * * * * * *

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Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1 REACH: Reach-1

RS: 320

I NPUT				
Description: XS 320				
INSERTED CROSS-SECTION TO (5/21/01)	EVALUATE IMPACT	OF PROP. SITE		
Station Elevation Datá	num= 478			
Sta El ev Sta	El ev Sta	El ev Sta	El ev Sta	Elev ****
0 190.92 3.28	190. 97 13. 11	191 16. 39	191. 06 22. 95	191. 05
26. 22 191. 19 29. 5	191. 24 39. 34	191. 1 42. 61	191. 21 52. 45	191. 25
65. 56 191. 15 72. 12	190. 87 75. 4	190. 79 81. 95	190. 8 85. 23	190. 7
95. 06 190. 25 101. 62 127. 84 189. 22 134. 4	189. 85 111. 45 188. 86 140. 96	189. 63 121. 29 188. 7 144. 24	189. 31 124. 57 188. 49 150. 79	189. 31 188. 3
154. 07 188. 1 157. 35	188. 02 163. 9	187. 99 173. 74	187. 34 180. 29	187. 16
190. 13 187. 19 203. 24	187. 1 206. 52	187. 03 213. 07	186. 8 222. 91	186. 51
226. 19 186. 48 232. 74	186. 24 236. 02	186. 24 239. 3	186. 35 242. 58	186. 33
245. 86 186. 13 249. 13 268. 8 185. 26 272. 08	186. 32 252. 41 184. 8 275. 36	186. 31 258. 97 184. 44 278. 64	185. 92 265. 52 184. 48 281. 91	185. 62 184. 72
285. 19 185. 2 288. 47	185. 79 291. 75	186. 92 298. 3	187. 07 304. 86	187. 34
308. 14 187. 12 321. 25	186. 56 324. 53	186. 47 331. 08	186. 13 334. 36	186. 06
337. 64 185. 87 347. 48	185. 54 357. 31	185. 15 363. 87	184. 67 370. 42	184.09
373. 7 183. 91 376. 98 393. 37 183. 08 396. 65	183. 34 380. 26 183. 19 399. 92	183. 07 386. 81 183. 14 406. 48	182. 75 390. 09 182. 75 413. 04	182. 84 182. 97
416. 31 183 426. 15	182. 94 432. 71	183. 2 435. 98	183. 25 442. 54	183. 44
449. 1 183. 12 455. 65	182. 87 458. 93	182. 98 472. 04	182. 51 475. 32	182. 57
481. 88 182. 49 494. 99 514. 66 182. 92 517. 93	182. 43 498. 27 182. 88 524. 49	182. 39 504. 82 182. 65 531. 05	182. 5 511. 38 182. 49 537. 6	182. 85 182. 22
544. 16 182. 22 550. 72	182 557. 27	182. 04 563. 83	181. 98 570. 38	181. 98
576. 94 181. 79 583. 5	181. 77 590. 05	181. 68 599. 89	181. 82 606. 44	181. 77
613 181. 55 629. 39	181. 49 635. 95	181. 23 645. 78	181. 21 655. 61	180. 97
665. 45 180. 81 675. 28 701. 51 180. 62 704. 79	180. 85 678. 56 180. 61 711. 34	180. 83 681. 84 180. 25 714. 62	180. 72 688. 4 180. 21 717. 9	180. 39 180. 31
721. 18 180. 31 724. 45	180. 22 734. 29	180. 09 744. 12	179. 89 750. 68	179. 9
753. 96 179. 85 776. 9	179. 68 786. 74	179. 76 793. 29	179. 65 803. 13	179. 74
806. 41 179. 65 809. 68 839. 19 179. 37 849. 02	179. 48 816. 24 179. 21 858. 86	179. 5 826. 08 178. 87 862. 13	179. 43 832. 63 178. 81 875. 25	179. 27 178. 82
878. 52 178. 58 881. 8	178. 49 888. 36	178. 54 891. 64	178. 63 894. 91	178. 32
901. 47 178. 26 908. 03	178. 14 917. 86	177. 91 930. 97	177. 76 937. 53	177. 76
947. 36 177. 67 953. 92	177. 79 957. 2	177. 74 960. 48	177. 47 963. 75	177. 31
967. 03 177. 25 973. 59 999. 81 176. 92 1006. 37	177. 25 980. 15 176. 86 1012. 93	177. 08 986. 7 176. 85 1016. 2	177. 22 993. 26 176. 76 1022. 76	177. 15 176. 97
1026. 04 176. 93 1032. 59	176. 7 1039. 15	176. 55 1048. 98	176. 43 1055. 54	176. 41
1062. 1 176. 18 1065. 37	176. 23 1068. 65	176. 37 1075. 21	176. 18 1081. 77	176. 43
1091. 6 176. 6 1101. 43 1137. 49 177. 04 1144. 05	176. 68 1111. 27 177. 04 1150. 6	176. 62 1121. 1 177. 09 1157. 16	176. 63 1124. 38 177. 05 1163. 72	176. 67 177. 31
1170. 27 177. 4 1176. 83	177. 65 1189. 94	178. 01 1193. 22	178. 13 1199. 77	177. 51
1203. 05 178. 59 1212. 89	178. 96 1219. 44	179. 29 1226	179. 48 1235. 83	179. 92
1239. 11 179. 94 1242. 39	179. 87 1252. 22	180. 01 1262. 06	179. 94 1265. 34	179. 95
1275. 17 180. 14 1285 1317. 79 180. 74 1324. 34	180. 49 1294. 84 180. 65 1327. 62	180. 63 1301. 39 180. 49 1340. 73	180. 69 1311. 23 180. 44 1347. 29	180. 7 180. 32
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Proposed - No-Rise
                                                                                                                                                                                                                         180. 33 1370. 23
179. 5 1399. 74
178. 32 1439. 07
175. 69 1465. 3
173. 5 1494. 8
171. 78 1517. 75
170. 77 1557. 08
170. 52 1586. 59
                                                                                                  180. 23 1363. 68
179. 99 1383. 35
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     1350.57
                                      180. 32 1357. 12
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                                      180.49 1380.07
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     1373.51
    1403. 01
1442. 35
1471. 85
                                      179. 05 1412. 85
177. 22 1452. 19
174. 8 1475. 13
172. 67 1501. 36
                                                                                                   178. 45 1416. 13
176. 61 1458. 74
174. 59 1481. 69
172. 44 1504. 63
                                                                                                                                                              178. 54 1425. 96
176. 07 1462. 02
174 1488. 24
172. 13 1511. 19
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     1498.08
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170. 42 1576. 75
170. 11 1596. 42
     1521.02
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                                       171. 13 1530. 86
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1521.02 171.13 130.30 171.14 134.14 171.03 130.35 170.77 137.08 170.42 1576.75 170.36 1580.03 170.52 1586.59 170.45 1589.86 170.34 1593.14 170.11 1596.42 170.06 1599.7 170.38 1602.98 170.79 1609.53 171.2 1612.81 171.62 1616.09 171.87 1619.37 171.95 1629.2 172.07 1635.76 171.93 1642.31 171.92 1648.87 171.68 1652.15 171.47 1655.42 171.14 1661.98 170.36 1665.26 170.35 1668.54 170.66 1675.09 171.48 1678.37 171.77 1681.65 171.88 1694.76 171.89 1698.04 171.86 1704.6 171.64 1707.87 171.73 1714.43 171.79 1720.99 172.03 1727.54 172.09 1734.1 172.41 1737.38 172.02 1740.65 170.76 1743.93 168.4 1747.21 165.79 1750.49 164.22 1753.77 163.64 1801 159.41848.298 163.1711851.575 164.861854.852 167.4961858.129 169.936 1861.405 171.1991864.682 171.3651867.959 171.3951871.236 171.461874.513 171.245 1877.79 170.8781881.066 170.6411884.312 170.6141887.558 170.781890.803 170.954 1894.049 171.0031897.294 170.999 1900.54 171.071903.786 171.2431907.031 171.424 1910.277 171.558 1917.67 171.35 1920.95 171.35 1924.23 171.06 1930.78 170.59 1934.06 169.75 1940.62 166.92 1943.89 165.69 1947.17 166.22 1950.45 167.63 171.47 1983.23 171.25 1986.51 171.47 1989.79 171.6 1993.06 171.87 2032.4 172.08 2038.96 172.06 2045.51 172.28 2048.79 172.31 2055.35 172.24 2058.63 172.32
                                      170. 34 1570. 2
170. 34 1593. 14
                                                                                                                                                              170. 36 1580. 03
     1566.92
                                                                                                                                                                                                                                                                                         170.45
                                                                                                                                                            171. 0 1993. 00
172. 02 2019. 29
172. 31 2055. 35
172. 69 2097. 96
173. 78 2133. 96
175. 06 2176. 48
175. 9 2215. 72
176. 29 2258. 24
176. 71 2307. 31
176. 33 2340. 01
175. 97 2379. 26
176. 02 2431. 6
175. 76 2467. 57
175. 74 2503. 55
175. 6 2536. 26
175. 74 2562. 43
175. 69 2598. 4
175. 71 2634. 38
175. 76 2680. 17
175. 4 2719. 42
175. 55 2752. 13
175. 74 2778. 3
176. 23 2817. 55
177. 07 2846. 93
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                                      172.06 2045.51
                                                                                                   172. 28 2048. 79
                                                                                                                                                                                                                                                                                        172.32
     2038.96
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172. 8 2104. 52
173. 94 2143. 77
175. 33 2183. 02
175. 97 2228. 81
176. 66 2268. 06
176. 48 2313. 85
176. 22 2353. 1
176. 09 2398. 89
175. 93 2438. 14
175. 84 2477. 39
175. 65 2510. 09
                                                                                                 172. 28 2048. 79
172. 67 2094. 68
173. 56 2130. 69
174. 72 2169. 93
175. 68 2209. 18
176. 34 2245. 16
176. 64 2287. 68
176. 28 2333. 47
176. 16 2375. 99
175. 98 2415. 24
175. 76 2461. 03
     2068. 46
2107. 79
                                      172. 47 2088. 13
173. 02 2120. 87
                                                                                                                                                                                                                                                                                        172.85
                                     173. 02 2120. 87

174. 57 2156. 85

175. 34 2202. 64

176. 28 2241. 89

176. 68 2277. 87

176. 45 2326. 93

176. 14 2369. 45

175. 91 2408. 7

175. 88 2451. 22

175. 69 2487. 2

175. 73 2526. 45

175. 72 2555. 88

175. 8 2575. 51

175. 63 2621. 3

175. 62 2657. 28

175. 57 2706. 34

175. 33 2742. 32
                                                                                                                                                                                                                                                                                         174.21
     2153. 58
2186. 29
                                                                                                                                                                                                                                                                                          175. 3
176. 3
    2238. 62
2274. 6
2320. 39
2359. 64
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176. 49
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175. 9
     2405.43
                                                                                                                                                                                                                                                                                        175.74
                                                                                                 175. 98 2415. 24
175. 76 2461. 03
175. 66 2493. 74
175. 7 2532. 99
175. 78 2559. 16
175. 7 2595. 13
175. 64 2624. 57
175. 71 2673. 63
175. 57 2716. 15
     2444.68
                                                                                                                                                                                                                                                                                        175.66
     2483. 93
                                                                                                                                                                                                                                                                                        175.63
                                                                                                                                                                                                                          175. 65 2510. 09
175. 69 2542. 8
175. 8 2565. 7
175. 73 2608. 22
175. 58 2640. 92
175. 72 2696. 53
175. 46 2725. 96
    2516. 64
2552. 61
2572. 24
2614. 76
2650. 74
                                                                                                                                                                                                                                                                                        175.63
                                                                                                                                                                                                                                                                                        175. 75
175. 74
175. 63
                                                                                                                                                                                                                                                                                         175. 75
     2703.07
                                                                                                                                                                                                                                                                                         175.44
                                                                                                 175. 57 2716. 15
175. 46 2748. 86
175. 64 2771. 76
176. 09 2807. 73
176. 78 2837. 17
178. 69 2882. 96
180. 34 2912. 4
183. 01 2941. 83
185. 81 2961. 46
                                                                                                                                                                                                                          175. 46 2725. 96
175. 66 2755. 4
175. 71 2784. 84
176. 49 2824. 09
177. 61 2856. 79
179. 09 2892. 77
181. 06 2922. 21
183. 7 2948. 38
187. 11 2968
191. 67 2997. 44
    2729. 24
2761. 94
2794. 65
                                       175. 33 2742. 32
                                                                                                                                                                                                                                                                                         175.58
                                      175. 65 2765. 21
175. 88 2804. 46
                                                                                                                                                                                                                                                                                        175.74
                                                                                                                                                                                                                                                                                         176.62
                                      175. 66 2804. 46
176. 75 2830. 63
178. 31 2876. 42
180. 05 2909. 13
182. 33 2938. 56
185. 28 2954. 92
    2827. 36
2866. 61
2902. 59
2932. 02
                                                                                                                                                              177. 07 2846. 98
178. 89 2886. 23
180. 53 2918. 94
183. 13 2945. 11
                                                                                                                                                                                                                                                                                        178
179. 35
                                                                                                                                                                                                                                                                                        181. 42
184. 58
     2951.65
                                                                                                                                                                186. 41 2964. 73
                                                                                                                                                                                                                                                                                         187.95
                                                                                                                                                               190. 59 2994. 17
     2974.54
                                       188. 97 2984. 35
                                                                                                   190.11 2987.63
                                                                                                                                                                                                                                                                                         191.91
                                                                                                                                                                                                                          194. 62 3020. 33
                                       192. 27 3003. 98
                                                                                                                                                                193. 72 3017. 06
     3000.71
                                                                                                    192.72 3010.52
                                                                                                                                                                                                                                                                                        195.21
                                                                                                                                                                197. 09 3033. 42 197. 68 3039. 96
        3023.6
                                      195. 65 3026. 88
198. 85 3049. 77
                                                                                                   196. 29 3030. 15
199. 37 3056. 31
                                                                                                                                                                                                                                                                                        198.19
         3046.5
                                                                                                                                                                200.65
 Manning's n Values
                                                                                                   num=
                                                                                                                          Šta
  Sta n Val Sta
                                                                                            n Val
                                                                                                                                                                 n Val
                                                  . 1 1740. 65
                                                                                                       . 0451858. 129
                                                                                                                                                                         . 1
                                                                                                  Lengths: Left Channel Right Coeff Contr. Expan. 860 860 550 .1 .3
 Bank Sta: Left Right
                            1740. 651858. 129
```

	Pr	oposed - No-Rise					
CROSS SECTION OUTPUT P	rofile #1%	*********					ىلدىك
******	*****	*****	* * *	*****	* * :	*****	* *
* E.G. Elev (ft)	* 179.76	* Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	* 0. 21	* Wt. n-Val.	*	0. 100	*	0.045	*
0.100 * * W.S. Elev (ft)	* 179.54	* Reach Len. (ft)	*	860.00	*	860.00	*
550.00 * * Crit W.S. (ft) 4887.96 *	*	* Flow Area (sq ft)	*	3087.00	*	2017. 39	*
* E.G. Slope (ft/ft) 4887.96 *	*0. 000522	* Area (sq ft)	*	3087. 00	*	2017. 39	*
* Q Total (cfs) 4657.97 *	*17700.00	* Flow (cfs)	*	3163.87	*	9878. 17	*
* Top Width (ft) 1037.36 *	* 1919. 31	* Top Width (ft)	*	764. 48	*	117. 48	*
* Vel Total (ft/s) 0.95 *	* 1.77	* Avg. Vel. (ft/s)	*	1. 02	*	4. 90	*
* Max Chl Dpth (ft) 4.71 *	* 20.14	* Hydr. Depth (ft)	*	4. 04	*	17. 17	*
* Conv. Total (cfs) *203831.8 *	*774549. 1	* Conv. (cfs)	*	138450. 3	* 4	432266. 9	
* Length Wtd. (ft) 1039.69 *	* 708.85	* Wetted Per. (ft)	*	765. 51	*	122. 05	*
* Min Ch El (ft) 0.15 *	* 159.40	* Shear (Ib/sq ft)	*	0. 13	*	0. 54	*
* Al pha 0. 15 *	* 4.40	* Stream Power (Ib/ft s)	*	0. 13	*	2. 64	*
* Frctn Loss (ft) 1848.97 *	* 0. 27	* Cum Volume (acre-ft)	*	1383. 02	*	468. 53	*
* C & E Loss (ft) 178.91 *	* 0.05	* Cum SA (acres)	*	245. 13	*	24. 54	*
170. 71	*****	******	**	*****	**:	*****	**
*****							

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

	rofile #Floo *****	dway *******	*****	*****
********* * E.G. Elev (ft) Right OB *	* 180. 42	* Element	* Left OB	* Channel *
* Vel Head (ft) 0.100 *	* 0.31	* Wt. n-Val.	* 0. 100	* 0.045 *
* W.S. Elev (ft) 550.00 *	* 180. 11	* Reach Len. (ft)	* 860.00	* 860.00 *
* Crit W.S. (ft) 2378.58 *	*	* Flow Area (sq ft)	* 1805.82	* 2083.69 *
* E.G. Slope (ft/ft) 2378.58 *	*0. 000617	* Area (sq ft)	* 1805.82	* 2083.69 *
* Q Total (cfs) 3603.59 *	*17700.00	* Flow (cfs)	* 2761.03	*11335.38 *
* Top Width (ft) 277.87 *	* 600.00	* Top Width (ft)	* 204.65	* 117.48 *
* Vel Total (ft/s) 1.52 *	* 2.82	* Avg. Vel. (ft/s)	* 1.53	* 5.44 *
* Max Chl Dpth (ft) 8.56 *	* 20.71	* Hydr. Depth (ft)	* 8.82	* 17.74 *
* Conv. Total (cfs)	*712347. 4	* Conv. (cfs) Page 17	*111119. 4	*456199. 2

```
*145028.8 *
* Length Wtd. (ft)
                    * 721.38 * Wetted Per. (ft)
                                                   * 214. 29 * 122. 05
286. 16
 Min Ch El (ft)
                        159.40 * Shear (lb/sq ft)
                                                         0.32
                                                                  0.66
  0.32
 Al pha
                         2.48
                               * Stream Power (lb/ft s) *
                                                         0.50
                                                                  3.58
  0.49
* Frctn Loss (ft)
                         0.32
                               * Cum Volume (acre-ft)
                                                       392.34
                                                                 481.61
1155. 48
 C & E Loss (ft)
                         0.07 * Cum SA (acres)
                                                        37.82
                                                                 24. 24
**************************
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

#### 

```
*****
* E.G. Elev (ft)
                        * 176.06 * Element
                                                             Left OB *
                                                                         Channel *
Right OB *
* Vel Head (ft)
                           0. 22
                                   * Wt. n-Val.
                                                               0.100
                                                                          0.045
 0. 100
* W.S. Elev (ft)
                        * 175.84
                                   * Reach Len. (ft)
                                                              860.00
                                                                         860.00
550.00 *
* Crit W.S. (ft)
                                   * Flow Area (sq ft)
                                                           * 1155.34
                                                                      * 1582.73
1314. 20
* E.G. Slope (ft/ft)
1314.20 *
                                   * Area (sq ft)
                                                           * 1155.34
                        *0.000544
                                                                      * 1582.73
* 0 Total (cfs)
                        * 8780.00
                                   * Flow (cfs)
                                                           * 1028.74
                                                                      * 6730.89
1020.37
                        * 1100.65
                                   * Top Width (ft)
* Top Width (ft)
                                                              279.96
                                                                         117.48
703. 21
* Vel Total (ft/s)
                             2. 17
                                   * Avg. Vel. (ft/s)
                                                                0.89
                                                                           4. 25
  0.78
 Max Chl Dpth (ft)
                                   * Hydr. Depth (ft)
                            16. 44
                                                                4. 13
                                                                          13.47
1.87 *
* Conv. Total (cfs)
                        *376300.8
                                   * Conv. (cfs)
                                                           * 44090.6
                                                                      *288478.5
 Length Wtd. (ft)
                           752.86
                                   * Wetted Per. (ft)
                                                              280.70
                                                                         122.05
705. 45
* Min Ch El (ft)
                           159.40
                                   * Shear (lb/sq ft)
                                                                0.14
                                                                           0.44
  0.06
                             2.99
                                   * Stream Power (lb/ft s) *
                                                                0.12
                                                                           1.87
 Al pha
  0.05
* Frctn Loss (ft)
                             0.32
                                   * Cum Volume (acre-ft)
                                                              611.92 *
                                                                         352.94
873.40
* C & E Loss (ft)
                             0.04 * Cum SA (acres)
                                                              103.92 *
                                                                          24.66 *
159.88 *
```

Warning: Divided flow computed for this cross-section.

#### CROSS SECTION OUTPUT Profile #2%

```
Proposed - No-Rise
                        * 178.47
* W.S. Elev (ft)
                                   * Reach Len. (ft)
                                                              860.00
                                                                     * 860.00
550.00
                                   * Flow Area (sq ft)
* Crit W.S. (ft)
                                                           * 2339.71
                                                                      * 1890.92
3783. 26
* E.G. Slope (ft/ft)
                                   * Area (sq ft)
                                                           * 2339.71
                                                                      * 1890.92
                        *0.000575
3783. 26
* 0 Total (cfs)
                        *15000.00
                                   * Flow (cfs)
                                                           * 2454.04
                                                                      * 9305.05
3240. 91
* Top Width (ft)
                                   * Top Width (ft)
                        * 1757.54
                                                              627.53
                                                                         117.48
1012. 53
 Vel Total (ft/s)
                             1.87
                                   * Avg. Vel. (ft/s)
                                                                1.05
                                                                           4.92
  0.86
 Max Chl Dpth (ft)
                            19.07
                                   * Hydr. Depth (ft)
                                                                3.73
                                                                          16.10
3.74 *
* Conv. Total (cfs)
*135157.3 *
                                   * Conv. (cfs)
                                                                      *388052.8
                        *625552.2
                                                           *102342.1
* Length Wtd. (ft)
                           720.38
                                   * Wetted Per. (ft)
                                                              628.47
                                                                         122.05
1014.85
 Min Ch El (ft)
                           159.40
                                  * Shear (lb/sq ft)
                                                                           0.56
                                                                0.13
  0.13
                             4.38
                                   * Stream Power (lb/ft s) *
 Al pha
                                                                0.14
                                                                           2.74
  0.11
* Frctn Loss (ft)
                             0.30
                                   * Cum Volume (acre-ft)
                                                           * 1063.47
                                                                         433. 17
1546.88
                                                              200.89
* C & E Loss (ft)
                             0.05
                                  * Cum SA (acres)
                                                                          24.54
```

Warning: Divided flow computed for this cross-section.

The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

#### CROSS SECTION OUTPUT Profile #0.2%

^	*****	~ ~ ~			* * * * * * * * * * * * * * * * * * * *	~ ~ /		` ^ /		` ^
*	*****									
	E.G. Elev (ft) right OB *	*	182. 79	*	Element	*	Left OB	*	Channel	*
*	Vel Head (ft) 0.100 *	*	0. 16	*	Wt. n-Val.	*	0. 100	*	0. 045	*
*	W. S. Elev (ft) 550.00 *	*	182. 63	*	Reach Len. (ft)	*	860. 00	*	860. 00	*
	Crit W.S. (ft) 159.17 *	*		*	Flow Area (sq ft)	*	6341. 18	*	2380. 19	*
*	E.G. Slope (ft/ft) 159.17 *	*C	0. 000379	*	Area (sq ft)	*	6341. 18	*	2380. 19	*
*	0 Total (cfs) 097.11 *	*2	25700. 00	*	Flow (cfs)	*	5510. 27	*1	11092. 63	*
*	Top Width (ft)	*	2448. 32	*	Top Width (ft)	*	1254. 05	*	117. 48	*
	076.79 * Vel Total (ft/s) 1.11 *	*	1. 52	*	Avg. Vel. (ft/s)	*	0. 87	*	4. 66	*
*	Max Chl Dpth (ft) 7.58 *	*	23. 23	*	Hydr. Depth (ft)	*	5. 06	*	20. 26	*
	Conv. Total (cfs)	*1	1319325. 0	,	* Conv. (cfs)	4	*282873.0	×	569446. 9	
*	467005.5 * Length Wtd. (ft) 079 26 *	*	687. 31	*	Wetted Per. (ft)	*	1255. 21	*	122. 05	*
	Min Ch El (ft)	*	159. 40	*	Shear (Ib/sq ft)	*	0. 12	*	0. 46	*
*	0. 18 * Al pha 0. 20 *	*	4. 30	*	Stream Power (Ib/ft s)	*	0. 10	*	2. 15	*
	0. 20									

```
* Frctn Loss (ft) * 0.20 * Cum Volume (acre-ft) * 2621.78 * 562.02 * 2677.05 *
                       Proposed - No-Rise
2677.05
              * 0.03 * Cum SA (acres)
C & E Loss (ft)
                                            * 462.41 * 25.77 *
211. 74
        ******************
```

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RI VER: RI VER-1

RS: 314.4 REACH: Reach-1

I NPUT

Description: XS 314.4 (LETTERED CROSS-SECTION W) Station Elevation Data num= 465 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 178. 01 177. 23 177. 79 177. 78 178. 26 176. 25 177. 74 3. 28 36. 07 9.84 16. 39 176. 69 22.95 176. 07 177. 76 177. 42 26. 23 55. 74 39. 35 177. 47 177. 73 42. 63 72. 14 177. 41 177. 78 52.46 65. 58 85. 25 68.86 78.69 178.05 177. 98 81.97 91.81 178.06 98.37 178. 15 101.65 178.12 178. 46 124.6 104.93 178.37 108. 2 114. 76 178.53 118.04 178.71 178.76 178. 7 179. 25 127.88 131. 16 178.85 147.55 179. 2 150.83 179. 14 160.67 179.16 163.95 170. 5 179. 31 180.34 179.33 190.18 179.49 193.46 179.48 216. 41 249. 2 295. 1 321. 33 357. 4 373. 8 179. 9 222. 97 255. 76 298. 38 327. 89 181. 04 181. 93 182. 24 181. 7 203. 29 226. 25 259. 03 179.78 209.85 180. 4 181.25 209. 85 242. 64 288. 54 318. 05 347. 57 370. 52 181. 82 182. 19 181. 78 236.08 181.69 181.8 181. 9 268. 87 311. 5 344. 29 367. 24 182. 07 181. 96 181. 38 180. 17 182. 25 181. 87 182. 14 181. 72 301.66 331.17 181. 21 179. 75 180.77 360.68 180. 98 363.96 181 179. 51 386. 91 377.08 179. 46 179. 21 179. 12 393.47 396. 75 400.03 179.01 179.05 409.86 178. 96 416. 42 179.05 426. 26 455. 77 498. 4 537. 74 570. 53 596. 76 419. 7 452. 49 491. 84 179.01 178. 94 449. 21 485. 28 178.99 432.82 442.65 178.88 178.94 178. 76 179. 15 178. 9 178. 97 459.05 178. 9 465.61 179.03 511. 51 544. 3 577. 09 179. 13 179. 77 521. 35 554. 14 179.04 179. 43 527.91 179.71 531. 18 567. 25 593. 48 180.11 180. 3 180.44 557.42 180.43 180. 37 179. 69 178. 56 590. 2 613. 16 639. 39 180. 49 179. 91 180. 42 179. 77 180. 46 179. 8 583.65 179.95 606.6 179.54 600.04 636. 11 668. 9 622.99 179.04 626.27 178.8 632.83 178.44 178.91 672. 18 645.95 179.37 659.06 179. 96 662.34 180.04 179.97 160. 88 813. 17 180. 97 816. 45 180. 94 823. 01 181. 04 832. 84 181. 01 842. 68 181. 23 849. 24 181. 3 852. 52 181. 42 855. 8 181. 44 862. 35 181. 26 868. 91 181. 29 875. 47 181. 37 885. 31 181. 17 891. 86 181. 24 901. 7 181. 19 908. 26 181. 24 914. 82 181. 16 921. 37 181. 25 927. 93 181. 28 937. 77 181. 09 939. 8982 181. 787955. 0579 181. 667970. 2175 181. 537985. 3771 181. 4171000. 537 181. 207 1015. 696 180. 8771030. 856 180. 5471046. 016 180. 3171061. 175 180. 1271076. 335 180. 197 1091. 495 180. 1571106. 654 176. 827 1108. 27 174. 54 1111. 55 174. 03 1118. 11 172. 53 1121. 39 171. 63 1124. 67 170. 63 1127. 95 169. 45 1131. 23 168. 44 1134. 5 167 01 1135. 36 166. 48 1137. 78 164. 99 1141. 06 163. 66 1144. 34 162 17 1209. 92 163. 79 1213. 2 164. 6 1207. 104. 180.03 174. 54 1111. 55 169. 45 1131. 23 163. 66 1144. 34 163. 06 1203. 36 165. 47 1219. 76 169. 2 1239. 43 173. 02 1259. 1 172. 06 1285. 34 171. 7 1314. 85 171. 56 1344. 36 171. 17 1386. 98 168. 44 1134. 5 162. 17 1160 163. 31 1206. 64 166. 8 1223. 04 169. 79 1242. 71 172. 98 1262. 38 171. 99 1288. 61 164. 99 1141. 06 162. 66 1200. 08 164. 6 1215. 54 168. 3 1236. 15 172. 85 1252. 55 172. 18 1275. 5 171. 78 1308. 29 162. 15 1196. 8 163. 79 1213. 2 168. 13 1229. 59 171. 96 1249. 27 1226. 31 1245. 99 170.94 172.89 1265.66 172.56 1272.22 171.92 1291.89 171. 95 1301. 73 171.74 1321.4 171.66 171. 49 1350. 91 171. 52 1341. 08 1324.68 171.66 1334.52 171.52 171. 38 1377. 15 171. 25 1380. 42 171. 17 1386. 98 171. 05 1403. 38 170. 98 1416. 49 170. 91 1419. 77 171. 16 1393. 54 1357.47 171.04 170. 94 1426. 33 1400.1 170.91

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Proposed - No-Rise
                         170.89 1455.84
                                                                    170. 76 1462. 4
  1442.72
                                                                                                             170. 74 1468. 96 170. 77 1485. 35
                                                                                                                                                                                                 170.66
                                                                     170.6 1505.02
                                                                                                              170. 7 1511. 58 170. 62 1518. 14
  1488.63
                          170.71 1498.47
                                                                                                                                                                                                 170.59
                         170. 53 1527. 98
170. 47 1567. 32
170. 53 1596. 83
                                                                   170. 64 1547. 65
170. 51 1573. 88
170. 56 1603. 39
170. 53 1632. 9
                                                                                                             170. 55 1554. 21
170. 51 1577. 16
170. 51 1606. 67
170. 55 1636. 18
                                                                                                                                                      170. 4 1557. 49
170. 58 1583. 72
170. 55 1616. 51
170. 41 1642. 74
  1521. 42
                                                                                                                                                                                                  170.48
  1564.05
                                                                                                                                                                                                  170.49
          1587
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  1619.79
                          170.58 1623.07
                                                                                                                                                                                                  170.36
                          170. 44 1652. 58
170. 46 1691. 92
                                                                                                              170. 41 1668. 97
  1646.02
                                                                    170. 45 1665. 69
                                                                                                                                                       170. 34 1675. 53
                                                                                                                                                                                                  170.35
                                                                    170. 42 1695. 2
170. 37 1737. 83
  1685.37
                                                                                                                                                       170. 4 1718. 16
                                                                                                              170. 46 1701. 76
                                                                                                                                                                                                  170. 4
                         170. 46 1691. 92
170. 5 1731. 28
170. 59 1773. 91
170. 85 1803. 42
170. 87 1836. 21
170. 74 1865. 73
170. 72 1895. 24
170. 8 1934. 59
  1724.72
                                                                                                              170. 45 1747. 67
                                                                                                                                                       170. 43 1754. 23
                                                                                                                                                                                                  170.58
                                                                                                            170. 45 1747. 67
170. 83 1783. 74
170. 87 1823. 1
170. 85 1849. 33
170. 76 1878. 84
170. 73 1918. 2
170. 87 1944. 43
171. 25 1973. 94
171. 13 1990. 34
                                                                                                                                                      170. 43 1754. 23
170. 81 1793. 58
170. 89 1829. 66
170. 78 1855. 89
170. 7 1885. 4
170. 79 1921. 48
171. 02 1947. 71
171. 17 1977. 22
171. 09 1993. 12
                                                                   170. 37 1737. 83
170. 72 1777. 19
170. 88 1813. 26
170. 82 1842. 77
170. 77 1875. 57
170. 78 1911. 64
170. 9 1941. 15
  1757.51
                                                                                                                                                                                                  170. 9
  1800.14
                                                                                                                                                                                                  170.83
  1832. 93
1859. 17
                                                                                                                                                                                                  170.78
                                                                                                                                                                                                  170.74
  1891. 96
1924. 75
                                                                                                                                                                                                  170.74
                                                                                                                                                                                                 171.02
                        170. 8 1934. 59
171. 2 1957. 55
171. 27 1983. 78
171. 04 2006. 74
170. 93 2036. 25
169. 25 2055. 93
170. 56 2085. 44
170. 83 2105. 12
170. 53 2144. 47
170. 46 2170. 7
                                                                   170. 9 1941. 15
171. 15 1967. 39
171. 27 1987. 06
171. 3 2013. 3
170. 82 2042. 81
169. 42 2059. 21
170. 99 2088. 72
170. 9 2111. 68
170. 27 2147. 75
170. 52 2180. 54
  1950.99
                                                                                                                                                                                                 171.17
     1980.5
                                                                                                                                                                                                  171.13
                                                                                                            171. 13 1990. 34

171. 05 2019. 85

170. 28 2046. 09

169. 74 2062. 49

170. 98 2092

170. 73 2114. 96

170. 29 2151. 03

170. 39 2187. 1

170. 27 2219. 89

170. 56 2249. 41

170. 3 2282. 2
                                                                                                                                                     171. 09 1993. 62
170. 98 2023. 13
169. 92 2049. 37
169. 97 2065. 77
170. 84 2095. 28
170. 52 2118. 23
170. 39 2160. 87
170. 26 2196. 94
  2000.18
                                                                                                                                                                                                       171
  2026. 41
                                                                                                                                                                                                  169.45
  2052.65
                                                                                                                                                                                                  170.06
  2078. 88
2101. 84
2131. 35
                                                                                                                                                                                                  170.81
                                                                                                                                                                                                  170.47
                                                                                                                                                                                                  170.53
  2167.42
                                                                                                                                                                                                  170.27
                                                                  170. 3 2213. 34
170. 53 2242. 85
170. 25 2275. 64
170. 25 2311. 72
170. 88 2347. 79
171. 32 2377. 3
171. 63 2400. 26
171. 44 2436. 33
171. 56 2472. 4
171. 54 2508. 48
171. 94 2541. 27
172. 01 2564. 22
171. 87 2597. 02
172. 12 2626. 53
172. 38 2659. 33
172. 32 2695. 4
172. 6 2721. 63
173. 06 2747. 87
                          170. 23 2206. 78
                                                                                                                                                       170. 29 2226. 45
  2200.22
                                                                    170. 3 2213. 34
                                                                                                                                                                                                  170.36
                         170. 46 2236. 29
170. 32 2269. 08
                                                                                                                                                        170.38 2255.97
                                                                                                                                                                                                  170.29
  2229.73
                                                                                                            170. 56 2249. 41
170. 3 2282. 2
170. 25 2324. 83
170. 91 2354. 35
171. 3 2383. 86
171. 67 2406. 82
171. 27 2442. 89
171. 41 2475. 68
                                                                                                                                                     170. 38 2255. 97
170. 19 2285. 48
170. 49 2331. 39
171. 02 2360. 91
171. 57 2416. 65
171. 38 2446. 17
171. 57 2482. 24
171. 65 2515. 03
    2265.8
                                                                                                                                                                                                  170.23
                         170. 32 2269. 08
170. 2 2298. 6
170. 82 2341. 23
171. 17 2370. 74
171. 51 2393. 7
171. 48 2429. 77
171. 54 2462. 57
  2295. 32
2337. 95
2364. 19
                                                                                                                                                                                                  170.56
                                                                                                                                                                                                  171.26
                                                                                                                                                                                                 171. 55
171. 58
171. 37
  2390. 42
  2419. 93
2452. 73
                                                                                                                                                                                                 171.59
                         171. 54 2462. 57
171. 46 2498. 64
171. 67 2537. 99
172. 09 2560. 95
171. 86 2590. 46
172. 14 2623. 25
172. 33 2649. 49
172. 43 2692. 12
172. 47 2715. 07
                                                                                                            171. 41 2475. 68
171. 69 2511. 76
171. 99 2547. 83
172. 02 2570. 78
172. 03 2600. 3
172. 22 2636. 37
172. 41 2665. 88
172. 32 2701. 96
172. 72 2728. 19
     2488.8
                                                                                                                                                                                                 171.71
                                                                                                                                                     171. 65 2515. 03
171. 99 2551. 11
172. 15 2577. 34
172. 01 2606. 86
172. 31 2639. 65
172. 51 2682. 28
172. 52 2708. 52
172. 7 2734. 75
172. 87 2754. 43
  2528. 15
2557. 67
                                                                                                                                                                                                  172.05
                                                                                                                                                                                                  172.05
     2583.9
                                                                                                                                                                                                  172. 1
  2613. 42
2642. 93
2685. 56
                                                                                                                                                                                                  172.38
                                                                                                                                                                                                  172. 42
172. 43
     2711. 8
                                                                                                                                                                                                  172.89
  2741.31
                          172.85 2744.59
                                                                    173.06 2747.87
                                                                                                              173. 13 2751. 15
                                                                                                                                                                                                  172.46
                                                                                                                                                        173. 33 2780. 66
  2757.71
                          172. 28 2767. 54
                                                                    172.64 2770.82
                                                                                                              172.89
                                                                                                                                2774. 1
                                                                                                                                                                                                  173.95
                                                                   172. 64 2770. 82
174. 21 2800. 34
174. 95 2833. 13
176. 37 2865. 92
178. 64 2895. 44
181. 17 2931. 51
182. 58 2974. 14
                                                                                                                                                       173. 33 2780. 86
174. 51 2806. 9
175. 52 2846. 25
177. 19 2879. 04
180. 23 2915. 11
181. 53 2947. 91
182. 92 2987. 26
                                             2790. 5
                                                                                                              174. 49 2803. 62
175. 28 2839. 69
  2787.22
                          174.24
                                                                                                                                                                                                  174.71
  2813.45
                          174.85 2820.01
                                                                                                                                                                                                  175.87
                         176. 05 2859. 37
178. 05 2892. 16
180. 98 2924. 95
182. 25 2967. 58
                                                                                                              176. 87 2872. 48
179. 03 2908. 56
181. 35 2941. 35
182. 71 2980. 7
  2852.81
                                                                                                                                                                                                  177.59
     2885.6
                                                                                                                                                                                                  180.73
  2921. 67
2954. 47
                                                                                                                                                                                                  181. 84
183. 23
                         183.65 3003.66
                                                                    184.02 3006.94
                                                                                                              184. 29 3010. 22 184. 48 3016. 77
                                                                                                                                                                                                  184.74
  2993.82
. 1
                                  . 1 1135. 36
                                                                    . 045 1215. 54
                                                                   Bank Sta: Left Right
1135.36 1215.54
                                           Ri ght
Ineffective Flow
                                                                                   2
                                               num=
       Sta L Sta R
0 950
                                                                   Permanent
                                                    El ev
                                               185
185
                                                                   F
          3015 3016.77
Blocked Obstructions
                                                                 num=
```

Sta L Sta R Elev 361. 15 664. 36 180. 04

0.1000 02011011 001101	ofile #1% *****	******	***	****	* * :	* * * * * * * * *	**
*****							
* E.G. Elev (ft) Right OB *	* 179.44	* Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.100 *	* 0.06	* Wt. n-Val.	*	0. 100	*	0. 045	*
* W. S. Elev (ft) 600.00 *	* 179. 38	* Reach Len. (ft)	*	600.00	*	1120. 00	*
* Crit W.S. (ft) *13409.48 *	* 173.46	* Flow Area (sq ft)	*	242. 21	*	1409. 02	
* E.G. Slope (ft/ft) *13409.48 *	*0.000252	* Area (sq ft)	*	465. 62	*	1409. 02	
* Q Total (cfs)	*17700.00	* Flow (cfs)	*	180. 64	*	4917. 29	
*12602.06 *  * Top Width (ft)  1683.68 *	* 1987.32	* Top Width (ft)	*	223. 46	*	80. 18	*
* Vel Total (ft/s)	* 1.18	* Avg. Vel. (ft/s)	*	0. 75	*	3. 49	*
0.94 * * Max Chl Dpth (ft) 7.96 *	* 20. 28	* Hydr. Depth (ft)	*	6. 01	*	17. 57	*
* Conv. Total (cfs) *794160.1 *	*1115423.0	* Conv. (cfs)	*	11383. 7	;	*309879. 3	
* Length Wtd. (ft) 1685.24 *	* 758.12	* Wetted Per. (ft)	*	43. 06	*	81. 97	*
* Min Ch El (ft) 0.13 *	* 159.10	* Shear (Ib/sq ft)	*	0. 09	*	0. 27	*
* Al pha 0. 12 *	* 2. 91	* Stream Power (lb/ft s)	*	0. 07	*	0. 94	*
* Frctn Loss (ft)	* 0. 21	* Cum Volume (acre-ft)	*	1347. 95	*	434. 70	*
1733.45 * * C & E Loss (ft)	* 0.00	* Cum SA (acres)	*	235. 38	*	22. 59	*
161. 73 * **********************************	*****	*******	* * *	****	* * :	****	* *
^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^							

Warning: Divided flow computed for this cross-section. Warning: The cross-section end points had to be extended vertically for the computed water surface.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# 

*****							
* E.G. Elev (ft)	* 180.03	* Element	*	Left OB	*	Channel	*
Right OB *							
* Vel Head (ft)	* 0.07	* Wt. n-Val.	*	0. 100	*	0. 045	*
0. 100 *							
* W.S. Elev (ft)	* 179. 96	* Reach Len. (ft)	*	600.00	*	1120. 00	*
600.00 *							
* Crit W.S. (ft)	* 173. 38	* Flow Area (sq ft)	*	227. 57	*	1455. 53	
*11717. 72 *							
* E.G. Slope (ft/ft)	*0.000260	* Area (sq ft)	*	227. 57	*	1455. 53	
*11717. 72 *							
* Q Total (cfs)	*17700.00	* Flow (cfs)	*	200. 31	*	5273.72	
*12225. 97 *							
<pre>* Top Width (ft)</pre>	* 1385.00	* Top Width (ft)	*	25. 36	*	80. 18	*
1279. 46 *							

```
Proposed - No-Rise
* Vel Total (ft/s)
                         1.32 * Avg. Vel. (ft/s)
                                                     * 0.88 * 3.62 *
  1.04
                         20.86 * Hydr. Depth (ft)
                                                           8. 97 *
 Max Chl Dpth (ft)
                                                                    18. 15 *
9.16 *
* Conv. Total (cfs)
*758345.4 *
                      *1097886.0 * Conv. (cfs)
                                                       * 12424.7 *327115.3
* Length Wtd. (ft)
                        769.18 * Wetted Per. (ft)
                                                          32. 31 *
                                                                   81. 97
1289. Ĭ4 *
* Min Ch El (ft)
                        159.10 * Shear (lb/sq ft)
                                                           0. 11
                                                                    0.29
  0. 15
* Al pha
                          2.68 * Stream Power (lb/ft s) *
                                                           0.10 *
                                                                    1.04
  0. 15
* Frctn Loss (ft)
                          0.22 * Cum Volume (acre-ft)
                                                         372. 26
                                                                   446.67 *
1066. 49 *
 C & E Loss (ft)
                          0.00 * Cum SA (acres)
                                                          35.55 *
                                                                    22. 29 *
66.32 *
```

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Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# CROSS SECTION OUTPUT Profile #10%

*****									
* E.G. Elev (ft) Right OB *	* 17	75. 70	*	Element	*	Left OB	*	Channel	*
* Vel Head (ft)	*	0. 07	*	Wt. n-Val.	*	0. 100	*	0. 045	*
* W. S. Elev (ft)	* 17	75. 62	*	Reach Len. (ft)	*	600.00	*	1120. 00	*
* Crit W.S. (ft)	* 16	69. 10	*	Flow Area (sq ft)	*	120. 20	*	1108. 09	*
7180.79 * * E.G. Slope (ft/ft)	*0.00	00309	*	Area (sq ft)	*	120. 20	*	1108. 09	*
7180.79 * * 0 Total (cfs)	* 878	30. 00	*	Flow (cfs)	*	79. 77	*	3651.83	*
5048.40 * * Top Width (ft)	* 173	34. 11	*	Top Width (ft)	*	27. 85	*	80. 18	*
1626.07 * * Vel_Total (ft/s)	*	1. 04	*	Avg. Vel. (ft/s)	*	0. 66	*	3. 30	*
0.70 * * Max Chl Dpth (ft)	* 1	16. 52	*	Hydr. Depth (ft)	*	4. 32	*	13. 82	*
4.42 * * Conv. Total (cfs)	*4992	202. 4	*	Conv. (cfs)	*	4535. 5	*2	207631. 0	
*287035.8 * * Length Wtd. (ft)	* 82	23. 36	*	Wetted Per. (ft)	*	29. 70	*	81. 97	*
1627.49 * * Min Ch El (ft)	* 15	59. 10	*	Shear (lb/sq ft)	*	0. 08	*	0. 26	*
0.09 * * Al pha	*	4. 41	*	Stream Power (lb/ft s)	*	0. 05	*	0. 86	*
0.06 * * Frctn Loss (ft)	*	0. 26		Cum Volume (acre-ft)	*	599. 33	*	326. 38	*
819.77 * * C & E Loss (ft)	*	0. 00		Cum SA (acres)	*	100. 88	*	22. 71	*
145. 18 * **********************************	*****			, ,	***		k * +		* *
*****									

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~									
* E.G. Elev (ft)	*	178. 35	*	Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	*	0. 07	*	Wt. n-Val.	*	0. 100	*	0. 045	*
0.100 * * W.S. Elev (ft)	*	178. 28	*	Reach Len. (ft)	*	600.00	*	1120. 00	*
600.00 * * Crit W.S. (ft)	*	172. 88	*	Flow Area (sq ft)	*	200. 90	*	1321. 46	
*11576.90 * * E.G. Slope (ft/ft)	*0.	000271	*	Area (sq ft)	*	279. 66	*	1321. 46	
*11576.90	*1!	5000.00	*	Flow (cfs)	*	149. 12	*	4580. 35	
*10270.54 * * Top Width (ft)	* .	1891. 97	*	Top Width (ft)	*	139. 13	*	80. 18	*
1672.66 * * Vel Total (ft/s)	*	1. 15	*	Avg. Vel. (ft/s)	*	0. 74	*	3. 47	*
0.89 * * Max Chl Dpth (ft)	*	19. 18	*	Hydr. Depth (ft)	*	5. 69	*	16. 48	*
6.92 * * * Conv. Total (cfs)	*9 <sup>.</sup>	11903. 9	*	Conv. (cfs)	*	9065. 3	* 2	278455. 7	
*624383.0 * * Length Wtd. (ft)	*	772. 12	*	Wetted Per. (ft)	*	37. 97	*	81. 97	*
1674. Ĭ6 * * Min Ch El (ft)	*	159. 10		Shear (Ib/sq ft)	*	0. 09	*	0. 27	*
0. 12 * * * * * * * * * * * * * * * * * *	*	3. 21		Stream Power (lb/ft s)	*	0. 07	*	0. 94	*
0.10 * * Frctn Loss (ft)	*	0. 23		Cum Volume (acre-ft)		1037. 61	*	401. 46	*
1449. 91 * * C & E Loss (ft)	*	0. 00		Cum SA (acres)		193. 32	*	22. 59	*
157.81 * ***********************************									* *
****									

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

### CROSS SECTION OUTPUT Profile #0.2%

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*******************										
*****										
* E.G. Elev (ft) Right OB *	* 182.56 * Element	* Left OB * Channel *								
* Vel Head (ft) 0.100 *	* 0.06 * Wt. n-Val.	* 0.100 * 0.045 *								
* W.S. Elev (ft) 600.00 *	* 182.50 * Reach Len. (ft)	* 600.00 * 1120.00 *								
* Crit W.S. (ft) *18748.48 *	* 174.27 * Flow Area (sq ft)	* 614.50 * 1659.37								
* E.G. Slope (ft/ft) *18748.48 *	*0.000208 * Area (sq ft)	* 2797.06 * 1659.37								
* 0 Total (cfs) *19536.34 *	*25700.00 * Flow (cfs)	* 290.03 * 5873.63								
* Top Width (ft) 1748.78 *	* 2964.32 * Top Width (ft)	* 1135. 36 * 80. 18 *								
* Vel Total (ft/s) 1.04 *	* 1.22 * Avg. Vel. (ft/s)	* 0.47 * 3.54 *								
* Max Chl Dpth (ft) 10.72 *	* 23.40 * Hydr. Depth (ft)	* 3.32 * 20.70 *								
* Conv. Total (cfs) *1353655.0 *	*1780729.0 * Conv. (cfs)	* 20096. 0 *406978. 3								

```
Proposed - No-Rise
* Length Wtd. (ft)
                   * 731.65 * Wetted Per. (ft)
                                               * 188. 20 *
                                                            81. 97 *
1750. 44
 Min Ch El (ft)
                      159.10 * Shear (lb/sq ft)
                                                    0.04
                                                             0. 26
  0.14
                        2.47 * Stream Power (lb/ft s) *
 Al pha
                                                    0.02
                                                             0.93
  0. 15
* Frctn Loss (ft)
                       0.17 * Cum Volume (acre-ft)
                                                * 2531.57
                                                            522. 15
2507. 18
* C & E Loss (ft)
                       0.00 * Cum SA (acres)
                                                * 438.82
                                                            23.82
*****
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1 RS: 300

I NPUT

Description: XS 300

INSERTED CROSS-SECTION TO EVALUATE IMPACT OF PROP. SITE

Station E		21/01) 2 Doto	D.I.M.	435					
Station E Sta	Elev	Sta	num= Elev	430 Sta	Elev	Sta	Elev	Sta	Elev
*****									
0	181. 3	9. 84	181. 29	22. 95	180. 94	29. 51	180. 64	32. 79	180. 6
49. 18	180. 55	55. 74	180. 2	59. 01	180. 11	68. 85	180	78. 69	179. 94
91.8	179. 47	98. 36	179. 57	104. 91	179. 39	108. 19	179. 57	124. 58	179. 27
131. 14	179. 26	137. 7	179. 13	147. 53	178. 8	160. 65	178. 8	173. 76	178. 62
183. 6	178. 29	186. 88	178. 29	190. 16	178. 13	196. 71	178. 14	203. 27	177. 96
209.83	177. 63	222. 94	177. 54	226. 22	177. 28	229. 5	177. 18	236.06	177. 22
242. 61	177. 03	252. 45	176. 86	259. 01	176. 41	265. 56	176. 27	268.84	176. 11
275. 4	175. 94	281. 96	175. 86	285. 23	175. 68	288. 51	174. 8	291. 79	174. 26
295. 07	174. 27	298. 35	173. 96	304. 91	173. 95	311. 46	174. 46	314. 74	174. 55
318. 02	174.8	321. 3	174. 79	324. 58	175. 02	331. 13	175. 01	344. 25	175. 26
350. 8	175. 15	357. 36	175. 33	363. 92	175. 35	370. 48	175. 46	373. 75	175. 44
380. 31	175. 21	393. 43	175. 53	399. 98	175. 75	406. 54	175. 68	419. 65	175. 71
422. 93	175. 54	426. 21	175. 69	432.77	175. 79	436. 05	175. 72	439. 33	175. 81
445. 88	175.8	455. 72	175. 9	459	175. 79	472.11	176. 04	478. 67	175. 87
485. 22	176. 12	488.5	176. 33	495. 06	176. 57	504. 9	176. 69	508. 17	176. 59
514. 73	176. 56	521. 29	176. 69	527. 85	176.65	540. 96	176. 82	544. 24	176. 79
547. 52	176. 93	554. 07	176. 91	560. 63	177. 23	570. 47	177. 38	577. 02	177. 55
580. 3	177. 41	586. 86	177.63	599. 97	177. 83	609.81	178. 12	616. 37	178.46
629. 48 668. 82	178. 95 179. 62	632. 76 675. 38	179. 15 179. 71	639. 32 688. 5	179. 31 179. 78	649. 15 698. 33	179. 4 179. 9	658. 99 701. 61	179. 58 179. 89
711. 45	180.05	721. 28	180.05	727. 84	180. 17	737.67	180. 19	747. 38	180. 23
760. 62	180. 03	773.74	180. 05	786. 85	179.85	793. 41	179. 85	803. 24	179. 73
819. 64	179. 74	826. 19	179. 49	839. 31	179. 03	852. 42	178. 89	855. 7	179.73
858. 98	178. 71	865. 54	178. 2	872. 09	178. 03	878. 65	177. 73	895. 04	177. 12
901.6	177. 05	914. 72	176. 83	931. 11	176. 46	937. 67	176. 39	950. 78	176.1
957. 34	175. 83	963. 89	175. 79	970. 45	175. 63	977. 01	175. 87	980. 29	175. 84
986. 84	176. 23	990. 12	176. 21	996. 68		1003. 24	176. 5	1006. 51	176. 61
1013.07	176. 69	1016. 35	176. 91	1026. 19	177. 12	1036.02		1049. 14	177. 51
1062. 25	177. 57	1075. 37	178. 17	1081. 94		1098.34	179. 13	1104. 9	179. 32
1111. 46	179. 61	1121. 3	179. 81	1127.86	180. 09	1131. 14	180. 07	1137. 7	180. 2
1150. 83	180. 3	1167. 23		1173. 79		1183. 63		1193. 47	179. 62
1203. 31	179. 59	1209. 88	179. 49	1229. 56		1232. 84	179. 32	1242. 68	179. 13
				Pac	ne 25				

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Proposed - No-Rise
 1621. 793 180. 5171642. 065 180. 4771662. 338 180. 447 1682. 61 180. 4271702. 883 180. 407 1723. 155 180. 3971743. 427 180. 377 1763. 7 180. 3571783. 972 180. 3371804. 245 180. 367 1824. 517 180. 407 1844. 79 180. 4471865. 062 180. 4871885. 334 180. 5271905. 607 180. 537
1824. 517 180. 407 1844. 79 180. 4471865. 062 180. 4871885. 334 180. 5271905. 607 180. 537 1925. 879 180. 5371946. 152 180. 5371966. 424 180. 5471986. 696 180. 5472006. 969 180. 547 2027. 241 180. 5472047. 514 180. 5472067. 786 180. 5372088. 058 180. 5172108. 331 180. 527 1218. 603 180. 4772148. 876 180. 4072169. 148 180. 327 2189. 42 180. 1572209. 693 179. 967 1229. 965 179. 9472250. 238 179. 957 2268. 15 177. 06 2271. 42 177. 15 2277. 96 177. 06 2291. 04 177. 28 2304. 12 177. 16 2307. 4 177. 22 2317. 21 177. 13 2327. 02 177. 3 2333. 56 177. 27 2340. 1 177. 09 2346. 65 177. 3 2356. 46 177. 27 2366. 27 177. 36 2379. 35 177. 39 2385. 9 177. 15 2395. 71 177. 38 2398. 98 177. 6 2405. 52 177. 51 2408. 79 177. 61 2415. 33 177. 51 2421. 88 177. 53 2425. 15 177. 63 2428. 42 177. 49 2431. 69 177. 1 2434. 96 176. 91 2441. 5 177. 2 2444. 77 177. 2 2448. 04 177. 01 2454. 58 176. 48 2457. 85 176. 4 2464. 4 175. 8 2467. 67 175. 62 2474. 21 174. 96 2484. 02 174. 3 2493. 83 173. 12 2500. 38 171. 96 2504. 81 171. 32 2516. 73 170. 64 2595. 23 162. 76 2598. 5 163. 53 2605. 04 167. 81 2608. 31 169. 47 2611. 58 170. 29 2618. 13 170. 41 2624. 67 170. 23 2627. 94 170. 39 2634. 48 171. 3 2637. 75 171. 43 2641. 02 171. 37 2647. 56 171. 02 2654. 11 170. 96 2660. 65 170. 77 2673. 73 170. 64 2686. 81 170. 31 2699. 9 170. 24 2706. 44 170. 05 2716. 25 169. 93 2722. 79 169. 92 2729. 34 169. 68 2735. 88 169. 63 2745. 7 169. 41 2755. 53 169. 34 2775. 21 168. 86
                                                                                                       170. 24 2706. 44
169. 63 2745. 7
168. 74 2798. 16
168. 42 2847. 33
168. 62 2883. 4
168. 93 2932. 58
169. 2 2991. 59
169. 22 3030. 94
169. 2 3096. 51
168. 77 3135. 85
168. 94 3198. 15
169. 01 3250. 6
169. 33 3289. 95
169. 37 3352. 24
169. 97 3398. 14
170. 2 3460. 43
170. 86 3526
                                         169. 68 2735. 88
168. 87 2794. 88
                                                                                                                                                                       169. 41 2755. 53
168. 77 2811. 27
                                                                                                                                                                                                                                        169. 34 2775. 21
     2729.34
                                                                                                                                                                                                                                                                                                         168.86
    2729. 34
2781. 76
2837. 5
2870. 28
2909. 63
2962. 09
3017. 82
3070. 28
                                       168. 87 2794. 88

168. 36 2840. 78

168. 75 2880. 12

168. 84 2919. 46

169. 13 2978. 48

169. 29 3073. 56

168. 82 3129. 29

168. 88 3191. 59

169. 01 3237. 49

169. 26 3286. 67

169. 3 3332. 57

169. 82 3394. 86

170. 12 3453. 88

170. 38 3516. 17

172. 41 3552. 23
                                                                                                                                                                       168. 77 2811. 27
168. 21 2853. 89
168. 68 2893. 24
168. 88 2939. 14
169. 15 3004. 71
169. 39 3040. 77
169. 19 3103. 07
168. 8 3145. 69
169. 01 3207. 98
169. 13 3263. 72
169. 23 3296. 5
169. 55 3362. 07
169. 92 3414. 53
170. 1 3493. 22
171. 24 3535. 84
172. 55 3565. 35
                                                                                                                                                                                                                                         168.63 2821.11
                                                                                                                                                                                                                                                                                                         168.72
                                                                                                                                                                                                                                       168. 63 2821. 11
168. 58 2860. 45
168. 59 2899. 79
168. 98 2958. 81
169. 17 3011. 26
169. 4 3044. 05
169. 01 3106. 34
168. 73 3155. 52
                                                                                                                                                                                                                                                                                                         168.78
                                                                                                                                                                                                                                                                                                         168.64
                                                                                                                                                                                                                                                                                                         169. 17
169. 3
                                                                                                                                                                                                                                                                                                         169.46
                                                                                                                                                                                                                                                                                                         169.04
     3122.74
                                                                                                                                                                                                                                                                                                         168.78
                                                                                                                                                                                                                                       168. 73 3155. 52
169. 01 3217. 82
169. 2 3276. 83
169. 2 3303. 06
169. 58 3375. 19
170. 05 3434. 2
170. 41 3503. 05
                                                                                                                                                                                                                                                                                                        169. 14
169. 31
     3162.08
     3227.65
     3280. 11
3319. 45
3385. 03
3450. 6
                                                                                                                                                                                                                                                                                                         169.27
                                                                                                                                                                                                                                                                                                         169.77
                                                                                                                                                                                                                                                                                                         170.15
                                                                                                                                                                                                                                                                                                            170. 3
                                                                                                                                                                                                                                        171. 4 3542. 4
172. 27 3571. 91
173. 07 3604. 69
     3506. 33
3548. 96
                                                                                                         170.86
                                                                                                                                                 3526
                                                                                                                                                                                                                                                                                                         171.99
                                                                                                         172. 54 3558. 79
171. 39 3588. 3
                                         172.41
                                                                     3552. 23
                                                                                                                                                                         172. 55 3565. 35
                                                                                                                                                                                                                                                                                                         171.57
                                                                                                                                                                       172. 55 3565. 35
171. 98 3601. 41
173. 52 3630. 92
174. 09 3666. 98
174. 75 3696. 49
175. 84 3732. 56
176. 81 3765. 34
175. 79 3788. 29
176. 97 3814. 52
177. 37 3850. 59
178. 77 3883. 37
                                                                     3578.46
                                                                                                                                      3588. 3
     3575. 18
                                         171.41
                                                                                                                                                                                                                                                                                                         173.11
                                                                                                        171. 39 3588. 3
173. 16 3624. 36
173. 96 3660. 43
174. 39 3686. 66
175. 52 3726
176. 07 3762. 06
175. 62 3781. 74
176. 8 3807. 96
177. 57 3840. 75
                                                                                                                                                                                                                                        173. 52 3637. 48
174. 27 3670. 26
     3607. 97
3640. 76
                                         172. 99 3611. 25
173. 59 3650. 59
                                                                                                                                                                                                                                                                                                         173.68
                                                                                                                                                                                                                                                                                                         174.23
                                        173. 39 3630. 39
174. 42 3676. 82
175. 39 3712. 89
175. 8 3755. 51
175. 89 3778. 46
176. 61 3804. 69
                                                                                                                                                                                                                                       174. 27 3670. 26
175. 04 3703. 05
175. 8 3739. 11
176. 89 3768. 62
176. 34 3794. 85
177. 08 3817. 8
                                                                                                                                                                                                                                                                                                        175. 31
175. 97
176. 69
176. 34
     3673. 54
3709. 61
     3745. 67
3775. 18
     3798.13
                                                                                                                                                                                                                                                                                                         177.01
                                                                                                                                                                                                                                       177. 62 3857. 14
178. 82 3893. 21
     3824.36
                                         177. 24 3830. 91
                                                                                                                                                                                                                                                                                                         177. 7
     3863. 7
3899. 77
3958. 78
                                                                                                         178. 34 3880. 09
179. 92 3929. 27
182. 73 3981. 73
185. 27 4024. 35
                                                                                                                                                                                                                                                                                                         179. 28
                                         177. 94 3870. 26
                                                                                                                                                                         178. 77 3883. 37
                                                                                                                                                                                                                                      181. 5 3952. 22
183. 88 3994. 84
186. 24 4034. 19
                                                                                                                                                                        181. 24 3939. 11
183. 27 3991. 57
185. 75 4030. 91
                                         179.66 3906.32
                                                                                                                                                                                                                                                                                                         182.11
                                         182. 21 3968. 62
                                                                                                                                                                                                                                                                                                         183.99
     4004.68
                                         184.55 4014.52
                                                                                                                                                                                                                                                                                                        186.35
 Manning's n Values
                                                                                                         num=
          Sta n Val
                                                                                                                                                     Šta
                                                                                   Sta
                                                                                                         n Val
                                                                                                                                                                            n Val
                                                                                                                                                                            . 1
                                                                                                               . 045 2605. 04
                                                                                 2520
                                                                                                        Lengths: Left Channel Right Coeff Contr. 1000 1840 1840 .1
                                                                     Ri ght
  Bank Sta: Left
                                                                                                                                                                                                                                                                                                            Expan.
                                         2520 2605.04
```

```
Proposed - No-Rise
Ineffective Flow
                     num=
          Sta R
   Sta L
                    Elev
                         Permanent
       02148.876
                     185
                              F
    3643 4034.19
                     185
                              F
Blocked Obstructions
                        num=
                                    1
  Sta L Sta R
                   El ev
  737. 32 1355. 9 180. 14
CROSS SECTION OUTPUT Profile #1%
                                 **********
* E.G. Elev (ft)
                         * 179. 22
                                    * Element
                                                               Left OB *
                                                                          Channel *
Right OB *
* Vel Head (ft)
                                    * Wt. n-Val.
                             0.09
                                                                0.100
                                                                           0.045
 0.100
* W.S. Elev (ft)
                           179. 13
                                    * Reach Len. (ft)
                                                             * 1000.00
                                                                        * 1840.00
1840.00 *
* Crit W.S. (ft)
                         * 172.30
                                   * Flow Area (sq ft)
                                                               733.34
                                                                        * 1499.81
9707. 15
* E.G. Slope (ft/ft)
*10421.41 *
                         *0.000321
                                    * Area (sq ft)
                                                             * 1981.38
                                                                        * 1499.81
* Q Total (cfs)
*11468.47 *
                         *17700.00
                                    * Flow (cfs)
                                                               384. 22
                                                                        * 5847.31
* Top Width (ft)
                         * 2129.30
                                    * Top Width (ft)
                                                               759.32
                                                                           85.04
1284. 94
 Vel Total (ft/s)
                            1.48
                                    * Avg. Vel. (ft/s)
                                                                 0.52
                                                                            3.90
   1. 18
* Max Chl Dpth (ft)
                            20.43
                                    * Hydr. Depth (ft)
                                                                 2.77
                                                                           17.64
9. 35 *
* Conv. Total (cfs)
*639916. 3 *
                                    * Conv. (cfs)
                                                             * 21438.9
                         *987622.4
                                                                        *326267.2
* Length Wtd. (ft)
                         * 1704.74
                                   * Wetted Per. (ft)
                                                               265.73
                                                                           88.70
1038. 81
 Min Ch El (ft)
                            158.70
                                   * Shear (lb/sq ft)
                                                                  0.06
                                                                            0.34
  0.19
                                   * Stream Power (lb/ft s) *
                             2.70
 Al pha
                                                                 0.03
                                                                            1.32
  0. 22
* Frctn Loss (ft)
                             0.76
                                   * Cum Volume (acre-ft)
                                                            * 1331.09
                                                                           397.31
1569. 33
 C & E Loss (ft)
                             0.02 * Cum SA (acres)
                                                               228. 61
                                                                           20.46
 141.29 *
  ····
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
        Multiple critical depths were found at this location. The critical depth
Note:
with the lowest, valid, energy was used.
CROSS SECTION OUTPUT Profile #Floodway
* E.G. Elev (ft)
                            179.80 * Element
                                                               Left OB *
                                                                          Channel *
Right OB *
* Vel Head (ft)
                                   * Wt. n-Val.
                             0. 10
                                                                0. 100
                                                                           0.045
 0. 100
* W.S. Elev (ft)
                            179. 70
                                   * Reach Len. (ft)
                                                             * 1000.00
                                                                       * 1840.00
1840.00 *
* Crit W.S. (ft)
                         * 172. 28
                                                                       * 1548.09 *
                                   * Flow Area (sq ft)
                                                               626. 96
8680.58
                                      Page 27
```

```
Proposed - No-Ri se
                         *0.000329
* E.G. Slope (ft/ft)
                                    * Area (sq ft)
                                                                626. 96
                                                                       * 1548.09 *
8680.58
                         *17700.00 * Flow (cfs)
* 0 Total (cfs)
                                                                419.82
                                                                        * 6243.48
*11036.70 \ * Top Width (ft)
                         * 1080.00
                                    * Top Width (ft)
                                                                            85.04
                                                                157.00
 837. 96
* Vel Total (ft/s)
                             1.63
                                    * Avg. Vel. (ft/s)
                                                                             4.03
                                                                  0.67
   1. 27
* Max Chl Dpth (ft)
                                    * Hydr. Depth (ft)
                                                                  3.99
                             21.00
                                                                            18.20
10.36 *
* Conv. Total (cfs)
                                    * Conv. (cfs)
                         *975105.1
                                                              23128.3
                                                                        *343957.6
*608019.3
 Length Wtd. (ft)
                         * 1702.34
                                    * Wetted Per. (ft)
                                                                160.28
                                                                            88.70
 848. 18
* Min Ch El (ft)
                            158.70
                                    * Shear (lb/sq ft)
                                                                  0.08
                                                                             0.36
  0.21
 Al pha
                              2.54
                                    * Stream Power (lb/ft s) *
                                                                  0.05
                                                                             1.45
  0. 27
 Frctn Loss (ft)
                              0.79
                                   * Cum Volume (acre-ft)
                                                                366.38
                                                                           408.06
 926.00
                                   * Cum SA (acres)
 C & E Loss (ft)
                              0.03
                                                                 34. 29
                                                                            20.17
  51.74
             ********************
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth Note: with the lowest, valid, energy was used.

### CROSS SECTION OUTPUT Profile #10%

CROSS SECTION OUTPUT		******	**	*****	**;	*****	**
*****							
* E.G. Elev (ft) Right OB *	* 175.44	* Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.100 *	* 0.08	* Wt. n-Val.	*	0. 100	*	0. 045	*
* W.S. Elev (ft)	* 175.36	* Reach Len. (ft)	*	1000.00	*	1840. 00	*
* Crit W.S. (ft)	* 168.44	* Flow Area (sq ft)	*	134. 98	*	1179. 12	*
* E.G. Slope (ft/ft)	*0.000317	* Area (sq ft)	*	178. 88	*	1179. 12	*
5849.14 * * Q Total (cfs)	* 8780.00	* Flow (cfs)	*	68. 78	*	3890. 92	*
4820.30 * * Top Width (ft)	* 1324.93	* Top Width (ft)	*	137. 96	*	85. 04	*
1101.93 * * Vel Total (ft/s)	* 1.24	* Avg. Vel. (ft/s)	*	0. 51	*	3. 30	*
0.83 * * Max Chl Dpth (ft) 5.58 *	* 16.66	* Hydr. Depth (ft)	*	2. 71	*	13. 87	*
* Conv. Total (cfs) *270682.7 *	*493039.0	* Conv. (cfs)	*	3862. 3	* 2	218494. 0	
* Length Wtd. (ft) 1038.81 *	* 1771.32	* Wetted Per. (ft)	*	50. 51	*	88. 70	*
* Min Ch El (ft)	* 158.70	* Shear (Ib/sq ft)	*	0. 05	*	0. 26	*
* Al pha	* 3.41	* Stream Power (Ib/ft s)	*	0. 03	*	0. 87	*
0.09 * * Frctn Loss (ft)	* 0.76	* Cum Volume (acre-ft)	*	597. 27	*	296. 97	*
730.03 * * C & E Loss (ft)	* 0.02	* Cum SA (acres) Page 28	*	99. 74	*	20. 59	*

126. 39 * **********************************		oposed - No-Rise *********	* * * :	*****	* * *	*****	**			
Warning: Divided flow computed for this cross-section. Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.										
CROSS SECTION OUTPUT F	Profile #2%	******	* * *:	*****	***	******	**			
******* * E.G. Elev (ft)	* 178.12	* Element	*	Left OB		Channel				
Right OB * * Vel Head (ft)	* 0.09	* Wt. n-Val.	*	0. 100	*	0. 045	*			
0.100 * * W.S. Elev (ft)	* 178.02	* Reach Len. (ft)	*	1000.00	*	1840. 00	*			
1840.00 * * Crit W.S. (ft)	* 171.87	* Flow Area (sq ft)	*	444. 55	*	1405. 80	*			
8559.66 * * E.G. Slope (ft/ft)	*0.000334	* Area (sq ft)	*	1194. 66	*	1405. 80	*			
9015.74 * * Q Total (cfs)	*15000.00	* Flow (cfs)	*	173. 04	*	5349. 75	*			
9477.21 *` * Top Width (ft)	* 2008.45	* Top Width (ft)	*	663. 38	*	85. 04	*			
1260.03 * * Vel Total (ft/s)	* 1.44	* Avg. Vel. (ft/s)	*	0. 39	*	3. 81	*			
1.11 * * Max_Chl_Dpth (ft)	* 19.32	* Hydr. Depth (ft)	*	1. 72	*	16. 53	*			
8.25 * * Conv. Total (cfs)	*821250. 1	* Conv. (cfs)	*	9474. 2	*2	292898. 7				
*518877.3 * * Length Wtd. (ft)	* 1725.83	* Wetted Per. (ft)	*	258. 81	*	88. 70	*			
1038.81 * * Min Ch El (ft)	* 158.70	* Shear (lb/sq ft)	*	0. 04	*	0. 33	*			
0. 17 * * Al pha	* 2.86	* Stream Power (lb/ft s)	) *	0. 01	*	1. 26	*			
0.19 * * Frctn Loss (ft)	* 0.80	* Cum Volume (acre-ft)	*	1027. 46	*	366. 39	*			
1308.08 * * C & E Loss (ft)	* 0.02	* Cum SA (acres)	*	187. 80	*	20. 46	*			
137. 61 *	*****	******	* * * :	*****	***	*****	**			
*****										
Warning: Divided flow computed for this cross-section. Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than										

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# 

```
* E.G. Elev (ft)
Right OB *
                       * 182.38 * Element
                                                            * Left OB * Channel *
* Vel Head (ft)
                        * 0.09 * Wt. n-Val.
                                                                           0.045 *
                                                            * 0.100 *
0.100 *
* W.S. Elev (ft)
                        * 182.29 * Reach Len. (ft)
                                                           * 1000.00 * 1840.00 *
1840.00 *
```

. 56	
76	
. 70	
. 04	*
. 04	*
. 80	*
15. 0	
. 70	*
. 34	*
. 39	*
. 08	*
. 69	*
****	*
5 1 3	1. 04 1. 04 1. 80 115. 0 3. 70 1. 34

Warning: The cross-section end points had to be extended vertically for the computed water šurface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

#### CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1 RS: 285

I NPUT

Description: XS 285
INSERTED CROSS-SECTION TO EVALUATE IMPACT OF PROP. SITE (5/21/01)

	(3/2	1/01)									
Station E			num=	408							
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev		
*****	*********************										
0	181. 45	13. 12	181. 21	16. 4	181. 28	32.8	180. 96	36. 08	180. 75		
42.64	180. 53	52.48	180. 55	59.04	180. 47	65.6	180. 13	72. 16	179. 95		
75. 44	180. 04	82	180. 01	91. 84	179. 61	98. 4	179. 46	101. 68	179. 47		
108. 24	179. 63	118. 08	179. 65	121. 36	179. 51	131. 2	179. 37	144. 32	179. 01		
154. 16	178. 78	157. 44	178. 87	167. 28	178. 8	170. 56	178. 88	180. 4	178. 63		
183. 68	178. 68	196. 8	178. 4	203. 37	177. 99	213. 21	178. 08	216. 49	177. 92		
226. 33	177. 75	232.89	177. 57	249. 29	177. 25	272. 25	176. 61	275. 53	176. 61		
285. 37	176. 36	291. 93	175. 97	298. 49	175. 45	311. 61	175. 23	318. 17	174. 77		
324. 73	174. 64	328. 01	174. 43	331. 29	173. 98	334. 57	173. 73	341. 13	173. 92		
347. 69	174. 48	354. 25	174. 69	357. 53	174. 87	364. 09	174. 82	367. 37	174. 87		
370. 65	175. 09	373. 93	175. 15	380. 49	175. 08	387. 05	175. 24	390. 33	175. 2		
396. 89	175. 3	403.45	175. 28	410. 01	175. 48	423. 13	175. 32	429. 69	175. 5		
432. 97	175. 47	436. 25	175. 6	442.81	175. 7	455. 93	175. 76	462. 49	175. 49		
469. 05	175. 53	472. 33	175. 64	485. 45	175. 72	492. 01	175. 56	498. 57	175. 49		
508. 41	175. 81	511. 69	175. 87	518. 25	175. 78	524.81	175. 81	534. 65	176. 06		
				Pag	je 30						

Proposed - No-Rise 176. 14 176. 95 177. 24 178. 38 179. 66 541.21 176. 18 547.77 554.33 176. 52 564.17 176.56 567.45 176.49 587. 13 623. 22 678. 98 176. 73 177. 12 177. 55 179. 55 176.84 574.01 593.69 603.54 610.1 176.77 176.84 629. 78 688. 82 757. 7 793. 78 639. 62 705. 22 764. 26 177. 44 179. 28 616.66 177.17 177.42 646. 18 178. 41 179. 91 178. 91 179. 91 656.02 711. 78 731. 46 787. 22 179. 99 721.62 770.82 780.66 180.01 180.11 180.09 800.34 180.17 806.9 180.18 179. 99 179. 75 826.58 820.02 180.08 180.13 836.42 842.98 180.03 852.82 179.86 179. 83 875. 78 179. 75 888. 9
179. 23 924. 98 178. 9 934. 82
177. 87 964. 34 177. 57 967. 62
177. 13 987. 31 177. 01 993. 87
176. 66 1029. 95 176. 48 1036. 51
176. 49 1066. 03 176. 57 1072. 59
177. 32 1105. 39 177. 3 1111. 95
177. 88 1151. 31 177. 88 1157. 87
178. 31 1200. 51 178. 45 1210. 35
179. 91 1243. 13 180. 15 1249. 69
180. 38 1279. 18 180. 33 1295. 57
179. 85 1321. 78 179. 47 1328. 33
177. 81 1348 177. 84 1354. 55
178. 78 1393. 87 179. 34 1397. 15
180. 06 1456. 13 180. 14 1469. 24
180. 54 1495. 46 180. 65 1502. 01
181. 12 1541. 33 181. 08 1547. 89
181. 351584. 607 180. 8171602. 021 179. 82 179. 3 179. 82 869. 22 179. 3 918. 42 178. 02 954. 5 177. 25 980. 74 176. 8 1023. 39 176. 38 1062. 75 177. 16 1098. 83 177. 61 1148. 03 178. 23 1184. 11 179. 28 1239. 86 180. 37 1266. 07 179. 96 1315. 23 177. 94 1344. 72 178. 63 1374. 21 179. 99 1436. 47 180. 48 1488. 9 869.22 875.78 888.9 179.7 902.02 179.47 859.38 179.83 178.47 908.58 941.38 178.31 947. 94 977. 46 1013. 55 1052. 91 177. 35 970. 9 176. 98 1006. 99 177. 26 176. 79 176. 42 1046. 35 176. 94 1075. 87 177. 36 1118. 51 178. 09 1167. 71 176. 19 177. 06 177. 59 1088. 99 1128. 35 178. 26 1170.99 178. 83 1216. 91 180. 34 1256. 24 178.97 1226. 75 1259. 52 180.44 180. 34 1256. 24 180. 1 1302. 12 179. 01 1334. 89 178. 02 1361. 1 179. 36 1416. 81 180. 38 1472. 52 180. 68 1518. 4 180.17 178. 1 178. 37 1308.67 1521. 67 100. 48 1488. 9 180. 54 1495. 46 180. 65 1502. 01 180. 48 1488. 9 180. 54 1495. 46 180. 65 1502. 01 180. 68 1518. 4 180. 91 1521. 67 180. 89 1538. 06 181. 12 1541. 33 181. 08 1547. 89 181. 18 1559. 91 181. 38 1573. 19 181. 41 1582. 64 181. 351584. 607 180. 81 1547. 89 181. 18 1559. 91 181. 38 1573. 91 180. 6071741. 327 180. 671671. 674 180. 6771689. 087 180. 657 1706. 5 180. 637 1723. 913 180. 6071741. 327 180. 577 1758. 74 180. 5871776. 153 180. 5871793. 566 180. 687 1898. 046 180. 7171915. 459 180. 7471932. 873 180. 6171863. 219 180. 6471880. 633 180. 687 1898. 046 180. 7171915. 459 180. 7471932. 873 180. 7871950. 286 180. 8272069. 562 180. 8272019. 939 180. 8272137. 528 180. 8272141. 822 180. 827208. 595 180. 8272107. 005 180. 8272124. 418 180. 8272141. 832 180. 827 2159. 245 180. 8272263. 725 180. 8272194. 072 180. 8272214. 485 180. 8272231. 596 180. 827 2240. 311 180. 8272263. 725 180. 8272281. 138 180. 8272214. 485 180. 8272231. 596 180. 527 2333. 378 180. 3172350. 791 180. 1172368. 204 179. 9072385. 617 179. 7072403. 031 179. 497 2420. 444 179. 1172437. 857 179. 3272455. 271 178. 327 2459. 03 177. 1 2468. 86 176. 52 2508. 2 175. 16 2511. 47 174. 88 2514. 75 174. 72 2518. 03 174. 77 2531. 14 174. 4 2534. 42 174. 35 2540. 98 174. 11 2547. 53 174. 09 2577. 04 173. 172. 82622. 93 172. 94 2636. 04 172. 88 2639. 32 172. 91 2642. 6 173. 09 2649. 15 173. 172. 8262. 93 172. 94 2636. 04 172. 88 2639. 32 172. 91 2642. 6 173. 09 2649. 15 173. 172. 8262. 93 172. 94 2636. 04 172. 88 2639. 32 172. 91 2642. 6 173. 09 2649. 15 173. 172. 8262. 93 172. 94 2636. 04 172. 88 2639. 32 172. 91 2642. 6 173. 09 2649. 15 173. 173. 172. 8262. 93 172. 94 2636. 04 172. 88 2639. 32 172. 91 2642. 6 173. 09 2649. 15 173. 173. 172. 8262. 93 172. 94 2636. 04 172. 88 2639. 32 172. 91 2642. 6 173. 09 2649. 15 173. 173. 172. 8262. 93 172. 94 2636. 04 172. 88 2639. 32 172. 91 2642. 6 173. 09 2649. 15 173. 31 2704. 88 173. 81 2704. 88 173. 55 2767. 16 173. 38 2691. 77 112. 8268. 67 173. 173. 173. 174. 174. 174. 174. 174. 174. 175. 174 1338.17 1367. 66 1429. 92 1475. 8 178. 63 179. 99 180. 48 173. 83 2691. 77
174. 02 2721. 27
173. 71 2750. 77
172. 38 2777
170. 18 2806. 5
170. 32 2839. 28
170. 35 2875. 34
169. 72 2914. 67
169. 17 2950. 73
168. 02 2976. 96
167. 54 3006. 46
170. 36 3040. 74
169. 14 3070. 23
162. 08 3086. 62
159. 65 3155. 44
165. 02 3167. 03
168. 41 3193. 25
168. 12 3216. 18 169. 02 2957. 29 167. 82 2993. 35 169. 59 3024. 36 170. 24 3057. 13 167. 57 3076. 79 159. 76 3093. 17 161. 34 3157. 2 168. 72 3173. 58 167. 97 3203. 08 169. 1 3226. 02 168. 05 2986. 79 168. 35 3013. 15 170. 25 3047. 29 168. 54 3073. 51 160. 38 3089. 9 159. 93 3156. 75 166. 97 3170. 31 167. 97 3196. 52 168. 49 3222. 74 170. 16 3034. 19 169. 56 3066. 96 163. 4 3083. 34 158. 2 3152. 16 162. 66 3163. 75 168. 72 3186. 69 3081. 19 3124 3160. 48 159. 71 161. 36 169. 3 162. 66 3163. 75 168. 72 3186. 69 167. 94 3212. 91 169. 4 3239. 12 3180. 14 168.14 168. 12 3216. 18 169. 19 3245. 68 3209.63 169.3 168. 92 3271. 89 168. 63 3304. 66 169. 23 3258. 79 3232.57 168.7 168. 81 3298. 11 3285 168.76 3291.56 3278.45 168.84 168.83 169. 15 3321. 05 169. 42 3327. 6 175. 26 3343. 99 176. 11 3347. 26 170. 29 3330. 88 169.04 3317.77 3307.94 171.15 3337.43 173. 98 3340. 71 176. 83 3353. 82 179.01

```
Proposed - No-Rise
                          180. 61 3363. 65
 3357.09
          179. 87 3360. 37
                                          181. 12 3370. 2
                                                         181. 56 3373. 48
                                                                          181. 97
          182.89 3380.03
                          183.68 3383.31
                                          184. 07 3389. 86
                                                         184. 53 3396. 42
 3376. 76
                                                                          184.86
 3402.97
          185.63 3406.25
                          185. 9
                                 3412.8
                                          186. 17 3422. 63 186. 46 3429. 19
                                                                          186.96
 3439.02
          187. 44 3455. 4
                          188.07 3465.24
                                          188.31
Manning's n Values
                          num=
                         n Val
  Sta n Val
                    Sta
                                     Sta
                                          n Val
          . 1 3076. 79
                           . 045 3167. 03
Bank Sta: Left
                          Lengths: Left Channel
                                                  Ri ght
                                                            Coeff Contr.
                 Ri ght
                                                                           Expan.
       3076. 79 3167. 03
                                                                            . 3
                                                             . 1
                                    220
                                            295
                                                    320
                                2
Ineffective Flow
                    num=
          Sta R
                          Permanent
   Sta L
                    El ev
       02281. 138
                     185
                              F
    3399 3465.24
                     185
                               F
Blocked Obstructions
                        num=
   Sta L Sta R
                    El ev
  807. 14 1460. 71
                   180.1
CROSS SECTION OUTPUT Profile #1%
* E.G. Elev (ft)
                            178.44 * Element
                                                                Left OB *
                                                                           Channel *
Right OB *
  Vel Head (ft)
                             0.32
                                    * Wt. n-Val.
                                                                 0.100
                                                                            0.045
  0. 100
* W.S. Elev (ft)
                           178. 12
                                    * Reach Len. (ft)
                                                                220.00
                                                                           295.00
 320.00 *
* Crit W.S. (ft)
                           171. 92
                                    * Flow Area (sq ft)
                                                             * 3891.90
                                                                        * 1627.53
1581. 99
* E.G. Slope (ft/ft)
                         *0.000733
                                    * Area (sq ft)
                                                             * 4814.60
                                                                        * 1627.53
1581. 99
* Q Total (cfs)
                         *17700.00
                                    * Flow (cfs)
                                                             * 5316.19
                                                                        * 9732.85
2650. 95
* Top Width (ft)
                                                             * 1091.19
                                    * Top Width (ft)
                         * 1365.53
                                                                            90.24
 184. 10
 Vel Total (ft/s)
                             2.49
                                    * Avg. Vel. (ft/s)
                                                                             5.98
                                                                  1.37
   1. 68
 Max Chl Dpth (ft)
                                    * Hydr. Depth (ft)
                             19.92
                                                                  6.27
                                                                            18.04
   8. 59
* Conv. Total (cfs)
                         *653684.0
                                    * Conv. (cfs)
                                                             *196334.0
                                                                        *359446.9
97903.1
 Length Wtd. (ft)
                            278. 13
                                    * Wetted Per. (ft)
                                                                622.16
                                                                            94.09
 186. 13 *
* Min Ch El (ft)
                            158. 20
                                    * Shear (lb/sq ft)
                                                                  0.29
                                                                             0.79
   0.39
                              3.32
                                    * Stream Power (lb/ft s) *
                                                                             4.73
 Al pha
                                                                  0.39
   0.65
* Frctn Loss (ft)
                              0.20
                                    * Cum Volume (acre-ft)
                                                             * 1253.09
                                                                           331.26
1315.81
* C & E Loss (ft)
                              0.01 * Cum SA (acres)
                                                                207.37
                                                                            16.76
  ****************
*****
Warning: Divided flow computed for this cross-section.
        Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
CROSS SECTION OUTPUT Profile #Floodway
```

* E.G. Elev (ft)	*	178. 98	*	Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	*	0. 38	*	Wt. n-Val.	*	0. 100	*	0. 045	*
0.100 * * W.S. Elev (ft)	*	178. 60	*	Reach Len. (ft)	*	220. 00	*	295.00	*
320.00 * * Crit W.S. (ft)	*	171. 93	*	Flow Area (sq ft)	*	3282. 56	*	1671. 38	*
1008.04 * * E.G. Slope (ft/ft)	*0	. 000782	*	Area (sq ft)	*	3282. 56	*	1671. 38	*
1008.04 *	*1	7700. 00	*	Flow (cfs)	*	5381. 78	* ^	10509. 98	*
* Top Width (ft)	*	605.00	*	Top Width (ft)	*	412. 79	*	90. 24	*
101.97 * * Vel_Total (ft/s)	*	2. 97	*	Avg. Vel. (ft/s)	*	1. 64	*	6. 29	*
1.79 * * Max Chl Dpth (ft)	*	20. 40	*	Hydr. Depth (ft)	*	7. 95	*	18. 52	*
* Conv. Total (cfs)	*6	32771. 6	*	Conv. (cfs)	* *	192397. 7	* ?	375729. 8	*
64644.1 * * Length Wtd. (ft)	*	276. 30	*	Wetted Per. (ft)	*	419. 01	*	94. 09	*
112.43 * * Min Ch El (ft)	*	158. 20	*	Shear (lb/sq ft)	*	0. 38	*	0. 87	*
0. 44 * * Al pha	*	2. 79	*	Stream Power (lb/ft s)	*	0. 63	*	5. 46	*
0.79 * * Frctn Loss (ft)	*	0. 21	*	Cum Volume (acre-ft)	*	321. 50	*	340.06	*
721.37 * * C & E Loss (ft)	*	0. 01	*	Cum SA (acres)	*	27. 75	*	16. 47	*
31.89 * ************	***	*****			* * ;	****	* * ;	*****	* *
*****									

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

### CROSS SECTION OUTPUT Profile #10%

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**************************************									
*****									
* E.G. Elev (ft) Right OB *	* 174.6	6 * Element	*	Left OB	*	Channel	*		
* Vel Head (ft) 0.100 *	* 0.2	7 * Wt. n-Val.	*	0. 100	*	0. 045	*		
* W.S. Elev (ft) 320.00 *	* 174.3	3 * Reach Len. (ft)	*	220. 00	*	295. 00	*		
* Crit W.S. (ft) 918.51 *	* 166.7	2 * Flow Area (sq ft)	*	1677. 03	*	1290. 52	*		
* E.G. Slope (ft/ft) 918.51 *	*0. 00067	3 * Area (sq ft)	*	1684. 23	*	1290. 52	*		
* Q Total (cfs) 1078.11 *	* 8780.0	) * Flow (cfs)	*	1366. 96	*	6334. 93	*		
* Top Width (ft) 171.43 *	* 824.2	6 * Top Width (ft)	*	562. 59	*	90. 24	*		
* Vel Total (ft/s) 1.17 *	* 2.2	6 * Avg. Vel. (ft/s)	*	0. 82	*	4. 91	*		
* Max Chl Dpth (ft) 5.36 *	* 16.1	3 * Hydr. Depth (ft)	*	3. 08	*	14. 30	*		
* Conv. Total (cfs) 41554.1 *	*338413.	) * Conv. (cfs)	*	52687.7	* 2	244171. 2	*		
* Length Wtd. (ft) 172.90 *	* 286.9	7 * Wetted Per. (ft)	*	545. 48	*	94. 09	*		
* Min Ch El (ft)	* 158. 2	) * Shear (Ib/sq ft) Page 33	*	0. 13	*	0. 58	*		

Proposed - No-Rise										
0. 22 * * Al pha	* 3.46	* Stream Power (lb/ft s)	*	0. 11	*	2. 83	*			
0.26 * * Frctn Loss (ft)	* 0.18	* Cum Volume (acre-ft)	*	575. 88	*	244. 81	*			
587.10 * * C & E Loss (ft)	* 0. 01	* Cum SA (acres)	*	91. 70	*	16. 89	*			
99.49 *	*****	*******	***	*****	* * *	*****	**			
*****										
Warning: Divided flow on Note: Multiple critic with the lowest, valid,	cal depths	were found at this location	on.	The cri	tic	cal depth				
CROSS SECTION OUTPUT F		********	***	*****	* * *	*****	**			
* E.G. Elev (ft)	* 177. 29	* Element	*	Left OB	*	Channel	*			
Right OB * * Vel Head (ft)	* 0.33	* Wt. n-Val.	*	0. 100	*	0. 045	*			
0.100 * * W.S. Elev (ft)	* 176. 96	* Reach Len. (ft)	*	220. 00	*	295.00	*			
320.00 * * Crit W.S. (ft)	* 171.13	* Flow Area (sq ft)	*	3176. 02	*	1523. 17	*			
1371.08 * * E.G. Slope (ft/ft)	*0. 000769	* Area (sq ft)	*	3621. 74	*	1523. 17	*			
1371.08 * * 0 Total (cfs) 2167.98 *	*15000.00	* Flow (cfs)	*	3904. 59	*	8927. 44	*			
* Top Width (ft)	* 1240. 17	* Top Width (ft)	*	969. 31	*	90. 24	*			
180.62 * * Vel_Total (ft/s)	* 2.47	* Avg. Vel. (ft/s)	*	1. 23	*	5. 86	*			
1.58 * * Max Chl Dpth (ft)	* 18.76	* Hydr. Depth (ft)	*	5. 16	*	16. 88	*			
7.59 * * Conv. Total (cfs)	*540790. 1	* Conv. (cfs)	* *	140770. 7	*3	321857. 9	*			
78161.4 * * Length Wtd. (ft)	* 280. 53	* Wetted Per. (ft)	*	616. 50	*	94.09	*			
182.46 * * Min_Ch_El_(ft)	* 158. 20	* Shear (Ib/sq ft)	*	0. 25	*	0. 78	*			
0.36 * * Alpha	* 3.47	* Stream Power (lb/ft s)	) *	0. 30	*	4. 56	*			
0.57 * * Frctn Loss (ft)	* 0. 21	* Cum Volume (acre-ft)	*	972. 17	*	304. 53	*			
1088.71 * * C & E Loss (ft)	* 0.01	* Cum SA (acres)	*	169. 06	*	16. 76	*			
	*****	********	***	*****	***	*****	**			
*****										
Warning: Divided flow on Note: Multiple critic with the lowest, valid,	cal depths	were found at this location	on.	The cri	tic	cal depth				
CROSS SECTION OUTPUT F	Profile #0.2	% ***********	***	*****	* * *	*****	**			
* E.G. Elev (ft)	* 181.70	* Element	*	Left OB	*	Channel	*			
Right OB *  * Vel Head (ft)	* 0.32	* Wt. n-Val.	*	0. 100	*	0. 045	*			
0.100 * * W.S. Elev (ft)	* 181.38	* Reach Len. (ft)	*	220. 00	*	295. 00	*			
320.00 *		Page 34								

	Pr	oposed - No-Rise			
* Crit W.S. (ft) 2202.85 *		* Flow Area (sq ft)	* 6181.72	* 1922.13	*
* E.G. Slope (ft/ft) 2202.85 *	*0.000668	* Area (sq ft)	*10547.09	* 1922.13	*
* Q Total (cfs) 4146.45 *	*25700.00	* Flow (cfs)	* 9299.07	*12254.49	*
* Top Width (ft) 200.50 *	* 3345.95	* Top Width (ft)	* 3055. 21	* 90. 24	*
* Vel Total (ft/s) 1.88 *	* 2.49	* Avg. Vel. (ft/s)	* 1.50	* 6.38	*
* Max Chl Dpth (ft) 10.99 *	* 23.18	* Hydr. Depth (ft)	* 7.77	* 21.30	*
* Conv. Total (cfs) *160485.3 *	*994699.8	* Conv. (cfs)	*359913.6	*474300.9	
* Length Wtd. (ft) 202.91 *	* 274.67	* Wetted Per. (ft)	* 797.02	* 94.09	*
* Min Ch El (ft) 0.45 *	* 158. 20	* Shear (Ib/sq ft)	* 0.32	* 0.85	*
* Al pha 0. 85 *	* 3.34	* Stream Power (Ib/ft s)	* 0.49	* 5.43	*
* Frctn Loss (ft) 1923.12 *	* 0.18	* Cum Volume (acre-ft)	* 2245.95	* 400.13	*
* C & E Loss (ft) 139.67 *	* 0.00	* Cum SA (acres)	* 349.65	* 17. 99	*
137.07	*****	*****	*****	*****	**
****					

Warning: Divided flow computed for this cross-section.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 280.55

I NPUT

Description: XS 280.55 (LETTERED CROSS-SECTION V) Station Elevation Data num= 382 El ev Sta Sta El ev Sta El ev Sta El ev Sta El ev 6.55 22.91 0 181.25 181.19 9.82 181.26 16.36 181.11 181.05 180.65 29.46 180.74 36 180.59 39.27 42.55 180.51 45.82 180.52 52.36 180.39 62.18 180.27 179.82 65.46 180. 15 68.73 180. 17 78. 55 81. 82 124. 37 179. 52 179. 35 179.91 179.62 121.09 179.36 91.64 98.18 179.7 108 179. 41 130.91 179. 16 179.03 134. 18 140.73 179.01 144 153. 82 183. 28 178. 75 178. 33 160. 37 189. 82 163. 64 196. 37 178. 76 178. 14 178. 74 177. 95 178. 53 177. 91 178.87 173.46 180 209.46 178.09 202.91 177. 24 219. 28 177.58 177.59 232.37 177.27 238. 91 225.82 245.46 176.92 252.01 176.99 176.93 261.82 268.37 176.45 255.28 176.57 176.72 274.92 281.46 176.54 288.01 176.4 294.55 175.97 297.82 175.65 301.1 175.55 175.37 304.37 175.21 307.64 317.46 175.14 320.73 174.92 333.83 174.52 340.37 174.49 346. 92 350.19 343.64 174. 15 174.02 174.03 353.46 173.82 173. 28 174. 94 175. 25 175. 56 356. 74 392. 74 174.11 174. 79 382. 92 173.77 369.83 360.01 373.1 174.87 399. 28 435. 28 471. 28 174. 91 175. 39 175. 21 175. 16 175. 23 175. 43 174.84 402.55 175.06 415.65 425.46 432. 01 461. 46 175. 33 175. 33 448. 37 494. 19 445.1 458.19 175.39 175.37 481.1 504.01 513.83 175.46 523.65 175.39 530.19 175. 41 536.74 175.66 175.62 540.01 175.72 553.1 175.7 562.92 569.47 546.56 556.38 175.9 175.99 175.87 176.1 595.65 176.51 576.01 176.07 589.1 176.33 612.01 176.56 615.29 634.92 625.1 176.7 176.8 641.47 176.62 644.74 176.6 654.56 177.01 670.92 661.11 177.06 667.65 177.04 177. 15 677.47 177.18 680.74 177 Page 35

```
## Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Con
                                                                                                                                                                                                                                                                 185. 29 3442. 54
185. 84 3468. 76
186. 23 3494. 98
185. 97
                                                                 Manning's n Values
                                                                                                                                                                                                                                                                   num=
                                                                   . 1 3083. 19 . 045 3167. 11 . 1
                                                                  Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Expan.
```

```
Proposed - No-Rise
       3083. 19 3167. 11
                                  1140
                                          1140
                                                  1140
                                                                  . 1
                                                                           . 3
Ineffective Flow
                    num=
          Sta R
                   Elev Permanent
   Sta L
       02492.625
                    185
                              F
                              F
    3409 3517.92
                    185
Blocked Obstructions
                                   1
                        num=
  Sta L Sta R El ev
  922. 45 1342. 86180. 2296
CROSS SECTION OUTPUT Profile #1%
*******************
* E.G. Elev (ft)
Right OB *
                           178. 23
                                   * Element
                                                            * Left OB *
                                                                         Channel *
 Vel Head (ft)
                             0.29
                                   * Wt. n-Val.
                                                                0.100
                                                                           0.045
 0.100
* W.S. Elev (ft)
                           177. 94
                                   * Reach Len. (ft)
                                                            * 1140.00
                                                                       * 1140.00
1140.00
                                   * Flow Area (sq ft)
* Crit W.S. (ft)
                        * 171.80
                                                                       * 1534.43
                                                            * 3320.62
2208. 53
* E.G. Slope (ft/ft)
                        *0.000693
                                   * Area (sq ft)
                                                            * 4349.66
                                                                       * 1534.43
2208. 53
* Q Total (cfs)
                        *17700.00
                                                                       * 9021.27
                                   * Flow (cfs)
                                                            * 4816.07
3862. 66
* Top Width (ft)
                        * 1290.37
                                   * Top Width (ft)
                                                               975.02
                                                                           83.92
 231. 43 *
* Vel Total (ft/s)
                             2. 51
                                   * Avg. Vel. (ft/s)
                                                                 1.45
                                                                            5.88
   1. 75
* Max Chl Dpth (ft)
                            19.94
                                   * Hydr. Depth (ft)
                                                                 7.17
                                                                           18.28
  9.54
* Conv. Total (cfs)
*146781.9 *
                                   * Conv. (cfs)
                                                            *183011.8
                                                                       *342810.3
                        *672603.9
* Length Wtd. (ft)
                                   * Wetted Per. (ft)
                        * 1140.00
                                                               464.86
                                                                           87.19
 233. 48 *
 Min Ch El (ft)
                                   * Shear (lb/sq ft)
                           158. 00
                                                                 0.31
                                                                            0.76
  0.41
 Al pha
                             3.00
                                   * Stream Power (lb/ft s) *
                                                                 0.45
                                                                            4.47
  0.72
* Frctn Loss (ft)
                                   * Cum Volume (acre-ft)
                                                                          320.55
                             1.08
                                                            * 1229.94
1301.89
* C & E Loss (ft)
                             0.03
                                   * Cum SA (acres)
                                                               202.15 *
                                                                           16. 17
 108.74 *
*******************************
*****
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
         the need for additional cross sections.
         Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
CROSS SECTION OUTPUT Profile #Floodway
* E.G. Elev (ft)
                       * 178.76 * Element
                                                               Left OB *
                                                                          Channel *
Right OB *
 Vel Head (ft)
                             0.35 * Wt. n-Val.
                                                                0.100 *
                                                                           0.045 *
 0.100
```

```
Proposed - No-Rise
* W. S. Elev (ft)
                         * 178.41
                                    * Reach Len. (ft)
                                                             * 1140.00
                                                                       * 1140.00
1140.00
* Crit W.S. (ft)
                         * 172.03 * Flow Area (sq ft)
                                                             * 3062.89
                                                                        * 1574.36
1559.81
* E.G. Slope (ft/ft)
                                   * Area (sq ft)
                         *0.000745
                                                             * 3062.89
                                                                        * 1574.36
1559. 81
* 0 Total (cfs)
                         *17700.00
                                   * Flow (cfs)
                                                             * 5019.80
                                                                        * 9767.38
2912.82
* Top Width (ft)
                           600.00
                                    * Top Width (ft)
                                                                369.19
                                                                           83.92
146. 89
                             2.86
* Vel Total (ft/s)
                                    * Avg. Vel. (ft/s)
                                                                 1.64
                                                                            6.20
  1.87
* Max Chl Dpth (ft)
                             20.41
                                    * Hydr. Depth (ft)
                                                                 8.30
                                                                            18.76
10.62 * '
* Conv. Total (cfs)
                                    * Conv. (cfs)
                         *648408.1
                                                             *183891.5
                                                                        *357810.6
*106706.0
* Length Wtd. (ft)
                         * 1140.00
                                   * Wetted Per. (ft)
                                                               377. 12
                                                                           87.19
157. 90
 Min Ch El (ft)
                           158.00
                                   * Shear (lb/sq ft)
                                                                 0.38
                                                                            0.84
  0.46
                             2.77
                                   * Stream Power (lb/ft s) *
 Al pha
                                                                 0.62
                                                                            5. 21
  0.86
                                                                305.48
* Frctn Loss (ft)
                             1.07
                                   * Cum Volume (acre-ft)
                                                                          329.07
711. 94
* C & E Loss (ft)
                             0.02
                                   * Cum SA (acres)
                                                                25. 78
                                                                           15.88
  30. 97
**************************
```

Warning: The energy loss was greater than 1.0 ft  $(0.3\ \text{m})$ . between the current and previous cross section. This may indicate

the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# CROSS SECTION OUTPUT Profile #10%

*****	****	******	* *	*****	* * :	*****	* *
*****							
* E.G. Elev (ft) Right OB *	* 174.46	* Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.100 *	* 0. 23	* Wt. n-Val.	*	0. 100	*	0.045	*
* W.S. Elev (ft)	* 174. 23	* Reach Len. (ft)	*	1140. 00	*	1140. 00	*
* Cri t W. S. (ft)	* 166.65	* Flow Area (sq ft)	*	1645. 28	*	1223. 71	*
1369.74 * * E.G. Slope (ft/ft)	*0.000588	* Area (sq ft)	*	1656. 60	*	1223. 71	*
1369. 74 * * Q Total (cfs)	* 8780.00	* Flow (cfs)	*	1423. 38	*	5703. 26	*
1653.36 * * Top Width (ft) 222.19 *	* 774.71	* Top Width (ft)	*	468. 59	*	83. 92	*
* Vel Total (ft/s) 1.21 *	* 2.07	* Avg. Vel. (ft/s)	*	0. 87	*	4. 66	*
<pre>* Max Chl Dpth (ft)</pre>	* 16. 23	* Hydr. Depth (ft)	*	3. 73	*	14. 58	*
6.16 * * Conv. Total (cfs)	*361948.4	* Conv. (cfs)	*	58677.7	* 2	235112. 4	*
* Length Wtd. (ft)	* 1140.00	* Wetted Per. (ft)	*	442. 47	*	87. 19	*
223.52 * * Min Ch El (ft)	* 158.00	* Shear (Ib/sq ft)	*	0. 14	*	0. 52	*
0. 23 * * Al pha	* 3.38	* Stream Power (lb/ft s) Page 38	*	0. 12	*	2. 40	*

		Pr	ор	osed	- No-F	Ri se					
0.27 * * Frctn Loss (ft)	*	0. 87	*	Cum	Volume	e (acre-ft)	*	567. 45	*	236. 30	*
578. 69 *		0. 67		Cuiii	voi une	(acre-rt)		507.45		230. 30	
* C & E Loss (ft)	*	0. 01	*	Cum	SA (ac	cres)	*	89. 10	*	16. 30	*
98. 05 * ********	*****	*****	**	****	*****	****	****	*****	***	*****	**
*****											
Warning: Divided flow computed for this cross-section.  Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.											
CROSS SECTION OUTPUT	Profil	· · - · ·	**	****	*****	****	****	*****	***	*****	**

******	*****	******	**	*****	* * ;	*****	* *
****							
* E.G. Elev (ft)	* 177.07	* Element	*	Left OB	*	Channel	*
Right OB *							
* Vel Head (ft)	* 0. 29	* Wt. n-Val.	*	0. 100	*	0. 045	*
0. 100 *							
* W.S. Elev (ft)	* 176. 78	* Reach Len. (ft)	*	1140. 00	*	1140. 00	*
1140.00 *							
* Crit W.S. (ft)	* 171.02	* Flow Area (sq ft)	*	2789. 51	*	1437. 50	*
1943. 14 *	+0 000704	* * * * * * * * * * * * * * * * * * * *		0005 00		4 407 50	*
* E.G. Slope (ft/ft)	*0. 000704	* Area (sq ft)	*	3285. 90	*	1437. 50	*
1943. 14 *	±45000 00	* EL		0//5 70	ىد.	0457.00	*
* Q Total (cfs)	*15000.00	* Flow (cfs)	^	3665. 79	^	8157. 30	^
3170. 71	+ 1157 4/	* T W: - + - (£+)	*	045 00	*	00.00	*
* Top Width (ft) 228.21 *	* 1157.46	* Top Width (ft)		845. 33		83. 92	
* Vel Total (ft/s)	* 2.43	* Avg. Vel. (ft/s)	*	1. 31	*	5. 67	*
1. 63 *	2.43	Avg. ver. (11/5)		1.31		5.07	
* Max Chl Dpth (ft)	* 18. 78	* Hydr. Depth (ft)	*	6. 11	*	17. 13	*
8. 51 *	10. 70	nyar. Depth (11)		0. 11		17.13	
* Conv. Total (cfs)	*565415.3	* Conv. (cfs)	* *	138179. 5	* 1	307484. 2	
*119751.6 *	00011010	(0.0)		10017710	•	30, 101.2	
* Length Wtd. (ft)	* 1140.00	* Wetted Per. (ft)	*	458. 30	*	87. 19	*
230. 05 *							
* Min Ch El (ft)	* 158.00	* Shear (Ib/sq ft)	*	0. 27	*	0. 72	*
0. 37 * ` ´		, ,					
* Al pha	* 3.13	* Stream Power (lb/ft s)	*	0. 35	*	4. 11	*
0. 61 *		,					
<pre>* Frctn Loss (ft)</pre>	* 1.10	<pre>* Cum Volume (acre-ft)</pre>	*	954. 73	*	294. 51	*
1076. 54 *							
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	*	164. 47	*	16. 17	*
105. 68 *							
******	*****	******	**	*****	* * ;	*****	* *

\*\*\*\*\*

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft  $(0.3\ \text{m})$ . between the current and previous cross section. This may indicate

the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT				****	*****	*****
****						
* E.G. Elev (ft) Right OB *	*	181. 52	* Element	*	Left OB *	Channel *

```
Proposed - No-Rise
* Vel Head (ft)
                             0.32
                                   * Wt. n-Val.
                                                                0. 100 *
                                                                          0.045
 0.100
 W.S. Elev (ft)
                           181.20 * Reach Len. (ft)
                                                            * 1140.00
                                                                       * 1140.00
1140.00
 Crit W.S. (ft)
                                   * Flow Area (sq ft)
                                                            * 5042.79
                           173. 52
                                                                       * 1808.47
2979. 08
* E.G. Slope (ft/ft)
                        *0.000662
                                   * Area (sq ft)
                                                            * 9385.58
                                                                       * 1808.47
2979. 08
* Q Total (cfs)
                        *25700.00
                                   * Flow (cfs)
                                                            * 8037.02
                                                                       *11598.78
6064. 20
 Top Width (ft)
                        * 3396.53
                                   * Top Width (ft)
                                                            * 3072.82
                                                                           83.92
239. 79
* Vel Total (ft/s)
                             2.61
                                   * Avg. Vel. (ft/s)
                                                                 1.59
                                                                            6.41
  2.04
 Max Chl Dpth (ft)
                                   * Hydr. Depth (ft)
                            23.20
                                                                 8.54
                                                                           21.55
 12.42
* Conv. Total (cfs)
                        *998885.5
                                   * Conv. (cfs)
                                                            *312376.0
                                                                       *450811.3
*235698.1
 Length Wtd. (ft)
                        * 1140.00
                                   * Wetted Per. (ft)
                                                              592.45
                                                                           87.19
242. 47
                           158.00
                                   * Shear (lb/sq ft)
 Min Ch El (ft)
                                                                 0.35
                                                                            0.86
  0.51
                             2.98
                                   * Stream Power (lb/ft s) *
 Al pha
                                                                 0.56
                                                                            5. 50
  1. 03
* Frctn Loss (ft)
                             1.04
                                   * Cum Volume (acre-ft)
                                                            * 2195.61
                                                                          387.50
1904.08
                             0.04
                                  * Cum SA (acres)
* C & E Loss (ft)
                                                               334. 17
                                                                           17.40
*************************
```

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft  $(0.3\ \text{m})$ . between the current and previous cross section. This may indicate

the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1 RS: 270

I NPUT

Description: XS 270

THIS CROSS SECTION IS THE INSERTED CROSS SECTION TO

REPRESENT

FILL PLACED SINCE THE EFFECTIVE FIS WAS

COMPLETED

THERE IS AN ENCR. IN THE NAT. RUN TO REFLECT EFFECTIVE

FLOW

Station E	I evati on	Data	num=	415									
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	Elev				
*************************													
0	179. 56	13. 12	179. 24	19. 68	179. 24	32.8	178. 98	36.08	178. 79				
42.64	178. 63	52. 48	178. 7	62. 32	178. 52	68.88	178. 54	72. 16	178. 34				
75. 44	178. 43	82	178. 32	88. 56	178. 04	91. 83	177. 83	95. 11	178. 01				
101. 67	177. 89	108. 23	177. 62	124. 63	177. 42	127. 91	177. 27	134. 47	177. 12				
141. 03	177. 16	147. 59	177. 11	157. 43	176. 69	170. 55	176. 47	173. 83	176. 55				
	Page 40												

Proposed - No-Rise 176. 57 175. 79 175. 23 175. 24 175. 12 174. 26 180. 39 219. 75 249. 27 275. 5 301. 74 324. 7 177.11 176.39 193.51 176.45 200.07 176. 1 209.91 176.18 176.06 216.47 223.03 176 232.87 175.65 236.15 175.43 253. 03 252. 55 278. 78 308. 3 331. 26 360. 78 242. 71 268. 94 295. 18 175. 5 175. 36 174. 79 174. 32 175. 53 175. 33 174. 89 259. 11 282. 06 175.63 175.37 265.67 175. 43 175. 01 175. 07 174. 6 288.62 311. 58 337. 82 314. 86 174.58 174.03 344.38 318.14 173.44 350. 94 373. 9 396. 86 354. 22 364.06 172.74 173.18 172.81 172.55 370.62 173.27 173.31 173.54 173.86 390.3 380.46 387.02 173.87 393.58 173.65 173. 86 174. 6 174. 79 403. 42 449. 33 409. 98 400.14 174.23 174.44 174.45 413.26 174.58 174. 23 174. 56 174. 71 175. 15 175. 23 176. 12 400. 14 432. 94 482. 13 518. 21 551. 01 593. 65 174. 44 174. 68 175. 02 175. 31 175. 23 176. 28 176. 77 409. 98 465. 73 495. 25 531. 33 567. 41 613. 33 649. 4 174. 77 175 475.57 423. 1 478. 85 174.72 174. 72 175. 11 175. 53 175. 68 176. 37 176. 89 488.69 501.81 175. 42 175. 46 176. 29 176. 69 177. 25 177. 35 178. 79 179. 94 175. 07 175. 35 175. 9 176. 6 511. 65 541. 17 577. 25 629. 73 521. 49 560. 85 534. 61 570. 69 596. 93 642. 84 678. 92 715 623. 17 659. 24 633 685. 48 724. 84 757. 64 176. 94 177. 52 669.08 176. 88 177. 28 665.8 176.82 692.04 177.15 701.88 177.29 708.44 728.12 177.52 747. 8 777. 32 810. 12 177. 26 178. 28 179. 36 179. 87 741. 24 770. 76 806. 84 760. 92 787. 16 177. 88 734.68 177.58 178.85 177. 58 178. 66 179. 79 180. 1 180. 37 180. 59 780. 6 819. 96 852. 75 895. 39 947. 87 177. 00 178. 77 179. 93 180. 17 767. 48 797 179.56 826.51 179.93 842. 91 882. 27 921. 63 180. 27 180. 45 180. 3 180. 13 849. 47 888. 83 934. 75 180. 31 180. 41 180. 44 833. 07 869. 15 911. 79 862. 59 898. 67 180.39 180. 47 180. 44 180.56 954. 43 180.32 180. 26 179. 97 180. 28 180. 17 964.27 970.83 980.67 990.51 997.07 180.16 1016. 74 1072. 5 1111. 86 179. 75 1046. 26 179. 47 1088. 9 178. 95 1138. 1 178. 59 1187. 3 179. 43 1229. 93 180. 32 1302. 09 179. 63 1348. 01 180. 05 1400. 43 180. 51 1446. 28 180. 26 1501. 95 178. 99 1544. 52 177. 61 1590. 37 178. 12 1629. 67 179. 63 1668. 97 179. 76 1701. 72 180. 1 1741. 02 180. 26 1793. 41 180. 17 1826. 16 179. 99 1039. 7
179. 58 1082. 34
179. 18 1124. 98
178. 62 1174. 18
179. 35 1220. 09
180. 32 1285. 69
179. 79 1331. 61
180. 02 1393. 88
180. 33 1433. 18
180. 32 1482. 3
179. 17 1537. 97
178. 17 1583. 82
177. 95 1619. 85
179. 11 1662. 42
179. 93 1691. 89
179. 96 1734. 47
180. 16 1786. 86
180. 35 1822. 89
180. 13 1852. 36 179. 99 179.75 1010.19 1039.7 1046. 26 179.73 1059.38 179.48 179. 73 1059. 38 179. 25 1102. 02 178. 92 1144. 66 178. 75 1193. 86 179. 84 1243. 05 180. 03 1311. 93 179. 67 1354. 57 180. 16 1410. 26 180. 41 1452. 83 180. 02 1505. 23 178. 92 1551. 07 179. 46 179. 11 179.19 1065.94 1105.3 178.98 179. 11 1111. 86 178. 88 1170. 9 178. 91 1213. 53 180. 12 1262. 73 179. 81 1325. 05 179. 73 1387. 33 180. 37 1423. 35 180. 44 1472. 48 179. 5 1531. 42 1161. 06 1200. 42 178.87 180. 11 1246. 33 1318. 49 179. 96 179. 52 1374.23 180. 2 1416.81 180.51 1465.93 180.02 1531. 42 1570. 72 1613. 3 1524. 88 1567. 45 178. 92 1551. 07 177. 43 1596. 92 178.61 178. 21 ... 177. 81 1613. 3 178. 84 1646. 04 179. 87 1688. 62 179. 77 1731. 19 180. 35 1777. 04 178. 21 177.47 1603. 47 1639. 49 1682. 07 1721. 37 178. 45 1632. 95 179. 69 1675. 52 179. 86 1711. 54 180. 14 1754. 11 178.47 179.89 179.86 180.13 180. 22 1806. 51 180. 31 1835. 99 1770. 49 180.22 180. 17 1826. 16 1809.79 180. 15 1816.34 180.13 180. 13 1852. 36 180. 24 1891. 66 180. 27 1930. 96 180. 27 1855. 64 180. 12 1894. 93 180. 21 1940. 78 180. 19 1862. 18 180. 2 1911. 31 179. 66 1947. 33 1839.26 180.25 1845.81 180.27 1885. 11 1917. 86 1872. 01 1914. 58 180.15 180.26 180. 15 1885. 11 180. 19 1917. 86 179. 97 1966. 98 180. 32 2003 180. 62 2039. 03 181. 03 2081. 6 180. 57 2127. 45 179.51 3087. 23 3123. 29 3159. 35 179. 69 3133. 13 179. 5 3162. 63 179. 32 3208. 35 179. 58 3142. 96 179. 47 3178. 98 3152.8 179. 58 179.56 3169.19 179.6 179. 1 3218. 15 173. 33 3247. 52 179. 58 3201. 83 175. 7 3240. 99 3188.77 178.61 3224.67 178.07 173. 86 3244. 26 3234.47 172.62 3254.05 170.53

```
Proposed - No-Rise
 3257.31
           169. 6 3263. 84
                             168. 38 3267. 11
                                                168. 05 3270. 37
                                                                  167. 97 3276. 9
                                                                                    167.97
 3280. 16
           168. 21 3286. 69
                             168. 26 3289. 95
                                                                  168. 78 3303. 01
                                                168. 37 3296. 48
                                                                                     168.61
                             168. 33
167. 84
167. 95
168. 23
                                                168. 35 3325. 86
167. 12 3368. 29
167. 91 3413. 98
168. 21 3443. 36
 3309.54
                                     3319.33
           168.58 3316.06
                                                                  168.09 3335.65
                                                                                     168.06
           167. 88
167. 73
168. 36
 3338. 91
3387. 87
                                                                  166. 93 3374. 82
168. 17 3420. 51
                   3345.44
                                       3358.5
                                                                                     167.27
                   3400.93
                                     3407.45
                                                                                     168.22
 3427.04
                    3430.3
                                                                  168.08 3449.89
                                     3436.83
                                                                                     168.18
 3459. 68
                   3469.47
                                                168. 57
           168.47
                             168.48
                                         3476
                                                        3485.79
                                                                   168.6 3489.05
                                                                                     168.78
                             168. 73
                   3505.37
                                     3515. 17
 3498.84
           168.86
                                                 168. 9
                                                        3528.22
                                                                  168. 93 3531. 48
                                                                                     169.05
                              169.3
                                                169. 49
                                                                  169.39 3554.33
 3538.01
           169.07
                   3541.28
                                      3547.8
                                                       3551.07
                                                                                     169.06
  3557.6
           168. 98
                   3564.12
                             169. 14
                                     3570.65
                                                168.82 3573.92
                                                                  167. 56 3577. 18
                                                                                     165.02
                   3668.57
                                                165. 77 3675. 1
187. 54 3691. 42
  3621.5
            157. 7
                             162.54
                                     3671.83
                                                                  172.07 3678.36
                                                                                     177.72
                                                                  189. 63 3694. 68
203. 18 3720. 79
205. 21 3753. 43
204. 97 3779. 54
 3681. 63
3701. 21
                             184. 89 3688. 15
201. 51 3707. 74
                   3684.89
           181. 75
                                                                                     192.46
           198.65
                   3704.47
                                                202.89
                                                           3711
                                                                                     203.66
           204. 34 3740. 38
205. 34 3759. 96
                                                204. 86 3750. 17
205. 03 3773. 02
 3737.11
                               204.4
                                       3746.9
                                                                                     205.04
                             204. 92 3766. 49
  3756.7
                                                                                     205.15
Manning's n Values
                             num=
                       Sta
                                       Sta n Val
    Sta n Val
                            n Val
              . 1 3570. 65
                             . 045 3675. 1
                                               . 1
                                                        Ri ght
Bank Sta: Left Right 3570.65 3675.1
                             Lengths: Left Channel Right 515 515
                                                                    Coeff Contr.
                                                                                      Expan.
                                                                     . 1
                                                                                       . 3
                                    2
Ineffective Flow
                       num=
   Sta L
            Sta R
                      El ev
                             Permanent
                     180
180
             3179
                             F
    3739 3779.54
                                  F
Blocked Obstructions
                            num=
                                         1
   Sta L Sta R Elev
1509. 55 1675. 03 179. 84
CROSS SECTION OUTPUT Profile #1%
                                     *****
* E.G. Elev (ft)
                            * 177.12 * Element
                                                                      * Left OB *
                                                                                     Channel *
Right OB *
  Vel Head (ft)
                                  0.60
                                         * Wt. n-Val.
                                                                          0.100
                                                                                       0.045
0.100 *
* W.S. Elev (ft)
                               176. 52
                                         * Reach Len. (ft)
                                                                         515.00
                                                                                     515.00
 515.00 *
 Crit W.S. (ft)
                            * 171.46
                                         * Flow Area (sq ft)
                                                                      * 2653.07
                                                                                  * 1569.80
 5.72 *
E.G. Slope (ft/ft)
                            *0.001500
                                         * Area (sq ft)
                                                                      * 3313.63
                                                                                  * 1569.80
   5.72
 Q Total (cfs)
                            *17700.00
                                                                      * 5996.77
                                                                                  *11699.69
                                         * Flow (cfs)
   3.53
 Top Width (ft)
                            * 898.81
                                         * Top Width (ft)
                                                                         791.80
                                                                                      104.45
   2.57 *
 Vel Total (ft/s)
                                 4. 19
                                         * Avg. Vel. (ft/s)
                                                                           2.26
                                                                                        7.45
   0.62
                                         * Hydr. Depth (ft)
 Max Chl Dpth (ft)
                                 18.82
                                                                           7.81
                                                                                       15.03
   2.23 *
 Conv. Total (cfs)
                            *457063.9
                                         * Conv. (cfs)
                                                                      *154853.6
                                                                                  *302119.1
   91. 2
 Length Wtd. (ft)
                                515.00
                                         * Wetted Per. (ft)
                                                                         340.79
                                                                                      111.56
   5. 14
 Min Ch El (ft)
                                157. 70
                                        * Shear (lb/sq ft)
                                                                           0.73
                                                                                        1.32
   0. 10
 Al pha
                                  2. 19
                                         * Stream Power (lb/ft s) *
                                                                           1.65
                                                                                        9.82
   0.06
* Frctn Loss (ft)
                                  0.70 * Cum Volume (acre-ft) * 1129.67 *
                                                                                      279.93
1272. 92
```

# 105. 67 \* ...........

Warning: Divided flow computed for this cross-section.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT PI	rofile #Floo	odway **********	*****	*****
*****				
* E.G. Elev (ft)	* 177.68	* Element	* Left C	B * Channel *
Right OB * * Vel Head (ft)	* 0.52	* Wt. n-Val.	* 0.100	0.045 *
0.100 * * W.S. Elev (ft)	* 177. 16	* Reach Len. (ft)	* 515.00	* 515.00 *
* Crit W.S. (ft)	* 171.45	* Flow Area (sq ft)	* 2870.94	* 1636.57 *
* E.G. Slope (ft/ft)	*0.001254	* Area (sq ft)	* 2870.94	* 1636.57 *
7.48 * * 0 Total (cfs)	*17700.00	* Flow (cfs)	* 6227. 21	*11468. 17 *
* Top Width (ft)	* 449.00	* Top Width (ft)	* 341.65	5 * 104.45 *
2.90 * * Vel Total (ft/s)	* 3. 92	* Avg. Vel. (ft/s)	* 2.17	* 7.01 *
0.62 * * Max Chl Dpth (ft)	* 19.46	* Hydr. Depth (ft)	* 8.40	) * 15.67 *
* Conv. Total (cfs)	*499812.4	* Conv. (cfs)	*175843.9	*323837.9 *
* Length Wtd. (ft)	* 515.00	* Wetted Per. (ft)	* 343.06	* 111.56 *
* Min Ch El (ft)	* 157.70	* Shear (Ib/sq ft)	* 0.66	* 1.15 *
* Al pha	* 2.18	* Stream Power (lb/ft s)	) * 1.42	2 * 8.05 *
* Frctn Loss (ft)	* 0.57	* Cum Volume (acre-ft)	* 227.83	* 287.06 *
691.43 * * C & E Loss (ft)	* 0.06	* Cum SA (acres)	* 16.47	' * 13.41 *
29.01		********		
	^ ^ ^ * * * * * * * * * * * *			^ ^ ^ ^ ^ * * * * * * * * * * *
*****				

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# CROSS SECTION OUTPUT Profile #10%

*****			
* E.G. Elev (ft) Right OB *	* 173.58	* Element	* Left OB * Channel *
Right OB *  * Vel Head (ft)  0.100 *	* 0.35	* Wt. n-Val.	* 0.100 * 0.045 *
* W.S. Elev (ft) 515.00 *	* 173. 23	* Reach Len. (ft)	* 515.00 * 515.00 *
* Cri t W. S. (ft) 0.39 *	* 167.38	* Flow Area (sq ft)	* 1555.07 * 1225.56 *
* E.G. Slope (ft/ft) 0.39 *	*0. 001095	* Area (sq ft)	* 1562.81 * 1225.56 *
* Q Total (cfs) 0.08 *	* 8780.00	* Flow (cfs)	* 2163. 27 * 6616. 65 *

```
Proposed - No-Rise
* Top Width (ft)
                          451.48
                                  * Top Width (ft)
                                                              346.36
                                                                        104.45
  0.67
                            3.16 * Avg. Vel. (ft/s)
 Vel Total (ft/s)
                                                                1.39
                                                                          5.40
  0. 21
 Max Chl Dpth (ft)
                                  * Hydr. Depth (ft)
                                                                4.77
                                                                         11.73
                            15. 53
  0. 58
 Conv. Total (cfs)
                        *265370.3
                                  * Conv. (cfs)
                                                           * 65383.5
                                                                      *199984.3
   2.5
 Length Wtd. (ft)
                                  * Wetted Per. (ft)
                           515.00
                                                              326.71
                                                                        111.56
   1. 34
 Min Ch El (ft)
                           157. 70
                                  * Shear (lb/sq ft)
                                                                0.33
                                                                          0.75
  0.02
 Al pha
                             2.25
                                   * Stream Power (lb/ft s) *
                                                                0.45
                                                                          4.05
  0.00
 Frctn Loss (ft)
                             0.52
                                   * Cum Volume (acre-ft)
                                                              525.32
                                                                        204.25
560.77
* C & E Loss (ft)
                                  * Cum SA (acres)
                             0.03
                                                               78. 43
                                                                         13.83
 95. 13 *
           ************************
*****
Warning: Divided flow computed for this cross-section.
```

Warning: Divided flow computed for this cross-section.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# CROSS SECTION OUTPUT Profile #2%

******	* * *	*****	* *	********	* * :	*****	* * *	*****	* *
*****									
* E.G. Elev (ft) Riaht OB *	*	175. 95	*	Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.100 *	*	0. 56	*	Wt. n-Val.	*	0. 100	*	0. 045	*
* W. S. Elev (ft) 515.00 *	*	175. 39	*	Reach Len. (ft)	*	515. 00	*	515. 00	*
* Crit W.S. (ft) 3.18 *	*	170. 78	*	Flow Area (sq ft)	*	2270. 43	*	1451. 30	*
* E.G. Slope (ft/ft) 3.18 *	*0	. 001513	*	Area (sq ft)	*	2512. 41	*	1451. 30	*
* Q Total (cfs) 1.62 *	*1!	5000. 00	*	Flow (cfs)	*	4688. 64	*1	10309. 74	*
* Top Width (ft) 1.91 *	*	731. 14	*	Top Width (ft)	*	624. 78	*	104. 45	*
* Vel Total (ft/s)	*	4. 03	*	Avg. Vel. (ft/s)	*	2. 07	*	7. 10	*
* Max Chl Dpth (ft)	*	17. 69	*	Hydr. Depth (ft)	*	6. 78	*	13. 89	*
* Conv. Total (cfs)	*38	85661. 9	*	Conv. (cfs)	*	120548. 6	*2	265071. 7	*
* Length Wtd. (ft)	*	515. 00	*	Wetted Per. (ft)	*	336. 14	*	111. 56	*
* Min Ch El (ft)	*	157. 70	*	Shear (Ib/sq ft)	*	0.64	*	1. 23	*
0.08 * * Al pha	*	2. 22	*	Stream Power (lb/ft s)	*	1. 32	*	8. 73	*
0.04 * * Frctn Loss (ft)	*	0. 71	*	Cum Volume (acre-ft)	*	878. 86	*	256. 71	*
1051.07 * * C & E Loss (ft)	*	0. 06	*	Cum SA (acres)	*	145. 24	*	13. 71	*
102. 67 *									
******	***	*****	* *	*******	* * :	*****	* * >	·****	* *
*****									

Warning: Divided flow computed for this cross-section.

Note: Multiple critical depths were found at this location. The critical depth

Page 44

with the lowest, valid, energy was used.

	ofile #0.2%	) *********	****	****	*****	**
******** * E.G. Elev (ft)	* 180.44	* Element	* Lof	t OB *	Channel	*
Right OB *	100. 44	LI ellett	Lei	t OB	Charmer	
* Vel Head (ft) 0.100 *	* 0.72	* Wt. n-Val.	* 0.	100 *	0.045	*
* W. S. Elev (ft) 515.00 *	* 179.72	* Reach Len. (ft)	* 515.	. 00 *	515.00	*
* Crit W.S. (ft) 17.36 *	* 173.05	* Flow Area (sq ft)	* 3781	. 05 *	1904. 07	*
* E.G. Slope (ft/ft) 17.36 *	*0. 001466	* Area (sq ft)	* 6827	. 77 *	1904. 07	*
* Q Total (cfs) 15.19 *	*25700.00	* Flow (cfs)	* 9728	. 57 *	15956. 24	*
* Top Width (ft) 4.88 *	* 1916. 75	* Top Width (ft)	* 1807	. 41 *	104. 45	*
* Vel Total (ft/s)	* 4.51	* Avg. Vel. (ft/s)	* 2	. 57 *	8. 38	*
* Max Chl Dpth (ft)	* 22.02	* Hydr. Depth (ft)	* 9	. 65 *	18. 23	*
3.55 * * Conv. Total (cfs) 396.9 *	*671292.0	* Conv. (cfs)	*25411	3. 2 *	416782. 0	*
* Length Wtd. (ft) 9.10 *	* 515.00	* Wetted Per. (ft)	* 393	. 08 *	111. 56	*
* Min Ch El (ft) 0.17 *	* 157.70	* Shear (Ib/sq ft)	* 0	. 88 *	1. 56	*
* Al pha 0. 15 *	* 2. 27	* Stream Power (Ib/ft s)	* 2	. 26 *	13. 09	*
* Frctn Loss (ft)	* 0.65	* Cum Volume (acre-ft)	* 1983	. 45 *	338. 92	*
1864.88 * * C & E Loss (ft)	* 0.10	* Cum SA (acres)	* 270	. 31 *	14. 94	*
134. 85 * **********************************	*****	*******	****	*****	*****	**
W	6					

Warning: Divided flow computed for this cross-section. Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

### CROSS SECTION

RIVER: RIVER-1 REACH: Reach-1 RS: 264

Description: XS 264 (LETTERED CROSS-SECTION U) THIS SECTION IS THE FIRST

SECTION U/S OF THE DIVIDED FLOW INSERTED

AN INEFFECTIVE FLOW

ENCROACHMENT AT 500' FROM LEFT CHANNEL BANK FOR THE

NATURAL RUN.

INEFFECTIVE FLOW AREA DUE TO FILL PLACED IN FLOODPLAIN Station Elevation Data num= 480 Sta Fley Sta Fley Sta Elev Sta Floy Sto Floy

Sta	ELEV	Sta	ELEV	Sta	EI eV	Sta	ELEV	Sta	ELEV
*****	*****	*****	*****	*****	*****	*****	*****	*****	****
-	180. 25 179. 7		180. 24 179. 48						
				Pag	je 45				

Proposed - No-Rise 81. 98 114. 78 91.82 178.97 98.38 104.94 108. 22 179.21 179.04 178.84 178.83 131. 17 170. 53 209. 88 239. 39 285. 3 178. 97 178. 53 177. 78 177. 41 177. 03 175. 9 178.64 141.01 178.39 147.57 178.13 157.41 178.04 160. 69 203. 32 232. 83 275. 47 178. 12 177. 64 176. 94 176. 15 180. 36 216. 44 249. 23 291. 86 177. 66 177. 45 176. 44 186. 92 223 255. 79 177. 81 177. 2 176. 43 196. 76 177.64 226. 28 262. 35 304. 98 177. 19 176. 31 175.63 298.42 175.6 175.45 175. 56 174. 95 324. 66 350. 89 175. 17 174. 94 331. 21 360. 73 311.54 175.43 314.82 318.1 175.49 175.01 175.11 341.05 174.89 334.49 347.61 174.84 174. 57 367. 29 373. 85 429. 59 413.2 174.76 174.7 174.67 400.08 174.65 406.64 445. 99 501. 74 174. 72 174. 8 462. 39 505. 02 419. 76 475. 51 174. 7 174. 75 174. 48 174. 84 439. 43 491. 9 174. 77 174. 68 174.8 174. 6 482.06 174. 8 174. 64 174. 54 174. 47 175. 38 175. 52 508. 3 537. 81 580. 44 619. 8 659. 15 685. 38 518. 14 550. 93 590. 28 629. 63 668. 99 174. 01 174. 81 174. 6 174. 89 174. 13 174. 73 174. 64 174. 94 174. 47 174. 75 174. 51 175. 21 527. 97 570. 61 613. 24 646. 03 174. 52 174. 64 174. 62 175. 41 514. 86 541. 09 521. 42 564. 05 596. 84 639. 47 675. 54 698. 5 587 623.08 175. 55 174. 62 665. 71 688. 66 682. 1 705. 06 175.53 175.61 175.08 175. 53 173. 36 172. 13 174. 25 174. 35 174. 92 174. 99 171.71 691.94 173.13 721. 46 754. 25 793. 6 819. 84 869. 02 914. 94 172. 67 174. 35 174. 5 174. 74 175. 22 175. 66 172. 15 171.92 714.9 734.57 173.54 711.62 741.13 171. 92 173. 86 174. 36 174. 72 175. 06 175. 31 175. 74 750. 97 787. 04 174. 22 174. 52 744. 41 760.81 770.65 174.23 773. 92 810 859. 19 891. 98 928. 05 806. 72 839. 51 885. 42 924. 77 174. 7 174. 99 175. 33 800.16 816. 56 865. 75 905. 1 174. 93 175. 15 175. 54 175. 98 829. 67 878. 86 921. 49 957. 57 175.62 944. 45 977. 24 175.69 954.29 175.94 964.13 175.7 970.68 175.92 175.93 987.08 176.16 1000.2 176. 25 1006. 76 176.39 176. 16 1000. 2 176. 71 1036. 27 177. 26 1078. 9 177. 28 1121. 53 177. 77 1167. 45 178. 01 1210. 08 178. 78 1255. 99 179. 55 1292. 06 180. 14 1331. 41 180. 37 1380. 6 180. 66 1459. 31 175. 93 987. 08 176. 5 1029. 71 177. 03 1075. 62 177. 41 1114. 98 177. 8 1160. 89 178. 04 1200. 24 178. 6 1249. 43 179. 39 1285. 5 180. 19 1318. 3 180. 41 1367. 49 180. 57 1446. 19 176. 4 1023. 15 177. 01 1059. 23 176. 67 1039. 55 177. 19 1085. 46 1016.59 176.83 1052. 67 1092. 02 1144. 49 177.25 177. 19 1085. 46 177. 41 1124. 81 177. 92 1170. 72 178. 27 1226. 47 179 1259. 27 179. 61 1295. 34 180. 31 1341. 25 180. 4 1393. 72 177. 01 1059. 23 177. 16 1101. 86 177. 73 1154. 33 178. 01 1190. 4 178. 3 1239. 59 179. 26 1278. 94 180. 05 1315. 02 177. 25 177. 33 177. 89 178. 36 179. 02 179. 74 180. 37 1180. 56 1229. 75 1265. 83 1298. 62 1360. 93 1354.37 180.35 180.56 180. 35 1360. 93 180. 61 1416. 68 180. 63 1472. 42 180. 62 1501. 94 180. 23 1554. 41 179. 89 1610. 16 178. 52 1669. 19 177. 79 1711. 82 177. 19 1754. 45 180. 41 1367. 49 180. 57 1446. 19 180. 72 1478. 98 180. 52 1511. 78 180. 34 1557. 69 179. 69 1623. 28 177. 93 1675. 75 177. 55 1724. 94 177. 09 1757. 73 1410. 12 1469. 15 1498. 66 180. 66 1459. 31 180. 61 1485. 54 180. 62 1462. 59 180. 65 1495. 38 180.7 180.55 180. 65 1495. 38 180. 32 1534. 73 180. 06 1593. 76 179. 43 1649. 51 177. 94 1692. 14 177. 31 1738. 05 176. 94 1780. 68 180. 47 1521. 62 180. 25 1580. 64 179. 73 1639. 67 177. 75 1688. 86 180.39 1547. 85 1603. 6 1659. 35 1701. 98 180.05 178. 86 177. 83 177. 42 1728. 21 176. 98 1767. 57 177. 19 176. 82 1744.61 176. 54 1810. 2 176. 69 1846. 27 176. 88 1879. 07 176. 84 1823. 32 176. 67 1859. 39 176. 78 1892. 18 176.68 1833.15 1790.52 176.77 1813.48 176.73 176. 77 1813. 48 176. 75 1856. 11 176. 78 1885. 62 176. 89 1908. 58 177. 14 1944. 65 177. 49 2000. 4 178. 07 2052. 87 178. 22 2095. 5 1790. 52 1842. 99 1875. 79 1898. 74 1931. 53 1990. 56 2039. 75 176.79 176.78 1872.51 176. 78 1872. 51 176. 69 1895. 46 177. 03 1928. 26 177. 13 1970. 89 177. 46 2029. 92 178. 25 2069. 27 178. 23 2108. 62 176. 78 1892. 18
176. 88 1915. 14
177. 2 1954. 49
177. 54 2006. 96
178. 24 2059. 43
178. 32 2098. 78
178. 3 2144. 69
178. 47 2187. 33
178. 28 2236. 52
177. 67 2269. 31
176. 6 2315. 22
175. 83 2361. 13
175. 51 2400. 49
175. 37 2433. 28
174. 98 2475. 91
174. 4 2525. 1 176.76 176. 66 1905. 3 177. 15 1941. 37 177. 55 1993. 84 177. 79 2046. 31 178. 28 2085. 67 177. 07 177. 27 177. 78 178. 18 2072.55 178.33 178. 22 2095. 5 178. 36 2138. 14 178. 34 2180. 77 178. 36 2220. 12 177. 67 2266. 03 177. 12 2311. 94 176. 14 2344. 74 175. 5 2393. 93 175. 32 2426. 72 175. 2 2472. 63 178. 23 2108. 62 178. 41 2151. 25 178. 41 2197. 16 178. 14 2239. 8 177. 5 2285. 71 176. 5 2325. 06 175. 8 2374. 25 175. 42 2407. 05 175. 28 2439. 84 175. 01 2482. 47 178. 29 2134. 86 178. 32 2167. 65 2118. 46 178.44 2157.81 178.42 178. 35 2216. 84 178. 07 2262. 75 177. 3 2302. 1 176. 37 2338. 18 175. 6 2387. 37 175. 46 2420. 16 2203. 72 2252. 91 2295. 55 2328. 34 178.2 177. 29 176.36 175. 6 175. 51 175. 3 2380.81 2416.88 175. 15 2449.68 2462.8 174.82 174. 65 2518. 55 174. 4 2525. 1 177. 1372584. 062 177. 3972603. 062 173. 74 2527. 06 177. 287 177. 4272622. 063 177. 387 2492. 31 174.73 2508.71 177. 1572565. 061 2546.061 176. 79 2643. 16 176. 52 2679. 24 176. 81 2639. 88 176.76 2630.04 176.68 2649.72 2626.77 176.64 176.73 2662.84 176.65 2669.4 175.88 2689.07 175.6

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Proposed - No-Rise
                                                 175. 3 2715. 31 175. 45 2721. 87 175. 68 2734. 98 175. 87 2754. 66 175. 68 2761. 22 175. 62 2774. 34 175. 15 2797. 29 175. 18 2800. 57 175. 45 2807. 13 177. 98 2836. 65 178. 49 2843. 2 178. 52 2856. 32 177. 92 2866. 16 178. 46 2882. 56 178. 47 2895. 68 178. 54 2912. 07 178. 29 2915. 35 177. 8 2918. 43
                  175. 76 2705. 47
175. 85 2744. 82
  2695.63
                                                                                                                                            175.65
  2741.54
                                                                                                                                             175.33
                   175. 67 2790. 73
177. 01 2826. 81
177. 97 2862. 88
178. 54 2908. 79
    2780.9
                                                                                                                                              175.8
  2816. 97
2859. 6
                                                                                                                                             178.24
                                                                                                                                             178.44
  2902. 23
                                                                                                                                             177.07
                   175. 26 2928. 47
173. 3 2957. 98
                                                                                174. 15 2938. 31
172. 27 2967. 82
                                                                                                               173. 8 2951. 42
170. 8 2974. 38
  2925.19
                                                  174.59 2931.75
                                                                                                                                             173.54
    2954.7
                                                  172.89 2961.26
                                                                                                                                             169.65
                   169. 56 2984. 22
168. 46 3017. 01
  2977.66
                                                  169.81 2990.78
                                                                                169.55 2997.34
                                                                                                               168.86 3000.62
                                                                                                                                             168.65
                                                 169. 81 2990. 78
168. 49 3020. 29
168. 33 3062. 92
167. 83 3102. 28
167. 76 3135. 07
167. 93 3167. 86
167. 93 3226. 89
167. 01 3276. 08
                                                                                                              168. 86 3000. 62
168. 34 3036. 69
167. 74 3082. 6
168. 01 3115. 39
167. 46 3144. 91
167. 76 3180. 98
167. 51 3213. 78
167. 36 3246. 57
166. 87 3285. 92
                                                                               168. 32 3026. 85
167. 77 3076. 04
168. 03 3108. 84
167. 71 3141. 63
168. 13 3174. 42
167. 66 3203. 94
  3010.45
                                                                                                                                             168.63
                   168. 46 3017. 01
168. 18 3056. 37
168. 03 3095. 72
168. 14 3125. 23
167. 83 3161. 31
167. 34 3190. 82
  3046.53
                                                                                                                                             168.02
  3089.16
                                                                                                                                             168. 16
  3118.67
                                                                                                                                             167.49
  3151. 47
3187. 54
                                                                                                                                             167.61
                                                                                                                                             167. 94
  3220.33
                                                                               167. 6 3240. 01
167. 12 3282. 64
                   167. 98 3223. 61
                                                                                                                                             167.44
  3253. 13
3295. 76
                   167. 15 3266. 25
                                                                                                                                             166, 91
                                                                                                             166. 87 3285. 92
167. 2 3335. 11
166. 77 3374. 47
166. 17 3397. 42
167. 16 3426. 94
167. 23 3459. 73
167. 33 3499. 08
167. 3 3548. 27
167. 2 3587. 63
                                                                               167. 12 3282. 64
167. 25 3322
166. 73 3361. 35
165. 9 3394. 14
167 3423. 66
167. 22 3456. 45
167. 49 3489. 24
167. 43 3541. 72
                   167. 13 3200. 23
167. 38 3302. 32
167. 14 3348. 23
166. 34 3384. 3
                                                 167. 19 3315. 44
                                                 166. 88 3354. 79
166 3390. 86
  3341.67
                                                                                                                                             166, 67
  3381. 03
3403. 98
3436. 77
                                                                                                                                             166.65
                                                 167. 06 3417. 1
167. 44 3449. 89
167. 32 3476. 13
167. 08 3525. 32
                   166. 71 3410. 54
167. 49 3443. 33
167. 49 3466. 29
                                                                                                                                             167. 08
167. 44
167. 27
  3463.01
  3508.92
                   167.44 3515.48
                                                                                                                                              167
                                                  167. 18 3574. 51
167. 58 3607. 3
  3558.11
                   167. 26 3564. 67
                                                                                167. 28 3581. 07
                                                                                                                                             167.31
                   167. 49 3597. 46
168. 13 3633. 54
                                                                                168. 06 3610. 58
168. 58 3643. 38
                                                                                                              168 3617. 14
168. 49 3646. 66
168. 77 3676. 58
                                                                                                                                             168.28
  3590.91
  3626.98
                                                  168.48
                                                                3640. 1
                                                                                                                                              168.6
                  168. 61 3666. 33
167. 29 3682. 73
160 3748. 32
180. 53 3764. 71
                                                 168. 72 3672. 89
164. 44 3686. 01
  3653. 21
3679. 45
                                                                                168. 66 3676. 17
                                                                                                                                             168.59
                                                                                161. 31 3690
163. 96 3754. 88
189. 21 3771. 27
                                                                                                             160 3720
169 3757.31
190.06 3781.11
                                                                                                                                             157. 5
                                                  160. 82 3751. 6
185. 66 3767. 99
        3745
                                                                                                                                             173.44
  3761.43
                                                                                                                                             191.88
. 1 3676. 58 . 045 3754. 88 . . 1
Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 3676.58\ 3754.88 1330\ 1300 1000 .1 .3 Ineffective Flow num= 2
     Sta L Sta R
                                     Elev Permanent
                                  180
180
                   3176. 1
                                                 F
       3790 3781.11
                                                         F
Blocked Obstructions num=
                                                                    1
Sta L Sta R El ev
  2326. 42 2605. 17 176. 19
CROSS SECTION OUTPUT Profile #1%
                                       * 176.36
* E.G. Elev (ft)
                                                                    * Element
                                                                                                                    * Left OB *
                                                                                                                                               Channel *
Right OB *
   Vel Head (ft)
                                                                                                                            0.100 *
                                                         0.38
                                                                    * Wt. n-Val.
                                                                                                                                                 0.045
0.100 *
* W.S. Elev (ft)
                                             * 175. 98
                                                                    * Reach Len. (ft)
                                                                                                                    * 1330.00
                                                                                                                                        * 1300.00
1000.00 *
                                             * 170.99 * Flow Area (sq ft)
    Crit W.S. (ft)
                                                                                                                     * 4302.67
                                                                                                                                         * 1235.45
    13.44 *
* E.G. Slope (ft/ft)
                                                                                                                     * 6921.54
                                             *0.001202 * Area (sq ft)
                                                                                                                                          * 1235.45
    13.44 *
* 0 Total (cfs)
9.79 *
                                             *17700.00 * Flow (cfs)
                                                                                                                    * 9296.63 * 8393.59
```

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Proposed - No-Ri se
* Top Width (ft)
                       * 1664.30
                                 * Top Width (ft)
                                                          * 1582. 10 *
                                                                        78. 30
  3. 91
 Vel Total (ft/s)
                            3. 19 * Avg. Vel. (ft/s)
                                                              2.16
                                                                         6.79
  0.73
 Max Chl Dpth (ft)
                                 * Hydr. Depth (ft)
                                                                        15.78
                           18. 48
                                                               8.60
  3.44
 Conv. Total (cfs) 282.3 *
                       *510630.5
                                  * Conv. (cfs)
                                                          *268200.1
                                                                    *242148.1
 Length Wtd. (ft)
                       * 1314.74
                                  * Wetted Per. (ft)
                                                             500.78
                                                                        85.43
  8.00
                                 * Shear (Ib/sq ft)
 Min Ch El (ft)
                                                                         1.08
                          157. 50
                                                               0.64
  0.13
 Al pha
                            2.39
                                  * Stream Power (lb/ft s) *
                                                              1.39
                                                                         7.37
  0.09
* Frctn Loss (ft)
                            0.81
                                  * Cum Volume (acre-ft)
                                                          * 1069.16
                                                                       263.35
1272.80
* C & E Loss (ft)
                            0.11 * Cum SA (acres)
                                                            165.00
                                                                        12.63
*******************************
*****
```

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

	33						
	Profile #Floo ******	dway ********	****	*****	* * *	*****	**
******** * E.G. Elev (ft) Right OB *	* 177.05	* Element	* L	_eft OB	*	Channel	*
* Vel Head (ft) 0.100 *	* 0.32	* Wt. n-Val.	*	0. 100	*	0. 045	*
* W. S. Elev (ft) 1000.00 *	* 176.73	* Reach Len. (ft)	* 13	330. 00	*	1300.00	*
* Cri t W. S. (ft) 16.51 *	* 170.99	* Flow Area (sq ft)	* 46	679. 99	*	1294. 49	*
* E.G. Slope (ft/ft) 16.51 *	*0.000962	* Area (sq ft)	* 53	301. 66	*	1294. 49	*
* Q Total (cfs) 11.56 *	*17700.00	* Flow (cfs)	* 95	569. 99	*	8118. 45	*
* Top Width (ft) 4.12 *	* 652.90	* Top Width (ft)	* 5	570. 48	*	78. 30	*
* Vel Total (ft/s) 0.70 *	* 2.95	* Avg. Vel. (ft/s)	*	2. 04	*	6. 27	*
* Max Chl Dpth (ft) 4.01 *	* 19. 23	* Hydr. Depth (ft)	*	9. 35	*	16. 53	*
* Conv. Total (cfs) 372.8 *	*570645.0	* Conv. (cfs)	*308	3534.8	*2	261737. 3	*
* Length Wtd. (ft) 8.81 *	* 1315.17	* Wetted Per. (ft)	* [	500. 78	*	85. 43	*
* Min Ch El (ft) 0.11 *	* 157.50	* Shear (Ib/sq ft)	*	0. 56	*	0. 91	*
* Al pha 0. 08 *	* 2.33	* Stream Power (lb/ft s)	*	1. 15	*	5. 71	*
* Frctn Loss (ft) 691.29 *	* 0.65	* Cum Volume (acre-ft)	* 1	179. 52	*	269. 73	*
* C & E Loss (ft) 28.97 *	* 0.09	* Cum SA (acres)	*	11. 08	*	12. 33	*
20. 91	*****	*******	****	*****	* * *	****	**

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# CROSS SECTION OUTPUT Profile #10%

	ofile #10% *****	*****	**:	*****	**;	****	* *
****							
* E.G. Elev (ft) Right OB *	* 173.03	* Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.100 *	* 0. 25	* Wt. n-Val.	*	0. 100	*	0. 045	*
* W.S. Elev (ft)	* 172. 78	* Reach Len. (ft)	*	1330. 00	*	1300.00	*
1000.00 * * Crit W.S. (ft) 3.91 *	* 168.90	* Flow Area (sq ft)	*	2701. 05	*	984. 88	*
* E.G. Slope (ft/ft) 3.91 *	*0.000920	* Area (sq ft)	*	3670. 15	*	984. 88	*
* Q Total (cfs) 1.65 *	* 8780.00	* Flow (cfs)	*	3744. 23	*	5034. 12	*
* Top Width (ft) 2.07 *	* 839.81	* Top Width (ft)	*	759. 44	*	78. 30	*
* Vel Total (ft/s)	* 2.38	* Avg. Vel. (ft/s)	*	1. 39	*	5. 11	*
0.42 * * Max Chl Dpth (ft) 1.89 *	* 15. 28	* Hydr. Depth (ft)	*	5. 40	*	12. 58	*
* Conv. Total (cfs) 54.5 *	*289455.3	* Conv. (cfs)	*	123438. 3	* 1	165962. 6	*
* Length Wtd. (ft) 4.31 *	* 1310.52	* Wetted Per. (ft)	*	500. 78	*	85. 43	*
* Min Ch El (ft) 0.05 *	* 157.50	* Shear (Ib/sq ft)	*	0. 31	*	0. 66	*
* Al pha 0. 02 *	* 2.79	* Stream Power (lb/ft s)	*	0. 43	*	3. 38	*
* Frctn Loss (ft)	* 0.76	* Cum Volume (acre-ft)	*	494. 39	*	191. 18	*
560.74 * * C & E Loss (ft) 95.12 *	* 0.03	* Cum SA (acres)	*	71. 89	*	12. 75	*
70.12	*****	*****	**:	*****	**;	****	* *
*****							
*****							

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# CROSS SECTION OUTPUT Profile #2%

*****				* * * * * * * * * * * * * * * * * * * *			` ^ /		
*****									
* E.G. Elev (ft)	*	175. 18	*	Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft) 0.100 *	*	0. 37	*	Wt. n-Val.	*	0. 100	*	0. 045	*
* W.S. Elev (ft) 1000.00 *	*	174. 81	*	Reach Len. (ft)	*	1330. 00	*	1300.00	*
* Cri t W. S. (ft) 9.26 *	*	170. 48	*	Flow Area (sq ft)	*	3715. 01	*	1143. 51	*
* E.G. Slope (ft/ft) 9.26 *	*0.	001257	*	Area (sq ft)	*	5337. 20	*	1143. 51	*

```
Proposed - No-Rise
* Q Total (cfs)
                       *15000.00
                                                          * 7445.65 * 7548.27
                                 * Flow (cfs)
  6.09
                       * 1215.93 * Top Width (ft)
 Top Width (ft)
                                                          * 1134.40
                                                                        78.30
  3. 22
 Vel Total (ft/s)
                            3.08
                                 * Avg. Vel. (ft/s)
                                                               2.00
                                                                         6.60
  0.66
 Max Chl Dpth (ft)
                           17. 31
                                  * Hydr. Depth (ft)
                                                               7.42
                                                                        14.60
  2.87
 Conv. Total (cfs)
                                  * Conv. (cfs)
                       *423009.9
                                                          *209972.2
                                                                    *212866. 1
 171. 6
 Length Wtd. (ft)
                       * 1313.68
                                  * Wetted Per. (ft)
                                                            500.78
                                                                        85.43
  6. 64
 Min Ch El (ft)
                          157. 50
                                  * Shear (lb/sq ft)
                                                               0.58
                                                                         1.05
  0. 11
                            2.52
                                  * Stream Power (lb/ft s) *
                                                                         6.94
 Al pha
                                                               1. 17
  0.07
                                  * Cum Volume (acre-ft)
* Frctn Loss (ft)
                            0.87
                                                             832.45
                                                                       241.37
1051.00
* C & E Loss (ft)
                            0.10 * Cum SA (acres)
                                                            134.84
                                                                        12.63
102. 64
           ******************
```

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

\*\*\*\*\*\*\*\*\*\*\*

# CROSS SECTION OUTPUT Profile #0.2%

*****					
* E.G. Elev (ft) Right OB *	* 179.70	* Element	* Left OB	3 * Channel	*
* Vel Head (ft)	* 0.39	* Wt. n-Val.	* 0. 100	* 0.045	*
* W.S. Elev (ft)	* 179.30	* Reach Len. (ft)	* 1330.00	* 1300.00	*
1000.00 * * Crit W.S. (ft)	* 172. 29	* Flow Area (sq ft)	* 5966.17	* 1495.71	*
29.63 * * E.G. Slope (ft/ft)	*0.001042	* Area (sq ft)	*15309.51	* 1495.71	*
29. 63 * * * 0 Total (cfs) 26. 20 *	*25700.00	* Flow (cfs)	*14925. 76	*10748.04	*
* Top Width (ft) 5.84 *	* 3321.91	* Top Width (ft)	* 3237.77	* 78.30	*
* Vel Total (ft/s) 0.88 *	* 3.43	* Avg. Vel. (ft/s)	* 2.50	* 7. 19	*
* Max Chl Dpth (ft) 5.08 *	* 21.80	* Hydr. Depth (ft)	* 11.92	* 19. 10	*
* Conv. Total (cfs) 811.6 *	*796255.3	* Conv. (cfs)	*462440. 3	*333003.3	*
* Length Wtd. (ft) 11.84 *	* 1316. 94	* Wetted Per. (ft)	* 500.78	* 85.43	*
* Min Ch El (ft)	* 157.50	* Shear (Ib/sq ft)	* 0.77	* 1.14	*
* Al pha	* 2.14	* Stream Power (Ib/ft s)	* 1.94	* 8. 18	*
0.14 * * Frctn Loss (ft)	* 0.69	* Cum Volume (acre-ft)	* 1852.59	* 318.82	*
1864.60 * * C & E Loss (ft) 134.79 *	* 0.12	* Cum SA (acres)	* 240.49	* 13.86	*

\*\*\*\*\*\*

Warning: Divided flow computed for this cross-section. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RI VER: RI VER-1

RS: 250.12 REACH: Reach-1

I NPUT

Description: XS 250.12
Broad Run Station 250.12
LOW CHORD ELEVATION REVISED
TO MATCH PROPOSED BRIDGE PLAN

Sta L Sta R El ev Permanent 3655 177. 9 0 F 3700 3765 177.9 F

		le #1%	**:	******	**:	* * * * * * * * * *	***	*****	<b>*</b> *
****									
* E.G. Elev (ft) Right OB *	*	175. 44	*	Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.070 *	*	0. 03	*	Wt. n-Val.	*	0. 070	*	0. 045	*
* W. S. Elev (ft) 0.50 *	*	175. 41	*	Reach Len. (ft)	*	0. 50	*	0.50	*
* Crit W.S. (ft) 44.87 *	*	160. 81	*	Flow Area (sq ft)	*	47. 10	*	599. 80	*
* E.G. Slope (ft/ft) 403.69 *	*0	. 000035	*	Area (sq ft)	*	4536. 27	*	599. 80	*
* 0 Total (cfs) 12.17 *	*	800.00	*	Flow (cfs)	*	13. 23	*	774. 60	*
* Top Width (ft)	*	2947. 76	*	Top Width (ft)	*	2842. 76	*	35.00	*
70.00 * * Vel Total (ft/s) 0.27 *	*	1. 16	*	Avg. Vel. (ft/s)	*	0. 28	*	1. 29	*
* Max Chl Dpth (ft) 8.97 *	*	18. 41	*	Hydr. Depth (ft)	*	9. 42	*	17. 14	*
* Conv. Total (cfs) 2052.0 *	*1	34906. 3	*	Conv. (cfs)	*	2231. 3	*1	30623. 1	*
* Length Wtd. (ft) 14.19 *	*	0. 50	*	Wetted Per. (ft)	*	14. 12	*	35. 41	*
* Min Ch El (ft) 0.01 *	*	157. 00	*	Shear (Ib/sq ft)	*	0. 01	*	0. 04	*
* Al pha	*	1. 21	*	Stream Power (lb/ft s)	*	0.00	*	0. 05	*
* Frctn Loss (ft)	*	0. 00	*	Cum Volume (acre-ft)	*	894. 24	*	235. 96	*
* C & E Loss (ft)	*	0. 02	*	Cum SA (acres)	*	97. 45	*	10. 94	*
104. 79 *	****	*****	**:	* * * * * * * * * * * * * * * * * * * *	**:	*****	***	*****	**

Warning: Divided flow computed for this cross-section. Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT PI					***	*****	***	*****	**
* E.G. Elev (ft) Right OB *	*	176. 31	*	Element	*	Left OB	*	Channel	*
Right OB *  * Vel Head (ft) 0.070 *	*	0. 02	*	Wt. n-Val.	*	0. 070	*	0. 045	*
* W.S. Elev (ft) 0.50 *	*	176. 29	*	Reach Len. (ft)	*	0. 50	*	0. 50	*
* Crit W.S. (ft) 49.23 *	*	160. 81	*	Flow Area (sq ft)	*	51. 46	*	630. 33	*
* E.G. Slope (ft/ft)	*0	. 000030	*	Area (sq ft)	*	51. 46	*	630. 33	*
49.23 * * Q Total (cfs)	*	800.00	*	Flow (cfs) Page 53	*	12. 12	*	776. 43	*

11 0p03ed - No-K13e										
11. 44 *										
* Top Width (ft) 5.00 *	*	45. 00	*	Top Width (ft)	*	5. 00	*	35. 00	*	
* Vel Total (ft/s) 0.23 *	*	1. 09	*	Avg. Vel. (ft/s)	*	0. 24	*	1. 23	*	
* Max Chl Dpth (ft) 9.85 *	*	19. 29	*	Hydr. Depth (ft)	*	10. 29	*	18. 01	*	
* Conv. Total (cfs) 2090.9 *	*1	46196. 7	*	Conv. (cfs)	*	2215. 7	*1	41890. 1	*	
* Length Wtd. (ft) 17.40 *	*	0. 50	*	Wetted Per. (ft)	*	17. 81	*	35. 41	*	
* Min Ch El (ft) 0.01 *	*	157. 00	*	Shear (Ib/sq ft)	*	0. 01	*	0. 03	*	
* Al pha 0.00 *	*	1. 23	*	Stream Power (lb/ft s)	*	0.00	*	0. 04	*	
* Frctn Loss (ft) 690.54 *	*	0.00	*	Cum Volume (acre-ft)	*	97. 80	*	241. 01	*	
* C & E Loss (ft) 28.87 *	*	0. 02	*	Cum SA (acres)	*	2. 30	*	10. 64	*	
*******	***	*****	**	*****	* * *	*****	***	****	**	
*****										

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

# CROSS SECTION OUTPUT Profile #10%

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CRUSS SECTION OUTPUT PROTITE #10% ************************************										
*****										
* E.G. Elev (ft) Right OB *	* 172. 23	* Element	*	Left OB	*	Channel	*			
* Vel Head (ft) 0.070 *	* 0.13	* Wt. n-Val.	*	0. 070	*	0.045	*			
* W. S. Elev (ft) 0.50 *	* 172.10	* Reach Len. (ft)	*	0. 50	*	0. 50	*			
* Cri t W. S. (ft) 28.48 *	* 162.04	* Flow Area (sq ft)	*	30. 57	*	483. 79	*			
* E.G. Slope (ft/ft) 176.67 *	*0.000241	* Area (sq ft)	*	101. 36	*	483. 79	*			
* Q Total (cfs) 15.71 *	* 1450.00	* Flow (cfs)	*	17. 29	*	1417. 00	*			
* Top Width (ft)	* 242.11	* Top Width (ft)	*	146. 95	*	35. 00	*			
* Vel Total (ft/s)	* 2.67	* Avg. Vel. (ft/s)	*	0. 57	*	2. 93	*			
0.55 * * Max Chl Dpth (ft) 6.15 *	* 15. 10	* Hydr. Depth (ft)	*	6. 35	*	13. 82	*			
* Conv. Total (cfs) 1012.3 *	* 93419.5	* Conv. (cfs)	*	1114. 1	*	91293. 1	*			
* Length Wtd. (ft) 13.14 *	* 0.50	* Wetted Per. (ft)	*	13. 59	*	35. 41	*			
* Min Ch El (ft) 0.03 *	* 157.00	* Shear (Ib/sq ft)	*	0. 03	*	0. 21	*			
* Al pha 0. 02 *	* 1.18	* Stream Power (lb/ft s)	*	0. 02	*	0. 60	*			
<pre>* Frctn Loss (ft)</pre>	* 0.00	* Cum Volume (acre-ft)	*	436. 81	*	169. 27	*			
558.67 * * C & E Loss (ft) 94.40 *	* 0.05	* Cum SA (acres)	*	58. 06	*	11. 06	*			
94.40 ^ ************************************										

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

# CROSS SECTION OUTPUT Profile #2%

	*****	******	* *	*****	* * *	*****	* *
******** * E.G. Elev (ft)	* 174. 21	* Element	*	Left OB	*	Channel	*
Right OB *  * Vel Head (ft)	* 0.04	* Wt. n-Val.	*	0. 070	*	0. 045	*
0.070 * * W.S. Elev (ft) 0.50 *	* 174.17	* Reach Len. (ft)	*	0. 50	*	0. 50	*
* Cri t W. S. (ft) 38.64 *	* 161.11	* Flow Area (sq ft)	*	40. 87	*	556. 21	*
* E.G. Slope (ft/ft) 316.51 *	*0.000064	* Area (sq ft)	*	1252. 22	*	556. 21	*
* Q Total (cfs) 12.82 *	* 950.00	* Flow (cfs)	*	14. 12	*	923. 06	*
* Top Width (ft) 70.00 *	* 2298.34	* Top Width (ft)	*	2193. 34	*	35.00	*
* Vel Total (ft/s) 0.33 *	* 1.49	* Avg. Vel. (ft/s)	*	0. 35	*	1. 66	*
* Max Chl Dpth (ft) 7.73 *	* 17.17	* Hydr. Depth (ft)	*	8. 17	*	15. 89	*
* Conv. Total (cfs) 1599.7 *	*118548.7	* Conv. (cfs)	*	1761. 5	*1	15187. 5	*
* Length Wtd. (ft) 14.19 *	* 0.50	* Wetted Per. (ft)	*	14. 12	*	35. 41	*
* Min Ch El (ft) 0.01 *	* 157.00	* Shear (Ib/sq ft)	*	0. 01	*	0.06	*
* Al pha 0.00 *	* 1.20	* Stream Power (Ib/ft s)	*	0.00	*	0. 10	*
* Frctn Loss (ft) 1047.26 *	* 0.00	* Cum Volume (acre-ft)	*	731. 86	*	216. 01	*
* C & E Loss (ft) 101.80 *	* 0.03	* Cum SA (acres)	*	84. 03	*	10. 94	*
	*****	*******	**	*****	***	*****	**

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

### CROSS SECTION OUTPUT Profile #0.2%

*****		****	^ ^	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	~ ~ ~	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~		~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	٠.,
*****										
* E.G. Elev (ft)	*	178. 89	*	Element		*	Left OB	*	Channel	*
Right OB *  * Vel Head (ft) 0.070 *	*	0. 00	*	Wt. n-Val.		*	0. 070	*	0. 045	*
* W. S. Elev (ft)	*	178. 89	*	Reach Len. Page 55	(ft)	*	0. 50	*	0. 50	*

```
0.50
                       * 160.59 * Flow Area (sq ft)
 Crit W.S. (ft)
                                                         *15271.76 *
                                                                      721.52
647. 14
 E.G. Slope (ft/ft)
                       *0.000000
                                 * Area (sq ft)
                                                         *15271.76
                                                                      721.52
647. 14
 Q Total (cfs)
                          700.00
                                 * Flow (cfs)
                                                           558.65
                                                                      109.85
 31. 51
 Top Width (ft)
                       * 3387.88
                                 * Top Width (ft)
                                                          3282.88
                                                                       35.00
 70.00 *
 Vel Total (ft/s)
                           0.04
                                 * Avg. Vel. (ft/s)
                                                             0.04
                                                                        0.15
  0.05
 Max Chl Dpth (ft)
                           21.89
                                 * Hydr. Depth (ft)
                                                             4.65
                                                                       20.61
  9. 24
 Conv. Total (cfs) 50975.3 *
                                 * Conv. (cfs)
                                                          *903881.1
                                                                    *177729.6
                       *1132586.0
 Length Wtd. (ft)
                            0.50
                                 * Wetted Per. (ft)
                                                         * 3292.52
                                                                       35.41
 90. Š3
 Min Ch El (ft)
                          157.00
                                 * Shear (lb/sq ft)
                                                              0.00
                                                                        0.00
  0.00
                                 * Stream Power (lb/ft s) *
                                                                        0.00
 Al pha
                            2.72
                                                             0.00
  0.00
* Frctn Loss (ft)
                            0.00
                                 * Cum Volume (acre-ft)
                                                         * 1385.73
                                                                      285.74
1856. 83
 C & E Loss (ft)
                            0.01 * Cum SA (acres)
                                                            140.94
                                                                       12. 17
133.92 *
*****
```

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

### **BRI DGE**

RIVER: RIVER-1 REACH: Reach-1 RS: 250.06 I NPUT Description: Bridge #2 - Runway Distance from Upstream XS = 611.5 Deck/Roadway Width Weir Coefficient 2.7 Upstream Deck/Roadway Coordinates num= Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 456 180 0 180 2856 155 3666 178.13 3666 178.13 169.49 3696 178. 13 169. 49 178. 13 155 3696 5056 177.9 Upstream Bridge Cross Section Data 477 Station Elevation Data num= El ev Sta El ev Sta El ev Sta El ev Sta El ev Sta \*\*\*\*\*\* 6.56 0 182.13 182 182.17 22.96 181.91 13.12 16. 4 182. 13 26.24 182.16 181.91 29.52 39.36 181.84 42.64 181.81 55.76 182 62.32 182.01 68.88 181. 69 75.45 181.7 82.01 181.47 88.57 181.54

Proposed - No-Rise 95. 13 127. 93 154. 17 183. 69 226. 34 259. 14 181. 42 181. 19 181. 27 180. 73 180. 15 114. 81 144. 33 170. 57 213. 21 239. 46 282. 1 301. 78 181.37 101.69 108.25 181.49 181.54 121.37 181.32 181. 37 181. 46 181. 23 180. 68 180. 26 179. 8 181.14 134.49 141.05 181.14 150.89 181.34 160. 73 196. 81 229. 62 167. 29 209. 93 181.04 177. 13 180.96 181 180. 26 180. 13 179. 91 180.27 216.49 180.48 236. 18 272. 26 180. 16 246.02 180.02 265. 7 291. 94 180.03 179.52 285.38 179.47 179. 45 179. 48 179. 3 179. 6 179. 29 179. 24 179. 6 179. 23 179. 57 179. 59 295. 22 321. 46 288.66 305.06 179.48 337. 86 367. 39 410. 03 318. 18 179.39 311.62 341.14 347. 7 387. 07 429. 71 179. 23 360.82 178. 93 383. 79 354.26 178.82 354. 26 396. 91 436. 27 465. 79 492. 03 524. 84 570. 76 593. 72 629. 8 659. 32 688. 85 721 65 179. 3 178. 73 178. 5 178. 21 177. 83 177. 58 177. 23 176. 98 176. 69 176. 51 176. 3 175. 92 179. 24 178. 77 178. 38 178. 2 178. 01 177. 67 177. 01 176. 73 176. 94 178. 93 178. 67 178. 37 177. 96 177. 91 177. 15 176. 79 176. 51 179. 23 178. 95 178. 6 178. 09 177. 84 177. 56 177. 21 403. 47 439. 55 472. 35 498. 59 413.31 178.51 452. 67 482. 19 508. 43 446. 11 478. 91 505. 15 531. 4 554. 36 577. 32 610. 12 639. 64 675. 73 708. 53 731. 49 751. 17 797. 09 178.08 178. 03 177. 61 177. 33 177. 19 462. 51 488. 75 515 537. 96 564. 2 587. 16 528. 12 547. 8 574. 04 600. 28 534. 68 557. 64 177. 13 176. 86 583.88 176.78 616. 68 642. 92 679. 01 176.65 600. 28 636. 36 669. 17 695. 41 724. 93 747. 89 783. 97 176. 39 626. 52 177.01 626. 52 649. 48 685. 57 718. 37 741. 33 767. 57 176. 56 176. 25 175.96 176 175. 92 175. 43 175. 21 174. 82 176.03 176.06 711.81 175.83 175. 61 175. 32 174. 92 174. 72 175. 62 175. 36 174. 83 175. 86 175. 53 175. 21 174. 71 721. 65 744. 61 774. 13 820. 06 738. 05 761. 01 175. 33 175. 14 803.65 174.85 174.8 836.46
174.35 875.82
174.02 925.02
173.73 957.83
173.84 993.91
174.04 1026.71
173.95 1066.07
174.1 1098.88
173.77 1131.68
173.79 1167.76
173.92 1216.96
173.85 1259.61
173.95 1315.37
174.25 1367.85
173.99 1426.9
173.8 1466.26
173.73 1492.5
173.9 1522.02
173.96 1558.11
174 1617.15 174.65 826.62 174.8 836.46 174.67 843.02 869. 26 911. 9 947. 98 977. 51 1010. 31 174. 48 869. 26 174 911. 9 174. 12 947. 98 173. 92 977. 51 174. 03 1010. 31 174. 09 1049. 67 174. 08 1085. 75 173. 87 1115. 28 173. 8 1148. 08 173. 94 1190. 72 173. 85 1246. 49 173. 93 1292. 41 174. 11 1354. 73 174. 25 1410. 5 173. 99 1453. 14 173. 85 1479. 38 173. 88 1508. 9 174. 4 882. 38
174. 21 931. 58
173. 78 964. 39
173. 99 1000. 47
173. 88 1036. 55
174. 04 1072. 63
174. 1 1102. 16
174. 04 1138. 24
173. 93 1174. 32
173. 86 1233. 36
173. 94 1269. 45
173. 99 1325. 21
174. 14 1384. 25
174. 02 1433. 46
173. 87 1469. 54
173. 81 1495. 78
173. 92 1528. 58
174. 05 1571. 23
174. 26 1623. 71 862.7 174.48 174.48 872.54 174.4 882.38 174.36 862. / 908. 62 938. 14 970. 95 1007. 03 1043. 11 1079. 19 1108. 72 1144. 8 1184. 16 174. 12 918. 46
173. 81 954. 55
173. 96 987. 35
173. 91 1020. 15
174. 11 1056. 23
173. 94 1092. 31
173. 94 1125. 12
173. 88 1157. 92
173. 89 1197. 28
173. 98 1253. 05
174. 03 1298. 97
174. 24 1364. 57
174. 02 1420. 34
173. 93 1456. 42
173. 76 1485. 94
173. 8 1515. 46
174. 02 1551. 55
174. 08 1604. 03
174. 11 1643. 39
174. 18 1676. 19
174. 13 1712. 28
173. 87 1771. 32
173. 97 1925. 49
173. 96 1977. 97
173. 96 2037. 02
173. 79 2073. 1
174. 12 2119. 03
174. 17 2155. 11
174. 14 2197. 75
174. 29 2233. 84
174. 25 2279. 76
173. 95 2312. 56
174. 14 2355 174.03 174.06 173. 88 173. 93 173. 96 173. 83 173. 85 173.89 173.99 1236.64 1236. 64 1282. 57 1341. 61 1387. 53 1443. 3 1476. 1 1502. 34 1535. 14 174.08 174.19 173.91 173. 81 173. 78 173. 99 1453. 14
173. 85 1479. 38
173. 88 1508. 9
173. 96 1544. 99
174. 12 1597. 47
174. 25 1636. 83
174. 13 1666. 35
174. 23 1705. 72
173. 98 1751. 64
173. 88 1797. 56
173. 88 1797. 56
173. 84 1797. 56
174. 99 1915. 65
174 1961. 57
173. 84 2017. 34
173. 82 2066. 54
174. 15 2102. 62
174. 23 2141. 99
174. 21 2187. 91
174. 43 2227. 27
174. 27 2273. 2
173. 99 2309. 28
174. 21 2350
174. 13 2380 173.83 173.97 174 1617. 15 174. 16 1646. 67 174. 08 1682. 75 174. 26 1623. 71 173. 96 1653. 23 174. 19 1695. 88 1584.35 174.22 1630. 27 1659. 79 1699. 16 1741. 8 1791 1836. 93 174.16 174. 08 1682. 75
174. 1 1725. 4
174. 07 1777. 88
173. 82 1813. 96
173. 87 1859. 89
173. 92 1895. 97
174. 05 1938. 61
174. 05 1987. 82
173. 93 2046. 86
174. 01 2079. 66
174. 21 2122. 31
174. 28 2164. 95
174. 26 2201. 03
174. 35 2240. 4
174. 02 2286. 32
174 2319. 12
174. 16 2365
174. 1 2420 174.14 174. 19 1093. 66 174. 14 1735. 24 173. 98 1784. 44 173. 78 1827. 08 173. 84 1866. 45 173. 89 1905. 81 173.96 173. 96 174. 03 173. 85 173. 93 173. 96 173. 89 1876. 29 173. 89 1905. 81 174. 03 1948. 45 173. 94 2004. 22 173. 88 2056. 7 174. 09 2086. 22 174. 12 2125. 59 174. 15 2168. 23 174. 17 2210. 87 174. 24 2260. 08 174. 06 2292. 88 1909.09 1958.29 2010. 78 2063. 26 2096. 06 173. 72 174. 02 174. 18 2138. 71 2184. 63 2220. 71 174. 19 174. 35 174. 2 2266.64 173.95 174. 2 2296.16 173. 95 2335. 11 2341.67 2370 174.16 174.14 174. 1 174. 1 174. 09 174. 08 2435 174.13 2380 174.11 2415 2420 174.09 2375 2440 174.08 2450 174.1 2455 2465 2480 174

			Proposed					
2495 174 2545 174.14 2605 173.83	2500 2555 2610	174. 01 174. 13 173. 83	2515 2560 2620	174. 1 174. 11 173. 79	2530 2565 2625	174. 16 174. 1 173. 78	2535 2580 2640	174. 16 174. 03 173. 71
2655 173. 66 2690 173. 58 2725 173. 45	2660 2700 2740	173. 66 173. 53 173. 36	2670 2705 2750	173. 64 173. 52 173. 32	2675 2710 2755	173. 64 173. 5 173. 31	2680 2715 2770	173. 6 173. 49 173. 24
2775 173. 21 2830 172. 87 2895 173. 17	2785 2845 2900	173. 12 172. 9 173. 25	2795 2865 2905	173. 06 173. 08 173. 38	2810 2885 2910	172. 9 173. 09 173. 45	2820 2890 2915	172. 87 173. 14 173. 63
2920 174.02 2980 175.83	2930 3005	174. 72 175. 83	2935 3010 3050	174. 91 175. 77	2945 3020	175. 14 175. 63	2975 3030 3060	175. 74 175. 52 175. 17
3035 175. 48 3080 175. 02 3130 174. 53	3045 3085 3135	175. 34 175 174. 47	3105 3145	175. 26 174. 86 174. 41	3055 3110 3155	175. 19 174. 8 174. 42	3115 3210	174. 73 174. 74
3215 174. 74 3255 174. 07 3280 173. 83	3220 3260 3290	174. 71 173. 98 173. 47	3225 3265 3295	174. 63 173. 91 173. 33	3235 3270 3300	174. 41 173. 88 173. 29	3245 3275 3305	174. 21 173. 83 173. 26
3310 173. 24 3365 172. 9 3395 172. 8	3315 3370 3400	173. 18 172. 86 172. 81	3325 3375 3410	173. 01 172. 8 172. 8	3330 3385 3415	172. 97 172. 76 172. 83	3355 3390 3420	172. 93 172. 77 172. 89
3425 172. 91 3450 172. 69 3480 172. 45	3430 3455 3490	172. 91 172. 61 172. 34	3435 3460 3500	172. 86 172. 56 172. 18	3440 3465 3505	172. 83 172. 52 172. 12	3445 3475 3515	172. 79 172. 48 172. 02
3525 171. 94 3560 171. 62 3600 171. 61	3530 3565 3605	171. 91 171. 63 171. 57	3535 3570 3620	171. 87 171. 54 171. 37	3545 3575 3625	171. 71 171. 46 171. 33	3555 3585 3630	171. 62 171. 5 170. 92
3635 170. 89 3695 159. 8	3640 3700 3740	171. 31 173. 08	3655 3705	172. 6 172. 6 168. 55	3660 3715	159. 39 171. 48	3681 3720	157 170. 94
3760 167. 78	3765	169. 05 167. 82	3745	100. 55	3750	168	3755	167. 7
Manning's n Values Sta n Val *******	Sta	num= n Val *****	3 Sta ****	n Val *****				
0 . 07	3660	. 045	3695	. 07				
3660	i ght 3695	Coeff C	. 3	Expan. . 5				
Ineffective Flow Sta L Sta R O 3655	num= Elev 177.9	Permane F						
3700 3765	177. 9	F						
Downstream Deck/R num= 8	oadway	Coordi na	tes					
Sta Hi Cord L	o Cord	Sta *****	Hi Cord	Lo Cord *****		Hi Cord *****		
0 180 3975 178.13 4005 178.13	0 155 155	485 3975 5085	180 178. 13 177. 9	0 169. 49 0	2885 4005	178. 6 178. 13	0 169. 49	
Downstream Bridge Station Elevation		ection D num=	ata 385					
Sta Elev	Sta	El ev	Sta	El ev	Sta *****	El ev	Sta *****	El ev
0 182.87 45.91 182.33 98.39 181.7	3. 28 52. 47	182. 74 182. 59	26. 24 55. 75 118. 07	182. 47 182. 38	32. 8 68. 87	182. 49 182. 21 181. 52	39. 35 75. 43	182. 28 182. 31
147. 58 180. 98 186. 94 180. 83	104. 95 154. 14 193. 5	181. 77 180. 97 180. 91	163. 98 206. 61	181. 41 181. 13 180. 64	124. 62 170. 54 219. 73	181. 02 180. 53	141. 02 180. 38 226. 29	181. 23 181. 04 180. 39
282. 04 179. 68	242. 69 288. 6 331. 24	180. 12 179. 88 179. 47	252. 53 295. 16 337. 8	180. 02 179. 63 179. 25	255. 81 308. 28 344. 36	180. 1 179. 45 179. 35	268. 93 314. 84 350. 92	179. 85 179. 43 179. 18
				je 58				

Proposed - No-Rise 367. 31 409. 95 462. 42 505. 06 554. 25 178.68 400.11 179.01 377.15 390.27 178.82 178.57 406.67 178.58 400. 11 436. 19 482. 1 537. 85 583. 77 629. 68 449.3 178.45 178.63 426. 35 178. 48 178.26 416.51 178. 31 178. 32 177. 97 177. 58 177 178. 23 177. 73 177. 36 176. 84 178. 23 177. 84 177. 38 178. 05 177. 71 177. 15 475. 54 518. 18 178.05 465.7 498.5 511. 62 560. 81 544.41 177. 5 177. 19 590. 33 636. 24 570.65 176. 53 176. 79 596.89 619.84 176.62 610 176.64 659. 2 691. 99 649.36 642.8 176.46 176.52 176.76 665.76 669.04 176.5 685.43 678.88 176.35 698.55 176.25 176.42 176.15 705.11 176.1 708.39 724.79 176.15 175.84 734.63 175.92 747.75 175.78 754.31 175.8 175. 64 175. 36 175. 36 175. 19 174. 84 174. 37 767. 42 800. 22 783. 82 833. 02 175.52 773.98 780.54 175.36 175. 29 175.54 793.66 816. 62 859. 25 892. 05 944. 52 987. 16 175. 54 175. 41 175. 17 174. 91 174. 71 174. 45 175.53 826.46 175.11 839.58 175.24 175. 11 839. 58 175. 11 875. 65 175. 01 921. 57 174. 56 977. 32 174. 27 1010. 11 173. 95 1052. 75 173. 76 1115. 06 173. 54 1164. 26 846. 13 882. 21 924. 85 983. 88 175. 16 175. 07 174. 78 174. 49 865. 81 898. 61 947. 8 997 872. 37 908. 45 174.89 174. 7 174. 34 967. 48 1006. 84 174. 37 174. 49 987. 16 174. 12 1033. 07 173. 86 1075. 71 173. 73 1131. 46 173. 55 1180. 65 173. 17 1246. 25 173. 26 1288. 88 173. 28 1331. 52 173. 33 1361. 03 173. 35 1420. 07 174 71 1472 54 174. 06 1042. 91 173. 96 1108. 5 173. 41 1151. 14 173. 4 1203. 61 174. 03 1039. 63 173. 86 1082. 27 1023.23 173.98 1065.87 173.62 173. 86 1082. 27 173. 69 1147. 86 173. 22 1193. 77 173. 01 1265. 92 173. 27 1295. 44 173. 3 1338. 08 173. 53 1380. 71 174. 1 1429. 9 173.48 1121.62 173. 54 1164. 26 173. 36 1223. 29 173. 07 1275. 76 173. 21 1315. 12 173. 39 1351. 19 173. 29 1400. 39 174. 31 1456. 14 1170.82 173.19 173. 4 1203. 81 172. 91 1269. 2 173. 06 1305. 28 173. 15 1344. 63 173. 2 1393. 83 174. 31 1443. 02 1242. 97 1282. 32 1318. 4 173.02 173. 17 173. 48 1354.47 173.42 1403.67 174.44 1472.54 174.72 1485.66 1465.98 174. 71 1472. 54
175. 08 1538. 13
174. 69 1597. 16
173. 44 1633. 24
173. 02 1659. 48
173. 19 1688. 99
172. 91 1731. 63
172. 78 1787. 38
172. 26 1846. 41
172. 49 1898. 89
172. 32 1957. 92
172. 02 2007. 11
171. 76 2043. 19
171. 73 2102. 22
171. 5 2167. 82
171. 61 2213. 73
171. 66 2266. 21
171. 64 2305. 56 174.71 175.03 1492.22 175 1508.61 175.29 1525. 01 1570. 93 175. 1 1547. 97 174. 09 1607 174. 96 1557. 81 173. 64 1610. 28 174. 95 1564. 37 173. 68 1613. 56 174.65 174.09 1607 173.1 1636.52 173.06 1669.32 173.07 1698.83 172.79 1744.75 172.7 1793.94 172.38 1852.97 172.34 1908.73 172.26 1967.76 171.82 2016.95 171.9 2056.31 171.57 2112.06 171.39 2187.49 171.58 2220.29 171.74 2279.32 171.53 2312.12 171.53 2358.04 173. 64 1610. 28 173. 31 1643. 08 172. 98 1672. 59 172. 73 1705. 39 173. 03 1764. 42 172. 75 1807. 06 172. 31 1866. 09 172. 53 1915. 29 172. 03 1977. 6 171. 81 2026. 79 171. 99 2062. 87 171. 59 2138. 3 171. 43 2194. 05 171. 45 2226. 85 171. 68 2285. 88 173.44 173. 68 1613. 56 173. 07 1649. 64 173. 18 1679. 15 172. 86 1711. 95 173. 01 1770. 98 172. 43 1813. 62 172. 44 1869. 37 1620. 12 1652. 92 1682. 43 1718. 51 1780. 82 173. 19 173. 04 173. 04 172. 76 173. 09 172. 52 172. 36 1843.13 172. 34 1941. 52 172. 02 1984. 16 171. 65 2030. 07 1879. 21 172.01 1948.08 171.93 2000. 55 2039. 91 2089. 1 2151. 42 2203. 89 171.93 171. 65 2030. 07 171. 84 2082. 55 171. 38 2141. 58 171. 56 2200. 61 171. 45 2233. 41 171. 73 2292. 44 171. 48 2325. 24 171.69 171.48 171. 51 171. 58 2262. 93 2295. 72 171.68 2285.88 171.56 171.64 2305.56 171. 58 2315.4 171.48 171. 53 2358. 04 171. 832424. 423 171. 782505. 575 171. 38 2341. 64 171. 792404. 135 171.48 2367.88 171.54 2374.43 2335.08 171.67 172. 032475. 143 171. 552525. 863 171. 472576. 583 2387. 55 2485. 287 1722454. 855 171. 752515. 719 171.97 171. 892495. 431 171.57 171. 782505. 575 171. 492556. 295 171. 52607. 015 171. 432738. 888 171. 37 2820. 04 171. 492931. 624 172. 32 3022. 92 2536. 007 2586. 727 2688. 167 2779. 464 2891. 048 171. 512546. 151 171. 512596. 871 171. 372728. 744 171. 412809. 896 171. 52566. 439 171. 462627. 303 171. 462749. 031 171. 42840. 328 171. 47 171. 42 171. 34 171. 37 171. 482667. 879 171. 352759. 176 171. 42850. 472 171. 842951. 912 171. 72941. 768 172. 743033. 064 171. 412911. 336 171.93 2982.344 171. 943002. 632 172. 833053. 353 172.83 172. 833053. 353 173. 833225. 801 172. 843317. 097 173. 713367. 817 174. 833479. 402 173. 68 3550. 41 172. 323611. 274 172. 483824. 299 3063.497 172. 963083. 784 173. 363104. 073 173. 713114. 217 173.82 3246.089 173. 523286. 665 173. 173337. 385 173. 083296. 809 173. 313347. 529 172. 873306. 953 173. 543357. 673 172.95 3327. 241 3388. 105 3499. 69 3560. 554 173. 91 174. 833469. 258 173. 953540. 266 172. 75 3601. 13 1723814. 155 174. 693418. 537 174. 253530. 122 174. 353408. 393 174.75 174. 333406. 373 174. 443509. 834 173. 073570. 698 171. 833793. 866 173.17 174. 253530. 122 173. 013580. 842 171. 83 3804. 01 173. 083895. 307 171. 99 172. 83 3621. 418 173. 023854. 731 3834.443 173. 333905. 451 173. 333915. 595 172.92 3946. 027 170. 963956. 171 168. 953966. 315 166. 143976. 459 163. 943986. 603 161.01 3990 156. 844027. 179 159.874037.323 161. 234047. 467 163. 494057. 611 165.32 167. 454077. 899 169. 434088. 043 173. 214169. 195 4067.755 1714098.188 172.024108.332 172.61 173. 294189. 483 4118.476 172. 844148. 908 173. 334219. 916 173.46

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Proposed - No-Rise
                             173. 544321. 356
4240. 204
           173. 584250. 348
                                              173. 054341. 644
                                                                173. 014361. 932
                                                                                  172.89
4392.364
                                                                                   172.47
           172.634412.652
                             172. 494422. 796
                                               172. 39 4432. 94
                                                                 172. 354463. 373
           172. 724564. 813
172. 254716. 973
                                               172. 834645. 965
4544.524
                             172. 834635. 821
                                                                 172. 814666. 253
                                                                                   172.55
                             172. 114767. 693
171. 924869. 133
4696.685
                                               171.864777.837
                                                                 171. 834798. 125
                                                                                   171.83
                                               172. 824899. 565
175. 655051. 726
           171.874828.557
                                                                 172.85 4960.43
4818.413
                                                                                   173.74
                             174. 775041. 582
4980.718
           173. 92 5011. 15
                                                                 175.83 5061.87
                                                                                   175.83
Manning's n Values
                             num=
                            n Val
                       Sta
                                        Sta
     Sta n Val
                                                n Val
           . 073966. 315 . 0454057. 611
                                                . 07
Bank Sta: Left
                   Ri ght
                             Coeff Contr.
                                              Expan.
      3966. 3154057. 611
                                                 . 5
                                      . 3
                                   2
Ineffective Flow
                      num=
   Sta L
          Sta R
                      El ev
                             Permanent
       0
            3985
                      177
                                  F
                                  F
    4035 5061.87
                       177
Upstream Embankment side slope
                                                         4 horiz. to 1.0 vertical
Downstream Embankment side slope
                                                         4 horiz. to 1.0 vertical
                                                =
Maximum allowable submergence for weir flow = Elevation at which weir flow begins = Energy head used in spillway design =
                                                        . 98
                                                     177. 4
Spillway height used in design
Weir crest shape
                                                = Broad Crested
Number of Bridge Coefficient Sets = 1
Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer
High Flow Method
       Energy Only
Additional Bridge Parameters
        Add Friction component to Momentum
        Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth inside the bridge at the upstream end
        Criteria to check for pressure flow = Upstream energy grade line
BRIDGE OUTPUT Profile #1%
                          * E.G. US. (ft)
*Inside BR DS *
                                  175.44 * Element
                                                                        *Inside BR US
* W.S. US. (ft)
                                  175. 41
                                           * E.G. Elev (ft)
                                                                              175.42
174.82
* Q Total (cfs)
                                  800.00
                                           * W.S. Elev (ft)
                                                                              175.33
174.63
* Q Bridge (cfs)
                                  800.00
                                          * Crit W.S. (ft)
                                                                              160.99
161. 69
* Q Weir (cfs)
                                           * Max Chl Dpth (ft)
                                                                               18. 33
17. 79
* Weir Sta Lft (ft)
                                           * Vel Total (ft/s)
                                                                                2.37
 3. 48
* Weir Sta Rgt (ft)
229.69 *
                                           * Flow Area (sq ft)
                                                                              338. 17
* Weir Submerg
                                           * Froude # Chl
                                                                                0.10
 0. 15
* Weir Max Depth (ft)
                                           * Specif Force (cu ft)
                                                                             3952.68
                                           Page 60
```

* Min El Weir Flow (ft)	* 178.1	* Hydr Depth (ft)	*		*	
* Min El Prs (ft) 53.52 *	* 169.49	* W.P. Total (ft)	*	80. 03	*	
* Delta EG (ft) 20029.1 *	* 0.72	* Conv. Total (cfs)	*	31004.0	*	
* Delta WS (ft)	* 0.7	* Top Width (ft)	*		*	
* BR Open Area (sq ft) 0.01 *	* 229.69	* Frctn Loss (ft)	*	0. 57	*	
* BR Open Vel (ft/s) 0.09 *	* 3.48	* C & E Loss (ft)	*	0. 03	*	
* BR Sluice Coef 0.43 *	*	* Shear Total (Ib/sq ft)	*	0. 18	*	
* BR Sel Method	*Energy only	* Power Total (lb/ft s)	*	0. 42	*	
*****	*****	******	***	*****	****	: <b>*</b>
*****						

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth Note: with the lowest, valid, water surface was used.

# 

2601 09 \*

*	176. 31	* Element	*In	side BR US	
*	176. 29	* E.G. Elev (ft)	*	176. 29	*
*	800.00	* W.S. Elev (ft)	*	176. 20	*
*	800.00	* Crit W.S. (ft)	*	160. 99	*
*		* Max Chl Dpth (ft)	*	19. 20	*
*		* Vel Total (ft/s)	*	2. 37	*
*		* Flow Area (sq ft)	*	338. 17	*
*		* Froude # Chl	*	0. 10	*
*		* Specif Force (cu ft)	*	4246. 64	*
*	178. 14	* Hydr Depth (ft)	*		*
*	169. 49	* W.P. Total (ft)	*	80. 03	*
*	0. 72	* Conv. Total (cfs)	*	31004.0	*
*	0. 71	* Top Width (ft)	*		*
*	229. 69	* Frctn Loss (ft)	*	0. 57	*
*	3. 48	* C & E Loss (ft) Page 61	*	0. 03	*
	*	* 176. 29  * 800. 00  * 800. 00  *  *  *  *  *  *  *  *  *  *  *  *	* 176.29 * E.G. Elev (ft)  * 800.00 * W.S. Elev (ft)  * 800.00 * Crit W.S. (ft)  * Max Chl Dpth (ft)  * Vel Total (ft/s)  * Flow Area (sq ft)  * Froude # Chl  * Specif Force (cu ft)  * 178.14 * Hydr Depth (ft)  * 169.49 * W.P. Total (ft)  * 0.72 * Conv. Total (cfs)  * 0.71 * Top Width (ft)  * 229.69 * Frctn Loss (ft)  * 3.48 * C & E Loss (ft)	* 176.29 * E.G. Elev (ft) *  * 800.00 * W.S. Elev (ft) *  * 800.00 * Crit W.S. (ft) *  * Max Chl Dpth (ft) *  * Vel Total (ft/s) *  * Flow Area (sq ft) *  * Froude # Chl *  * Specif Force (cu ft) *  * 178.14 * Hydr Depth (ft) *  * 169.49 * W.P. Total (ft) *  * 0.72 * Conv. Total (cfs) *  * 0.71 * Top Width (ft) *  * 229.69 * Frctn Loss (ft) *  * 3.48 * C & E Loss (ft) *	* 176.29 * E. G. El ev (ft) * 176.29  * 800.00 * W. S. El ev (ft) * 176.20  * 800.00 * Crit W. S. (ft) * 160.99  * Max Chl Dpth (ft) * 19.20  * Vel Total (ft/s) * 2.37  * * Flow Area (sq ft) * 338.17  * * Froude # Chl * 0.10  * Specif Force (cu ft) * 4246.64  * 178.14 * Hydr Depth (ft) *  * 169.49 * W. P. Total (ft) * 80.03  * 0.72 * Conv. Total (cfs) * 31004.0  * 0.71 * Top Width (ft) *  * 229.69 * Frctn Loss (ft) * 0.57  * 3.48 * C & E Loss (ft) * 0.03

0 09 *		110 111 30			
* BR SIuice Coef	*	* Shear Total	(lb/sq ft)	* 0.18	*
0.43 * * BR Sel Method	*Energy only	* Power Total	(lb/ft s)	* 0.42	*
1.49 * *********	*****	*****	*****	*****	*****
*****					

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth

with the lowest, valid, water surface was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

\*\*\*\*\*\*\*\*\*\*\*\*

# BRIDGE OUTPUT Profile #10%

*******	****	*****	**	******	***	*****	*****
* E.G. US. (ft)	*	172. 23	*	Element	*Ins	side BR US	
*Inside BR DS * * W.S. US. (ft)	*	172. 10	*	E.G. Elev (ft)	*	172. 18	*
170. 20  * *	*	1450. 00	*	W.S. Elev (ft)	*	171. 88	*
169.58 * * Q Bridge (cfs)	*	1450. 00	*	Crit W.S. (ft)	*	162. 39	*
163.47 * * Q Weir (cfs)	*		*	Max Chl Dpth (ft)	*	14. 88	*
12.74 * * Weir Sta Lft (ft)	*		*	Vel Total (ft/s)	*	4. 29	*
6.31 * * Weir Sta Rgt (ft)	*		*	Flow Area (sq ft)	*	338. 17	*
229.69 * * Weir Submerg	*		*	Froude # Chl	*	0. 20	*
0.31 * * Weir Max Depth (ft)	*		*	Specif Force (cu ft)	*	2924. 08	*
1638.86 * '	*	178. 13		Hydr Depth (ft)	*		*
* Min El Prs (ft)	*	169. 49	*	W.P. Total (ft)	*	80. 03	*
53.52 * * Delta EG (ft)	*	2. 31		Conv. Total (cfs)	*	31004. 0	*
20029.1 *	*	2. 29		Top Width (ft)	*		*
* BR Open Area (sq ft)	*	229. 69		Frctn Loss (ft)	*	1. 89	*
0.02 * * BR Open Vel (ft/s)	*	6. 31		C & E Loss (ft)	*	0. 10	*
0. 26 * * BR Sluice Coef	*	0. 01		Shear Total (Ib/sq ft)	*	0. 18	*
1. 40 *	*Eno	rav only			*	2. 47	*
* BR Sel Method 8.86 * ********				Power Total (lb/ft s)	++++		
	x						

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and Page 62

This may indicate previous cross section.

the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth

with the lowest, valid, water surface was used.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).
indicate the need for additional cross

sections.

\*\*\*\*\*

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

# BRIDGE OUTPUT Profile #2%

****							
* E.G. US. (ft) *Inside BR DS *	*	174. 21	*	Element	*I ns	side BR US	
* W.S. US. (ft)	*	174. 17	*	E.G. Elev (ft)	*	174. 18	*
173.33 * * Q Total (cfs)	*	950. 00	*	W.S. Elev (ft)	*	174. 06	*
173.07 * * Q Bridge (cfs)	*	950. 00	*	Crit W.S. (ft)	*	161. 33	*
162.12 * * Q Weir (cfs)	*		*	Max Chl Dpth (ft)	*	17. 06	*
16.23 * * Weir Sta Lft (ft)	*		*	Vel Total (ft/s)	*	2. 81	*
4.14 * * Weir Sta Rgt (ft) 229.69 *	*		*	Flow Area (sq ft)	*	338. 17	*
* Weir Submerg	*		*	Froude # Chl	*	0. 12	*
0.18 * * Weir Max Depth (ft)	*		*	Specif Force (cu ft)	*	3547. 02	*
2278.25 * * Min El Weir Flow (ft)	*	178. 13	*	Hydr Depth (ft)	*		*
* Min El Prs (ft)	*	169. 49	*	W.P. Total (ft)	*	80. 03	*
* Delta EG (ft)	*	1. 01	*	Conv. Total (cfs)	*	31004.0	*
20029.1 * * Del ta WS (ft)	*	0. 99	*	Top Width (ft)	*		*
* BR Open Area (sq ft)	*	229. 69	*	Frctn Loss (ft)	*	0. 81	*
0.01 * * BR Open Vel (ft/s)	*	4. 14	*	C & E Loss (ft)	*	0. 04	*
0.12 * * BR SI ui ce Coef	*		*	Shear Total (Ib/sq ft)	*	0. 25	*
0.60 * * BR Sel Method 2.49 *	*Ener	gy only	*	Power Total (Ib/ft s)	*	0. 70	*
**********	****	*****	* *	******	****	******	*****

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #		*****	*********	·******
*****				
* E.G. US. (ft) *Inside BR DS *	*	178. 89	* Element *Inside BR	US
* W. S. US. (ft) 178. 50 *	*	178. 89	* E.G. Elev (ft) * 178.8	88 *
* Q Total (cfs)	*	700.00	* W.S. Elev (ft)	35 *
* Q Bridge (cfs)	*	582. 89	* Crit W.S. (ft) * 160.7	74 *
161.34 * * Q Weir (cfs)	*		* Max Chl Dpth (ft) * 21.8	35 *
* Weir Sta Lft (ft)	*		* Vel Total (ft/s)	32 *
* Weir Sta Rgt (ft)	*		* Flow Area (sq ft)	53 *
* Weir Submerg	*		* Froude # Chl	)6 *
* Weir Max Depth (ft)	*		* Specif Force (cu ft) * 5244.8	37 *
4361.12 * * Min El Weir Flow (ft)	*	178. 13	* Hydr Depth (ft) * 0.0	54 *
* Min El Prs (ft)	*	169. 49	* W.P. Total (ft) * 1414.9	93 *
1954.44 * * Del ta EG (ft)	*	0. 41	* Conv. Total (cfs) * 32252.	2 *
* Delta WS (ft)	*	0. 41	* Top Width (ft)	17 *
1874.73 * * BR Open Area (sq ft)	*	229. 69	* Frctn Loss (ft) * 0.3	38 *
0.00 * * BR Open Vel (ft/s)	*	1. 97	* C & E Loss (ft) * 0.0	00 *
* BR Sluice Coef	*		* Shear Total (lb/sq ft) * 0.0	)2 *
0.03 * * BR Sel Method 0.02 *	*Ener	gy only	* Power Total (lb/ft s) * 0.0	)1 *
· · · -	*****	*****	*******	*****
****				

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth

with the lowest, valid, water surface was used.

# CROSS SECTION

RIVER: RIVER-1 REACH: Reach-1 RS: 250

I NPUT Description: XS 250 Broad Run Station 250 CHANNEL REACH DISTANCE ADJUSTED PER PROPOSED RUNWAY BRIDGE THIS IS THE D/S FACE OF RUNWAY 34-R Station Elevation Data 385 num=

Sta El ev Sta El ev Sta El ev El ev El ev Sta Sta Page 64

\*\*\*\*\*\*\*\*\* \*\*\*\*\*\*\*\* 182.87 3.28 182.74 182.47 32.8 182. 49 39.35 182.28 0 26.24 45. 91 98. 39 147. 58 186. 94 182. 33 181. 7 180. 98 180. 83 52. 47 104. 95 154. 14 193. 5 182. 59 181. 77 180. 97 180. 91 55. 75 118. 07 163. 98 182. 21 181. 52 181. 02 180. 53 68. 87 124. 62 182. 31 181. 23 182.38 75.43 181. 41 181. 13 180. 64 141.02 170. 54 219. 73 180. 38 226. 29 181.04 206.61 180.39 232. 85 282. 04 242.69 180. 1 252. 53 295. 16 268. 93 180.38 180.12 180.02 255.81 179.85 179.68 288.6 179.88 179.63 308.28 179.45 314.84 179.43 331. 24 377. 15 416. 51 465. 7 511. 62 179.65 321.4 179.47 337.8 179.25 344.36 179.35 350.92 179.18 344. 36 400. 11 436. 19 482. 1 537. 85 583. 77 629. 68 665. 76 698. 55 390. 27 367. 31 409. 95 406. 67 449. 3 179.01 178.68 178.82 178.57 178.58 178. 82 178. 31 178. 23 177. 84 177. 38 176. 62 426. 35 475. 54 518. 18 178.45 178.63 178.48 178.26 178. 32 177. 97 177. 58 177 178. 23 177. 73 177. 36 176. 84 178. 05 177. 71 177. 15 176. 53 178. 05 177. 5 177. 19 462. 42 505. 06 498.5 544. 41 570. 65 619. 84 659. 2 691. 99 554. 25 596. 89 560. 81 590. 33 636. 24 610 176.64 176. 53 636. 24 176. 79 669. 04 176. 25 705. 11 175. 78 754. 31 175. 36 793. 66 175. 11 839. 58 175. 11 875. 65 175. 01 921. 57 174. 56 977. 32 174. 27 1010. 11 176. 46 176. 76 176. 15 175. 92 649. 36 685. 43 176. 52 642.8 176. 5 678.88 176. 42 175. 84 176.35 176. 1 724. 79 773. 98 176. 15 747. 75 708.39 734.63 175.8 175. 84 175. 64 175. 36 175. 36 175. 19 174. 84 767. 42 800. 22 175. 54 783.82 175.52 780.54 175.29 833. 02 872. 37 908. 45 816. 62 859. 25 892. 05 175. 41 175. 17 174. 91 174. 71 175.53 826.46 175.24 175. 16 175. 07 174. 78 846. 13 882. 21 924. 85 865. 81 898. 61 947. 8 997 174.89 174.7 944. 52 967. 48 174.34 983.88 174.49 987.16 174. 37 997
174. 03 1039. 63
173. 86 1082. 27
173. 69 1147. 86
173. 22 1193. 77
173. 01 1265. 92
173. 27 1295. 44
173. 3 1338. 08
173. 53 1380. 71
174. 1 1429. 9
174. 72 1485. 66
175. 1 1547. 97
174. 09 1607
173. 1 1636. 52 174.37 174. 45 1006. 84 174.37 174. 06 1042. 91
173. 96 1108. 5
173. 41 1151. 14
173. 4 1203. 61
172. 91 1269. 2
173. 06 1305. 28
173. 15 1344. 63
173. 2 1393. 83
174. 31 1443. 02
175. 03 1492. 22
174. 96 1557. 81
173. 64 1610. 28
173. 31 1643. 08
172. 98 1672. 59
172. 73 1705. 39
173. 03 1764. 42
172. 75 1807. 06
172. 31 1866. 09 1023.23 174. 12 1033. 07 174.06 1042.91 173.95 1052.75 173.98 173. 86 1075. 71 173. 73 1131. 46 173. 76 1115. 06 173. 54 1164. 26 173.62 1065.87 173. 73 1131. 46
173. 55 1180. 65
173. 17 1246. 25
173. 26 1288. 88
173. 28 1331. 52
173. 33 1361. 03
173. 35 1420. 07
174. 71 1472. 54
175. 08 1538. 13
174. 69 1597. 16
173. 44 1633. 24
173. 02 1659. 48
173. 19 1688. 99
172. 91 1731. 63
172. 78 1787. 38
172. 26 1846. 41
172. 49 1898. 89 1121.62 173.48 173. 54 1164. 26 173. 36 1223. 29 173. 07 1275. 76 173. 21 1315. 12 173. 39 1351. 19 174. 31 1456. 14 175 1508. 61 1170.82 173.19 1242. 97 1282. 32 1318. 4 173.02 173. 02 173. 17 173. 48 173. 42 174. 44 1354.47 1403.67 1465.98 175.29 174. 95 1564. 37 173. 68 1613. 56 1525. 01 1570. 93 174.65 173.1 1347.77
174.09 1607
173.1 1636.52
173.06 1669.32
173.07 1698.83
172.79 1744.75
172.7 1793.94
172.38 1852.97
172.34 1908.73
172.26 1967.76
171.82 2016.95
171.9 2056.31
171.57 2112.06
171.39 2187.49
171.58 2220.29
171.74 2279.32
171.53 2312.12
171.53 2358.04
171.832424.423
171.782505.575
171.492556.295 173.44 1620. 12 1652. 92 1682. 43 1718. 51 173.07 1649.64 173.19 173. 18 1679. 15 172. 86 1711. 95 173. 01 1770. 98 173.04 172. 76 173. 09 1780.82 172. 43 1813. 62 172.52 1843. 13 172. 31 1866. 09 172.44 1869.37 172.36 172. 26 1846. 41 172. 49 1898. 89 172. 32 1957. 92 172. 02 2007. 11 171. 76 2043. 19 171. 73 2102. 22 171. 5 2167. 82 171. 61 2213. 73 171. 64 2266. 21 172. 31 1866. 09 172. 53 1915. 29 172. 03 1977. 6 171. 81 2026. 79 171. 99 2062. 87 171. 59 2138. 3 171. 43 2194. 05 171. 45 2226. 85 171. 68 2285. 88 172. 34 1941. 52 172. 02 1984. 16 171. 65 2030. 07 1879. 21 172.01 1948.08 171.93 2000. 55 2039. 91 2089. 1 2151. 42 2203. 89 171.93 171. 83 2030. 07 171. 84 2082. 55 171. 38 2141. 58 171. 56 2200. 61 171. 45 2233. 41 171. 73 2292. 44 171.69 171. 48 171. 51 171. 58 2262.93 171.56 171. 64 2305. 56 171. 38 2341. 64 171. 792404. 135 171. 892495. 431 171. 58 2315. 4 171. 48 2367. 88 1722454. 855 171. 752515. 719 171. 48 2325. 24 171. 54 2374. 43 172. 032475. 143 171. 552525. 863 2295. 72 171.48 2335.08 171.67 2387.55 171.97 2485. 287 171.57 171. 512546. 151 171. 512596. 871 171. 372728. 744 171. 412809. 896 171. 52566. 439 171. 462627. 303 171. 462749. 031 171. 42840. 328 171. 492556. 295 171. 52607. 015 2536.007 171. 472576. 583 171.47 2586. 727 2688. 167 2779. 464 171. 482667. 879 171. 352759. 176 171. 42850. 472 171. 842951. 912 171.42 171. 432738. 888 171. 37 2820. 04 171.34 171. 37 2891.048 171. 412911. 336 171. 492931. 624 171. 72941. 768 171.93 172. 32 3022. 92 173. 363104. 073 2982.344 171. 943002. 632 172. 743033. 064 172. 833053. 353 172.83 173. 713114. 217 3063, 497 172. 963083. 784 173. 833225. 801 173.82 173. 083296. 809 172. 873306. 953 173. 313347. 529 173. 543357. 673 173. 523286. 665 173. 173337. 385 3246.089 172. 843317. 097 172.95 3327. 241 173. 713367. 817 173.91

```
Proposed - No-Rise
                           174. 693418. 537
3388. 105
          174. 353408. 393
                                           174. 833469. 258
                                                            174. 833479. 402
                                                                             174.75
 3499. 69
                           174. 253530. 122
                                           173. 953540. 266
          174. 443509. 834
                                                                             173.17
                                                            173. 68 3550. 41
                                           172. 75 3601. 13
1723814. 155
                                                            172. 323611. 274
172. 483824. 299
3560.554
          173.073570.698
                           173. 013580. 842
                                                                             171.99
3621. 418
          171. 833793. 866
                           171.83 3804.01
                                                                             172.83
                           173. 083895. 307
168. 953966. 315
3834.443
          173.023854.731
                                            173. 333905. 451
                                                            173. 333915. 595
                                                                             172.92
                                           166. 143976. 459
                                                            163. 943986. 603
3946.027
          170. 963956. 171
                                                                             161.01
    3990
          156. 844027. 179
                           159.874037.323
                                           161. 234047. 467
                                                            163. 494057. 611
                                                                             165.32
4067.755
                                                            172.024108.332
          167, 454077, 899
                           169, 434088, 043
                                              1714098. 188
                                                                             172.61
4118.476
          172. 844148. 908
                           173. 214169. 195
                                           173. 294189. 483
                                                            173. 334219. 916
                                                                             173.46
                           173. 544321. 356
4240. 204
          173. 584250. 348
                                           173.054341.644
                                                            173.014361.932
                                                                             172.89
          172. 634412. 652
                                           172.39 4432.94
4392.364
                           172. 494422. 796
                                                            172. 354463. 373
                                                                             172.47
          172. 724564. 813
172. 254716. 973
4544.524
                           172. 834635. 821
                                            172. 834645. 965
                                                            172. 814666. 253
                                                                             172.55
4696, 685
                           172. 114767. 693
                                            171. 864777. 837
                                                            171. 834798. 125
                                                                             171.83
                           171. 924869. 133
174. 775041. 582
                                           172. 824899. 565
175. 655051. 726
          171. 874828. 557
4818. 413
                                                            172. 85 4960. 43
                                                                             173.74
4980.718
          173. 92 5011. 15
                                                            175.83 5061.87
                                                                             175.83
Manning's n Values
                           num=
                     Sta n Val Sta
    Sta n Val
                                           n Val
           . 073966. 315 . 0454057. 611 . 07
                          Lengths: Left Channel
                                                   Ri ght
Bank Sta: Left Right
                                                              Coeff Contr.
                                                                              Expan.
      3966. 3154057. 611
                                                              . 3
                                    10 13
                                                    35
                                                                              . 5
                                 2
Ineffective Flow
                    num=
           Sta R
                    El ev
  Sta L
                          Permanent
            3985
                    177
                             F
    4035 5061.87
                     177
CROSS SECTION OUTPUT Profile #1%
                                  * E.G. Elev (ft)
                         * 174.72 * Element
                                                               * Left OB *
                                                                              Channel *
Right OB *
* Vel Head (ft)
                                     * Wt. n-Val.
                                                                               0.045
                               0.02
* W.S. Elev (ft)
                            174. 71
                                     * Reach Len. (ft)
                                                                   10.00
                                                                               13.00
  35.00 *
* Crit W.S. (ft)
                         * 160.74
                                     * Flow Area (sq ft)
                                                                              795.09
* E.G. Slope (ft/ft)
                        *0.000025
                                                               * 6076.27
                                     * Area (sq ft)
                                                                           * 1257.08
1948.73 *
* Q Total (cfs)
                             800.00
                                     * Flow (cfs)
                                                                              800.00
* Top Width (ft)
                         * 3891.49
                                     * Top Width (ft)
                                                               * 2848.91
                                                                               91.30
 951. 29 *
                         * 1.01
                                                                               1.01
* Vel Total (ft/s)
                                     * Avg. Vel. (ft/s)
* Max Chl Dpth (ft)
                             17.87
                                     * Hydr. Depth (ft)
                                                                               15.90
                          *161241.3
                                     * Conv. (cfs)
                                                                           *161241.3
* Conv. Total (cfs)
* Length Wtd. (ft)
                                     * Wetted Per. (ft)
                                                                               52.24
                              13.00
* Min Ch El (ft)
                            156. 84
                                     * Shear (lb/sq ft)
                                                                                0.02
                                     * Stream Power (lb/ft s) *
* Al pha
                               1.00
                                                                                0.02
* Frctn Loss (ft)
                               0.00
                                     * Cum Volume (acre-ft) *
                                                                  893.66 *
                                                                              231.42
1267. 77
                               0.00 * Cum SA (acres)
* C & E Loss (ft)
                                                                   97. 17 *
                                                                               10.93 *
104.70 *
```

Warning: Divided flow computed for this cross-section. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT P				ay ********	***	*****	***	*****	**
* E.G. Elev (ft)	*	175. 59	*	Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft) *	*	0. 01	*	Wt. n-Val.	*		*	0. 045	*
* W.S. Elev (ft)	*	175. 58	*	Reach Len. (ft)	*	10.00	*	13. 00	*
35.00 * * Crit W.S. (ft)	*	160. 74	*	Flow Area (sq ft)	*		*	838. 60	*
* E.G. Slope (ft/ft)	*0	. 000037	*	Area (sq ft)	*		*	838. 60	*
* Q Total (cfs)	*	800.00	*	Flow (cfs)	*		*	800.00	*
* Top Width (ft)	*	50.00	*	Top Width (ft)	*		*	50.00	*
* Vel Total (ft/s)	*	0. 95	*	Avg. Vel. (ft/s)	*		*	0. 95	*
* Max Chl Dpth (ft)	*	18. 74	*	Hydr. Depth (ft)	*		*	16. 77	*
* Conv. Total (cfs)	*1	31533. 3	*	Conv. (cfs)	*		*1	31533. 3	*
* Length Wtd. (ft)	*	13. 00	*	Wetted Per. (ft)	*		*	81. 00	*
* Min Ch El (ft)	*	156. 84	*	Shear (Ib/sq ft)	*		*	0. 02	*
* Al pha	*	1. 00	*	Stream Power (lb/ft s)	*		*	0. 02	*
* Frctn Loss (ft)	*	0.00	*	Cum Volume (acre-ft)	*	97. 80	*	236. 98	*
690.48 * * C & E Loss (ft) 28.87 * ***********************************	* ***	0.00		Cum SA (acres)	*	2. 30	*	10. 64	*

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT **********************************		*******	****	*****	*****	**
* E.G. Elev (ft) Right OB *	* 169.92	* Element	*	Left OB	* Channel	*
* Vel Head (ft)	* 0.11	* Wt. n-Val.	*		* 0.045	*
* W.S. Elev (ft) 35.00 *	* 169.81	* Reach Len. (ft)	*	10. 00	* 13.00	*
* Crit W.S. (ft)	* 161.78	* Flow Area (sq ft)	*		* 550. 24	*
* E.G. Slope (ft/ft)	*0.000276	* Area (sq ft)	*	24. 84	* 809. 99	*
49. 11 * * Q Total (cfs)	* 1450.00	* Flow (cfs)	*		* 1450.00	*
* Top Width (ft)	* 128.52	* Top Width (ft) Page 67	*	14. 48	* 91.30	*

22. 74 *			Op	osca - No-Ki sc					
* Vel Total (ft/s)	*	2. 64	*	Avg. Vel. (ft/s)	*		*	2. 64	*
* Max Chl Dpth (ft)	*	12. 97	*	Hydr. Depth (ft)	*		*	11. 00	*
* Conv. Total (cfs)	*	87303.4	*	Conv. (cfs)	*		*	87303. 4	*
* Length Wtd. (ft)	*	13. 00	*	Wetted Per. (ft)	*		*	52. 24	*
* Min Ch El (ft)	*	156. 84	*	Shear (Ib/sq ft)	*		*	0. 18	*
* Al pha *	*	1. 00	*	Stream Power (lb/ft s)	*		*	0. 48	*
* Frctn Loss (ft) 558.60 *	*	0.00	*	Cum Volume (acre-ft)	*	436. 81	*	164. 77	*
* C & E Loss (ft) 94.40 *	*	0. 02	*	Cum SA (acres)	*	58. 06	*	11. 05	*
*****	***	*****	**	*****	***	*****	**	*****	**
******									

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

# CROSS SECTION OUTPUT Profile #2%

****	***	****	<b>*</b> * :	******	* * :	*****	* * *	:*****	t <b>*</b>
**********  * E. G. El ev (ft)	*	173. 20	*	Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	*	0. 03	*	Wt. n-Val.	*		*	0. 045	*
* W.S. Elev (ft) 35.00 *	*	173. 18	*	Reach Len. (ft)	*	10.00	*	13.00	*
* Crit W.S. (ft)	*	161. 00	*	Flow Area (sq ft)	*		*	718. 60	*
* E.G. Slope (ft/ft) 580.63 *	*0	. 000049	*	Area (sq ft)	*	2276. 37	*	1117. 40	*
* Q Total (cfs)	*	950. 00	*	Flow (cfs)	*		*	950. 00	*
* Top Width (ft) 707.61 *	* .	2722. 11	*	Top Width (ft)	*	1923. 20	*	91. 30	*
* Vel Total (ft/s)	*	1. 32	*	Avg. Vel. (ft/s)	*		*	1. 32	*
* Max Chl Dpth (ft)	*	16. 34	*	Hydr. Depth (ft)	*		*	14. 37	*
* Conv. Total (cfs)	*13	36224. 0	*	Conv. (cfs)	*		* 1	136224. 0	*
* Length Wtd. (ft)	*	13.00	*	Wetted Per. (ft)	*		*	52. 24	*
* Min Ch El (ft)	*	156. 84	*	Shear (Ib/sq ft)	*		*	0. 04	*
* Al pha	*	1. 00	*	Stream Power (Ib/ft s)	*		*	0.06	*
* Frctn Loss (ft) 1047.14 *	*	0.00	*	Cum Volume (acre-ft)	*	731. 64	*	211. 48	*
* C & E Loss (ft) 101.74 *	*	0. 01		Cum SA (acres)	*	83. 85	*	10. 93	*
*****************************	(**:	*****	× * :	* * * * * * * * * * * * * * * * * * * *	* * :	*****	< * *	:*****	*

Warning: Divided flow computed for this cross-section. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

### Proposed - No-Rise CROSS SECTION OUTPUT Profile #0.2%

*****		*****	*:	*****	* * ז	****	***	*****	**
*****									
* E.G. Elev (ft) Right OB *	*	178. 48	*	Element	*	Left O	3 *	Channel	*
* Vel Head (ft) 0.070 *	*	0.00	*	Wt. n-Val.	*	0. 070	*	0. 045	*
* W. S. Elev (ft) 35.00 *	*	178. 48	*	Reach Len. (ft)	*	10.00	*	13.00	*
* Crit W.S. (ft) 5699.50 *	*	160. 54	*	Flow Area (sq ft)	*1	18501. 64	*	1601. 44	*
* E.G. Slope (ft/ft) 5699.50 *	*(	0.00000	*	Area (sq ft)	*1	18501. 64	*	1601. 44	*
* Q Total (cfs) 140.22 *	*	700. 00	*	Flow (cfs)	*	432. 47	*	127. 32	*
* Top Width (ft) 1004.26 *	*	4642. 40	*	Top Width (ft)	*	3546. 85	*	91. 30	*
* Vel Total (ft/s)	*	0. 03	*	Avg. Vel. (ft/s)	*	0. 02	*	0. 08	*
* Max Chl Dpth (ft)	*	21. 64	*	Hydr. Depth (ft)	*	5. 22	*	17. 54	*
* Conv. Total (cfs)	* *	1917480. 0	,	* Conv. (cfs)	7	*1184633.	0	*348749.	2
* Length Wtd. (ft)	*	14. 28	*	Wetted Per. (ft)	*	3547. 99	*	94. 55	*
* Min Ch El (ft)	*	156. 84	*	Shear (Ib/sq ft)	*	0.00	*	0. 00	*
* Al pha	*	2. 19	*	Stream Power (Ib/ft s)	*	0.00	*	0.00	*
* Frctn Loss (ft)	*	0.00	*	Cum Volume (acre-ft)	*	1379. 92	*	280. 77	*
1852.62 * * C & E Loss (ft)	*	0.00	*	Cum SA (acres)	*	126. 42	*	11. 26	*
126. 19 *	**	******	* *	* * * * * * * * * * * * * * * * * * * *	**	******	***	******	**
****					,				^

Warning: Divided flow computed for this cross-section. Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

# CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1 RS: 246

I NPUT

Description: XS 246

CHANNEL REACH DISTANCE ADJUSTED PER PROPOSED RUNWAY

BRI DGE

THIS IS THE CROSS SECTION BETWEEN THE RUNWAYS Station Elevation Data num= 390

Station E	revation	Data	num=	390									
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev				
*******************													
0	182. 87	3. 28	182. 74	26. 25	182. 47	32.81	182. 48	39. 37	182. 27				
45. 93	182. 32	52. 49	182. 57	68. 89	182. 21	75. 46	182. 31	98. 42	181. 7				
104. 98	181. 75	118. 1	181. 4	124. 67	181. 5	137. 79	181. 21	141. 07	181. 22				
147. 63	180. 96	154. 19	180. 94	164. 03	181. 1	170. 59	181	180. 44	181. 01				
				Pac	ne 69								

Proposed - No-Rise 180.87 203.4 187 180.79 193.56 180.77 206.68 180.63 213.24 180.62 180. 87 180. 29 179. 86 179. 19 178. 75 178. 25 226. 37 236. 21 288. 7 337. 91 390. 4 180.39 262.45 179.99 269.01 179.82 242.77 180.09 179. 38 179. 14 178. 58 178. 27 282. 14 331. 35 374 179. 68 179. 41 178. 7 178. 62 179. 61 179. 36 178. 52 295. 26 344. 47 311. 66 351. 03 179.57 321.51 367. 43 410. 08 178.98 400. 24 406.8 178.44 178. 32 178. 44 177. 99 177. 4 413.36 426.49 436.33 459.29 446.17 178.26 472. 42 538. 03 567. 56 465.85 178.16 178. 2 482.26 498.66 178.02 511.78 177.68 177.63 177. 53 518.35 177.79 544.59 547.87 554.43 177.51 560.99 177. 29 590.52 177.31 583.96 177.13 177.26 597.08 177 177. 31 176. 71 176. 53 176. 05 175. 7 175. 49 636. 45 669. 26 705. 34 744. 71 643. 01 679. 1 176. 42 176. 28 610.2 613.48 629.89 176.5 176.54 176.83 176. 54 176. 41 175. 99 175. 71 175. 37 175. 06 174. 87 174. 74 656. 13 685. 66 725. 03 757. 83 800. 48 662. 69 692. 22 731. 59 767. 68 810. 32 665. 98 698. 78 734. 87 777. 52 826. 73 176.64 176.6 176. 6 176. 17 175. 86 175. 62 175. 36 176. 36 175. 86 175. 76 175. 45 708. 62 751. 27 790. 64 846. 41 176. 29 176. 09 175. 82 175. 28 175. 11 784. 08 833. 29 175. 36 826. 73 175. 07 869. 38 174. 88 908. 74 174. 46 957. 95 174. 13 997. 32 174. 11 1033. 41 173. 77 1076. 06 173. 68 1125. 27 173. 53 1177. 76 173. 17 1226. 97 172. 86 1279. 46 173. 15 1312. 27 175. 45 810. 32 175. 25 866. 1 175. 11 898. 9 174. 67 951. 39 174. 32 987. 48 174. 12 1026. 85 173. 94 1069. 5 173. 66 1121. 99 173. 35 1167. 92 173. 37 1220. 41 889. 06 928. 43 977. 64 875. 94 921. 87 175. 16 174.99 856.25 174. 94 174. 41 892.34 174.85 174. 94 921. 87 174. 41 964. 52 174. 4 1007. 16 173. 92 1043. 25 173. 73 1079. 34 173. 55 1135. 11 173. 28 1187. 6 173. 18 1233. 53 944. 83 174.28 174. 51 977. 64 174. 13 1017. 01 173. 95 1049. 81 173. 84 1099. 02 173. 43 1144. 95 173. 38 1207. 29 173. 04 1240. 09 174. 26 173. 75 980. 92 1020. 29 1062. 94 1112. 15 1148. 23 173. 88 173. 46 173. 28 1213.85 173.24 172. 86 1279. 46
173. 15 1312. 27
173. 23 1348. 35
173. 49 1400. 84
174. 52 1463. 18
175. 07 1541. 91
174. 39 1574. 72
173. 29 1617. 37
173. 15 1666. 58
172. 72 1719. 07
172. 97 1755. 16
172. 45 1797. 81
172 1840. 46
172. 19 1892. 95
171. 77 1938. 88
171. 74 1981. 52
171. 54 2027. 45
171. 38 2066. 82 173. 19 1292. 58 1249.93 172. 91 1263. 06 173.02 1286.02 172.93 1299. 14 1335. 23 172. 95 1305. 71 173. 07 1341. 79 173. 09 1322. 11 173. 07 1361. 48 173. 14 1328. 67 173. 14 1371. 32 173.27 173. 07 1341. 79
173. 21 1391
174. 4 1446. 77
175. 2 1522. 23
174. 46 1568. 16
173. 63 1607. 53
172. 92 1653. 46
172. 85 1699. 39
173. 01 1751. 88
172. 8 1784. 68
172. 24 1833. 89
172. 1 1876. 54
171. 88 1932. 31
171. 84 1968. 4
171. 47 2017. 61
171. 58 2056. 98 173.03 173. 07 1361. 48 173. 43 1407. 41 174. 63 1489. 42 174. 97 1548. 48 174. 45 1581. 28 173. 14 1620. 65 172. 94 1679. 7 172. 68 1725. 63 173. 14 1371. 32 173. 73 1423. 81 175. 11 1499. 27 174. 72 1555. 04 174. 14 1587. 84 173. 26 1637. 05 173. 04 1682. 98 173. 03 174. 31 175. 09 174. 78 174. 18 173. 07 172. 89 1384. 44 1443. 49 1505. 83 1561. 6 1600.97 1640.33 1692.83 172.78 1738.75 172.77 1692. 83 1745. 32 1778. 12 1827. 33 1869. 98 1912. 63 1965. 12 2007. 77 172. 68 1725. 63 172. 81 1765 172. 5 1807. 65 172. 1 1847. 02 172 1896. 23 171. 55 1948. 72 171. 78 1991. 37 171. 39 2034. 02 172. 86 1771. 56 172. 26 1814. 21 172. 65 172. 35 172. 25 1614. 21 172. 05 1856. 86 172. 12 1909. 35 171. 93 1955. 28 171. 63 2001. 21 172.21 172.03 171. 8 171. 68 171. 65 2040. 58 171.49 171. 42 2073. 38 171. 29 2109. 47 171. 36 2155. 4 171. 29 2211. 17 2047.14 171.58 2056.98 171. 38 2066. 82 171. 26 2079. 95 171.4 171. 26 2079. 95 171. 45 2129. 16 171. 24 2175. 09 171. 4 2230. 86 171. 2 2293. 19 171. 15 2352. 24 171. 612421. 056 171. 842481. 583 171. 232572. 373 171. 072703. 513 171. 09 2804. 39 171. 35 2096. 35 171. 19 2142. 28 171. 28 2191. 49 2089.79 171.51 2102.91 171.28 2132. 44 2184. 93 2240. 7 2306. 31 171. 22 2148. 84 171. 4 2204. 61 171.35 171. 22 171. 4 2204. 61 171. 56 2280. 07 171. 31 2322. 72 171. 492400. 881 171. 882461. 407 171. 382521. 934 171. 29 2211. 17 171. 36 2286. 63 171. 2 2335. 84 171. 522410. 969 171. 872471. 495 171. 292542. 109 171. 32 2253. 82 171. 17 2312. 87 171. 59 2388. 33 171. 862441. 232 171. 24 171. 47 171. 81 171. 69 2378. 49 2431. 144 2491. 671 171. 52511. 846 171.17 171. 18 2673. 25 171. 032794. 303 171. 062905. 268 171. 682965. 794 2592.548 171. 22612. 723 171. 162622. 811 171.1 171. 082753. 952 171. 092885. 092 171. 612955. 707 171. 09 2804. 39 171. 122925. 443 171. 832975. 882 171.07 2723.688 171.062743.864 2814. 478 2935. 531 171. 092844. 741 171. 492945. 619 171.33 171.83 171. 612935. 707 172. 693036. 408 173. 833217. 988 172. 833328. 953 174. 62 3429. 83 174. 313550. 883 171. 863026. 321 173. 78 3117. 11 172. 993288. 602 174. 123419. 742 172.97 2985.97 172. 833056. 584 172. 833066. 672 3107. 022 3278. 514 3389. 479 173. 713268. 426 173. 13369. 304 174. 833490. 356 173. 643571. 058 173.833228.075 173.11 172. 833339. 041 174. 773439. 918 173. 7 174. 83 3500.444 174. 763530. 708 173. 793560. 971 173.45 171. 833671. 936 172. 253792. 989 171.83 3581.146 173. 153601. 322 172. 513611. 409 172. 13621. 497 171. 963722. 374 172. 263813. 164 171. 963762. 725 172.083782.901 3712. 287 172.22 172. 493823. 252 173. 223883. 778 172.83 3833.34 172. 973843. 427 3803.076 173.16 3853.515 173. 12 3873. 69 173. 293893. 866 173. 333903. 954 173.11

```
Proposed - No-Rise
3944. 305
3994. 743
           170. 493954. 392
                             168. 58 3964. 48
                                              165. 943974. 568
                                                                163. 353984. 656
                                                                                   161. 1
                             156. 84014. 919
                                              159. 834025. 006
                                                                160. 134035. 094
           159.83
                    4012
                                                                                  161. 35
                                              168. 744085. 533
173. 194135. 972
174. 534257. 024
                                                                170. 344095. 621
173. 374156. 147
174. 534287. 288
173. 474428. 516
4045. 182
4105. 708
           163. 52 4055. 27
172. 444115. 796
                             165. 274075. 445
172. 934125. 884
                                                                                  171.87
                                                                                  173.66
4176. 322
           173.85 4186.41
                                1744246. 937
                                                                                  174.28
4307.463
                             174. 024367. 989
                                                173. 94418. 428
           174.094317.551
                                                                                  173.36
4438.604
           173. 314448. 691
                             173. 394519. 306
                                               173.694529.393
                                                                173. 724579. 832
                                                                                   173.7
4640.358
           173. 784670. 622
                             173. 774751. 323
                                               173. 234761. 411
                                                                173. 154771. 499
                                                                                  173.13
4781.586
           173. 074791. 674
                             173. 114801. 762
                                                173. 14821. 938
                                                                172. 854842. 113
                                                                                  172.68
4872. 376
4973. 253
           172. 834882. 464
                             172. 94912. 727
                                               173. 264932. 903
                                                                173. 464963. 166
                                                                                  173.85
                                              174. 835023. 692
           174.064993.429
                             174. 415013. 604
                                                                175. 25 5033. 78
                                                                                  175.75
Manning's n Values
                             num=
n Val
            . 07 3964. 48
                              . 045 4055. 27 . 07
                                                                  Coeff Contr.
Bank Sta: Left
                  Ri ght
                             Lengths: Left Channel
                                                       Ri ght
                                                                                   Expan.
       3964. 48 4055. 27
                                          5 10
                                                          35
                                                                    . 3
                                                                                     . 5
Ineffective Flow
                                   2
                      num=
            Sta R
                      Elev
                             Permanent
   Sta L
             3972
                       180
                                F
    4052 5033.78
                       180
CROSS SECTION OUTPUT Profile #1%
                                    ..
********************
* E.G. Elev (ft)
                           * 174.72 * Element
                                                                       Left OB *
                                                                                   Channel *
Right OB *
  Vel Head (ft)
                                        * Wt. n-Val.
                                                                                    0.045
                                 0.01
* W.S. Elev (ft)
                                                                         5.00
                               174.71
                                        * Reach Len. (ft)
                                                                                    10.00
  35. 00 *
 Crit W.S. (ft)
                           * 161.57
                                        * Flow Area (sq ft)
                                                                                * 1114, 41
* E.G. Slope (ft/ft)
                           *0.000015
                                        * Area (sq ft)
                                                                    * 6467.22
                                                                                * 1219.42
1246. 26
* Q Total (cfs)
                               800.00
                                        * Flow (cfs)
                                                                                   800.00
* Top Width (ft)
                           * 3899.97
                                        * Top Width (ft)
                                                                     2856. 58
                                                                                    90.79
 952.60 *
* Vel Total (ft/s)
                                0.72
                                        * Avg. Vel. (ft/s)
                                                                                      0.72
* Max Chl Dpth (ft)
                                17. 91
                                        * Hydr. Depth (ft)
                                                                                     13.93
                                                                                *208928.9
* Conv. Total (cfs)
                            *208928.9
                                        * Conv. (cfs)
* Length Wtd. (ft)
                                10.00
                                        * Wetted Per. (ft)
                                                                                    82.37
                                        * Shear (lb/sq ft)
                                                                                      0.01
* Min Ch El (ft)
                               156. 80
* Al pha
                                 1.00
                                        * Stream Power (lb/ft s) *
                                                                                      0.01
                                       * Cum Volume (acre-ft)
* Frctn Loss (ft)
                                 0.00
                                                                       892. 22
                                                                                   231.05
1266. 49
* C & E Loss (ft)
                                 0.01 * Cum SA (acres)
                                                                        96. 51
                                                                                     10.90
 103.93
```

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

Proposed - No-Rise
1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS	SECTI ON	OUTPUT	Profile	#FI oodway

*****	* * *	*****	**	*******	***	*****	* * *	*****	* *
**********  * E. G. El ev (ft)	*	175. 59	*	Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft) *	*	0. 01	*	Wt. n-Val.	*		*	0. 045	*
* W.S. Elev (ft) 35.00 *	*	175. 58	*	Reach Len. (ft)	*	5. 00	*	10.00	*
* Crit W.S. (ft)	*	161. 57	*	Flow Area (sq ft)	*		*	1183. 98	*
* E.G. Slope (ft/ft)	*0	. 000017	*	Area (sq ft)	*		*	1183. 98	*
* Q Total (cfs)	*	800.00	*	Flow (cfs)	*		*	800.00	*
* Top Width (ft)	*	80.00	*	Top Width (ft)	*		*	80.00	*
* Vel Total (ft/s)	*	0. 68	*	Avg. Vel. (ft/s)	*		*	0. 68	*
* Max Chl Dpth (ft)	*	18. 78	*	Hydr. Depth (ft)	*		*	14. 80	*
* Conv. Total (cfs)	*1	96812. 7	*	Conv. (cfs)	*		*1	196812. 7	*
* Length Wtd. (ft)	*	10.00	*	Wetted Per. (ft)	*		*	104. 82	*
* Min Ch El (ft)	*	156. 80	*	Shear (Ib/sq ft)	*		*	0. 01	*
* Al pha *	*	1. 00	*	Stream Power (lb/ft s)	*		*	0. 01	*
* Frctn Loss (ft) 690.48 *	*	0.00	*	Cum Volume (acre-ft)	*	97. 80	*	236. 67	*
* C & E Loss (ft)	*	0. 01	*	Cum SA (acres)	*	2. 30	*	10. 62	*
28. 87 * ******************	***	****	**	******	***	****	* * *	*****	* *
*****									

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# CROSS SECTION OUTPUT Profile #10%

**************************	******************							
* E.G. Elev (ft)	* 169.89	* Element	*	Left OB	* Channel	*		
Right OB * * Vel Head (ft)	* 0.06	* Wt. n-Val.	*		* 0.045	*		
* W.S. Elev (ft)	* 169.83	* Reach Len. (ft)	*	5. 00	* 10.00	*		
35.00 * * Crit W.S. (ft)	* 162.57	* Flow Area (sq ft)	*		* 723. 93	*		
* E.G. Slope (ft/ft)	*0.000203	* Area (sq ft)	*	30. 05	* 776. 28	*		
60.73 * * 0 Total (cfs)	* 1450.00	* Flow (cfs)	*		* 1450.00	*		
* Top Width (ft) 27.05 *	* 134.52	* Top Width (ft)	*	16. 69	* 90.79	*		

* Vel Total (ft/s)	*	Pr 2. 00		osed - No-Rise Avg. Vel. (ft/s)	*		*	2. 00	*
*		2.00		7.1.g. voi. (1.2,3)				2.00	
* Max Chl Dpth (ft)	*	13. 03	*	Hydr. Depth (ft)	*		*	9. 05	*
* Conv. Total (cfs)	*1	01800. 5	*	Conv. (cfs)	*		*1	01800. 5	*
* Length Wtd. (ft)	*	10.00	*	Wetted Per. (ft)	*		*	82. 37	*
* Min Ch El (ft)	*	156. 80	*	Shear (Ib/sq ft)	*		*	0. 11	*
* Al pha *	*	1. 00	*	Stream Power (lb/ft s)	*		*	0. 22	*
* Frctn Loss (ft) 558.56 *	*	0.00	*	Cum Volume (acre-ft)	*	436. 80	*	164. 54	*
* C & E Loss (ft) 94.38 *	*	0. 05	*	Cum SA (acres)	*	58. 05	*	11. 03	*
*****	***	*****	* *	******	* * *	*****	* * *	*****	* *
*****									

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# 

******			~ ~ .	* * * * * * * * * * * * * * * * * * * *	~ ~ .				
*********  * E.G. Elev (ft)	*	173. 20	*	Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	*	0. 01	*	Wt. n-Val.	*		*	0. 045	*
* W.S. Elev (ft) 35.00 *	*	173. 18	*	Reach Len. (ft)	*	5. 00	*	10.00	*
* Crit W.S. (ft)	*	161. 84	*	Flow Area (sq ft)	*		*	992. 20	*
* E.G. Slope (ft/ft) 234.23 *	*0	. 000030	*	Area (sq ft)	*	2639. 10	*	1080. 73	*
* 0 Total (cfs)	*	950. 00	*	Flow (cfs)	*		*	950.00	*
* Top Width (ft) 219.37 *	*	2341. 40	*	Top Width (ft)	*	2031. 24	*	90. 79	*
* Vel Total (ft/s)	*	0. 96	*	Avg. Vel. (ft/s)	*		*	0. 96	*
* Max Chl Dpth (ft)	*	16. 38	*	Hydr. Depth (ft)	*		*	12. 40	*
* Conv. Total (cfs)	*1	72156. 2	*	Conv. (cfs)	*		*1	172156. 2	*
* Length Wtd. (ft)	*	10. 00	*	Wetted Per. (ft)	*		*	82. 37	*
* Min Ch El (ft)	*	156. 80	*	Shear (Ib/sq ft)	*		*	0. 02	*
* Al pha *	*	1. 00	*	Stream Power (Ib/ft s)	*		*	0. 02	*
* Frctn Loss (ft) 1046.82 *	*	0. 00	*	Cum Volume (acre-ft)	*	731. 08	*	211. 15	*
* C & E Loss (ft) 101.36 *	*	0. 01	*	Cum SA (acres)	*	83. 39	*	10. 90	*
******	* * *	****	* * :	*****	* * :	****	* * *	******	* *
*****									

Warning: Divided flow computed for this cross-section. Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) Page 73

is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

		le #0.2%	**:	*******	* * :	*****	k * *	******	* *
****									
* E.G. Elev (ft) Right OB *	*	178. 48	*	Element	*	Left OB	*	Channel	*
* Vel Head (ft)	*	0.00	*	Wt. n-Val.	*		*	0. 045	*
* W.S. Elev (ft)	*	178. 47	*	Reach Len. (ft)	*	5.00	*	10.00	*
35.00 * * Crit W.S. (ft)	*	161. 39	*	Flow Area (sq ft)	*		*	1415. 49	*
* E.G. Slope (ft/ft)	*0	. 000005	*	Area (sq ft)	*	18889. 58	*	1561. 11	*
4917.20 * * Q Total (cfs)	*	700.00	*	Flow (cfs)	*		*	700. 00	*
* Top Width (ft) 978.51 *	*	4616. 67	*	Top Width (ft)	*	3547. 37	*	90. 79	*
* Vel Total (ft/s)	*	0. 49	*	Avg. Vel. (ft/s)	*		*	0. 49	*
* Max Chl Dpth (ft)	*	21. 67	*	Hydr. Depth (ft)	*		*	17. 69	*
* Conv. Total (cfs)	*3	11242. 8	*	Conv. (cfs)	*		* 3	311242. 8	*
* Length Wtd. (ft)	*	9. 75	*	Wetted Per. (ft)	*		*	82. 37	*
* Min Ch El (ft)	*	156. 80	*	Shear (Ib/sq ft)	*		*	0. 01	*
* Al pha	*	1. 00	*	Stream Power (Ib/ft s)	*		*	0. 00	*
* Frctn Loss (ft) 1848.35 *	*	0.00	*	Cum Volume (acre-ft)	*	1375. 63	*	280. 30	*
* C & E Loss (ft) 125.39 *	*	0.00	*	Cum SA (acres)	*	125. 61	*	11. 23	*
******	* * *	*****	* * :	****	* * :	*****	**	******	<b>*</b> *

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

#### CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 245

I NPUT

Description: XS 245

LOW CHORD ELEVATION REVISED TO MATCH PROPOSED BRIDGE

PLAN

THIS IS THE U/S FACE OF THE SMALL RUNWAY Station Elevation Data num= 389

El ev Sta Elev Sta El ev Sta El ev Sta El ev Sta Page 74

182.87 3.28 182.74 26.25 182.47 32.81 182.48 39.37 182.27 0 45. 93 104. 98 147. 63 187 182. 32 181. 75 180. 96 180. 79 52. 49 118. 1 154. 19 193. 56 75. 46 137. 79 170. 59 182. 57 181. 4 182. 21 181. 5 182. 31 181. 21 98.42 181. 7 181. 22 68.89 124. 67 164. 03 141.07 180. 94 180. 87 181. 1 180. 77 180.44 181 181.01 203.4 206.68 180.63 213.24 180.62 179.82 226.37 180.39 236. 21 180.29 242.77 180.09 262.45 179.99 269.01 282. 14 288. 7 337. 91 179. 38 179.68 179.86 295.26 179.61 311.66 321.51 179.57 331.35 179. 41 179.19 344.47 179.36 351.03 179.14 178.98 367.43 179. 19 178. 75 178. 25 178. 2 177. 63 177. 31 176. 71 178. 7 178. 62 406. 8 446. 17 178. 58 178. 27 374 390. 4 400.24 178.52 410.08 178.44 178. 52 178. 44 177. 99 177. 4 177. 13 176. 5 413. 36 436. 33 482. 26 544. 59 459. 29 511. 78 554. 43 426.49 178.26 178. 27 178. 02 177. 53 177. 26 176. 54 176. 28 465. 85 518. 35 560. 99 610. 2 178. 16 177. 79 177. 29 176. 83 498. 66 547. 87 590. 52 472. 42 538. 03 567. 56 613. 48 665. 98 698. 78 734. 87 777. 52 826. 73 869. 38 908. 74 957. 95 997. 32 177. 68 177. 51 583. 96 629. 89 597. 08 177 177 176. 42 636. 45 679. 1 708. 62 643.01 176. 41 175. 99 176.64 669. 26 176.36 656.13 176. 6 685.66 176.17 692.22 176.05 705.34 725.03 175.86 176. 09 175. 82 175. 28 175. 11 174. 99 174. 85 175. 71 175. 37 175. 06 731. 59 175. 7 175.86 757. 83 751.27 744.71 175.76 175. 86 175. 62 175. 36 175. 16 174. 94 174. 41 784. 71 784. 08 833. 29 875. 94 921. 87 175. 49 175. 36 790. 64 767.68 800.48 175.45 856. 25 892. 34 944. 83 810.32 846.41 175.25 174. 87 174. 74 174. 51 866. 1 898. 9 951. 39 175. 07 174. 88 889. 06 928. 43 175. 11 174. 67 174. 94 921. 87 174. 41 964. 52 174. 4 1007. 16 173. 92 1043. 25 173. 84 1099. 02 173. 43 1144. 95 173. 38 1207. 29 173. 04 1240. 09 173. 19 1292. 58 173. 14 1328. 67 173. 14 1371. 32 173. 73 1423. 81 175. 11 1499. 27 174. 72 1555. 04 174. 28 980. 92 174. 26 1020. 29 174. 46 977. 64 174.32 987.48 174.13 174. 13 1017. 01 174.12 174. 11 1033. 41 173. 73 1079. 34 173. 55 1135. 11 173. 28 1187. 6 173. 18 1233. 53 173. 02 1286. 02 173. 09 1322. 11 173. 07 1361. 48 173. 43 1407. 41 174. 63 1489. 42 174. 97 1548. 48 174. 45 1581. 28 173. 14 1620. 65 172. 94 1679. 7 172. 68 1725. 63 172. 81 1765 172. 1 1847. 02 172 1896. 23 173. 95 1049. 81 1026.85 174. 11 1033. 41 173.75 1062.94 173.94 173. 66 1121. 99 173. 35 1167. 92 173.88 1112.15 1076.06 173.68 173. 88 1112. 15 173. 46 1148. 23 173. 28 1213. 85 173. 24 1249. 93 172. 93 1299. 14 173. 27 1335. 23 173. 03 1384. 44 174. 31 1443. 49 175. 09 1505. 83 1125. 27 1177. 76 1226. 97 1279. 46 1312. 27 1348. 35 173.53 173. 35 1167. 92 173. 37 1220. 41 172. 91 1263. 06 172. 95 1305. 71 173. 07 1341. 79 173. 21 1391 174. 4 1446. 77 175. 2 1522. 23 173. 17 172. 86 173. 15 173. 23 173. 49 174. 52 1400.84 1463.18 175.07 175. 09 1505. 83 174. 78 1561. 6 174. 18 1600. 97 173. 07 1640. 33 172. 89 1692. 83 172. 77 1745. 32 172. 65 1778. 12 172. 35 1827. 33 172. 21 1869. 98 175. 11 1499. 27 174. 72 1555. 04 174. 14 1587. 84 173. 26 1637. 05 173. 04 1682. 98 172. 78 1738. 75 172. 86 1771. 56 172. 26 1814. 21 1541. 91 1574. 72 1617. 37 1666. 58 174.39 174.46 1568.16 173.63 1607.53 173. 29 173. 63 1607. 53 172. 92 1653. 46 172. 85 1699. 39 173. 01 1751. 88 172. 8 1784. 68 172. 24 1833. 89 173.15 172. 72 172. 97 1719. 07 1755. 16 172.45 1797.81 172 172. 05 1856. 86 172. 12 1909. 35 171. 93 1955. 28 1840.46 172. 1 1876. 54 172.19 172 1896. 23 171. 55 1948. 72 171. 78 1991. 37 171. 88 1932. 31 172.03 1912.63 1892.95 172. 03 1912. 63 171. 8 1965. 12 171. 68 2007. 77 171. 49 2047. 14 171. 4 2089. 79 171. 28 2132. 44 171. 35 2184. 93 171. 22 2240. 7 171. 24 2306. 31 171. 47 2378. 49 171 742427. 229 171.77 1938.88 171. 84 1968. 4 171.74 1981. 52 171. 63 2001. 21 171. 47 2017. 61 171. 63 2001. 21
171. 65 2040. 58
171. 26 2079. 95
171. 45 2129. 16
171. 24 2175. 09
171. 4 2230. 86
171. 2 2293. 19
171. 15 2352. 24
171. 542417. 074
171. 73 2498. 32
171. 232549. 099
171. 16 2640. 5
171. 062742. 058
171. 1 2833. 46
171. 212924. 862
171. 832975. 641 171.54 171. 47 2017. 61 171. 58 2056. 98 171. 35 2096. 35 171. 19 2142. 28 171. 28 2191. 49 171. 32 2253. 82 171. 17 2312. 87 171. 59 2388. 33 171. 76 1991. 37 171. 39 2034. 02 171. 42 2073. 38 171. 29 2109. 47 171. 36 2155. 4 171. 29 2211. 17 2027. 45 2066. 82 171.38 171. 51 171. 22 171. 4 2102. 91 2148. 84 2204.61 171.56 171. 29 2211. 17 171. 36 2286. 63 171. 2 2335. 84 171. 562406. 918 171. 852478. 008 171. 292538. 943 171. 22610. 033 171. 12721. 747 171. 062813. 149 2280.07 171.31 2322.72 171.49 171. 47 2378. 49 171. 742427. 229 171. 432508. 476 171. 23 2569. 41 171. 162670. 968 171. 082752. 214 171. 072843. 616 2401.45 171. 852457. 697 171.88 2467. 853 171. 432518. 631 171. 29 171. 172579. 566 171. 08 2691. 28 171. 042792. 837 171. 092884. 239 2528. 787 2589. 722 2711. 591 2802. 993 171.17 171.08 171. 09 171. 06 2904. 551 171. 332935. 018 171. 482945. 174 171. 122914. 707 171.6 171. 86 3026. 42 173. 793117. 822 2955.33 171. 682965. 485 171. 832975. 641 171. 832985. 797 172.69 172. 833067. 043 172. 983107. 666 3036.576 172. 833056. 887 173.83 172. 833341. 249 174. 813493. 585 3219.38 173.833270.158 173.09 3290.47 172. 833331. 093 173.15 173. 533381. 872 173. 973422. 495 174. 673432. 651 3361.56 174.83

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Proposed - No-Rise
3503.741
           174. 713524. 053
                             174. 413534. 208
                                               174. 223544. 364
                                                                 173. 94 3554. 52
                                                                                    173.72
3564.676
                             173. 343595. 143
                                               172. 723605. 299
                                                                  172. 373615. 455
            173. 63574. 832
                                                                                    171.85
                                                                  171. 953727. 168
172. 253798. 259
173. 113859. 193
           171. 833676. 389
172. 063767. 791
172. 27 3818. 57
173. 333899. 816
                             171. 843686. 545
172. 113777. 947
172. 743828. 726
                                               171. 893706. 857
172. 213788. 103
172. 853838. 882
3666. 234
                                                                                    171.97
3757. 635
3808. 414
                                                                                    172.22
                                                                                    173.13
 3889.66
                              173. 33940. 439
                                                170. 553950. 595
                                                                  169. 153960. 751
                                                                                    166.96
                                                                   156. 84021. 686
3970.907
           164. 573981. 063
                             162. 183991. 218
                                                159.83
                                                        4016
                                                                                    159.83
                                                 164. 74062. 309
                                                                  166. 394072. 464
4031.841
           160. 714041. 997
                             162. 884052. 153
                                                                                    167.98
 4082.62
           169. 464092. 776
                              171. 44102. 932
                                                172. 834113. 087
                                                                  172. 974123. 243
                                                                                    173.39
                                                                  174. 494255. 268
           173. 654143. 555
                                               174. 314184. 178
175. 114397. 449
4133. 399
                             173.834174.022
                                                                                    175.28
4265. 424
                             175. 324306. 047
                                                                  175. 084417. 761
           175.34 4275.58
                                                                                    174.99
                                               175. 054509. 163
175. 044752. 901
174. 234874. 771
174. 77 4996. 64
                                                                  175. 14600. 564
174. 774793. 524
173. 964884. 926
                                                                                    175.07
4438.072
           174. 854448. 228
                             174. 854488. 851
           175. 134691. 966
174. 794854. 459
173. 714915. 394
                             175. 124712. 278
174. 324864. 615
173. 794986. 484
4641. 188
4813. 836
                                                                                    174.73
                                                                                    173.83
4905. 238
                                                                  175. 085006. 795
                                                                                    175.55
5016, 951
           175. 885027. 107
                             176. 025047. 418
                                                176. 2 5067. 73
                                                                  176.26
Manning's n Values
                             num=
. 073970. 907
                              . 0454052. 153 . 07
                             Lengths: Left Channel Right Coeff Contr. Expan.
      sta: Left Ri ght
3970. 9074052. 153
Bank Sta: Left
                                                           230
                                         230
                                              230
Ineffective Flow num=
                                    2
            Sta R
                      El ev
                             Permanent
   Sta L
             3996
                     176.9
       0
    4031 5067.73
                     176.6
CROSS SECTION OUTPUT Profile #1%
* E.G. Elev (ft)
                        * 174.71 * Element
                                                                        Left OB *
                                                                                     Channel *
Right OB *
* Vel Head (ft)
                           * 0.03
                                         * Wt. n-Val.
                                                                                      0.045
* W.S. Elev (ft)
                           * 174.68
                                        * Reach Len. (ft)
                                                                          50.00 *
                                                                                      50.00
  50.00 *
* Crit W.S. (ft)
                           * 161. 20
                                        * Flow Area (sq ft)
                                                                                     560.75
* E.G. Slope (ft/ft)
                          *0.000048
                                         * Area (sq ft)
                                                                     * 6449.75
                                                                                  * 1140.07
 456. 54 *
* Q Total (cfs)
                               800.00
                                         * Flow (cfs)
                                                                                     800.00
                       * 3240.13
* Top Width (ft)
                                         * Top Width (ft)
                                                                     * 2853.20
                                                                                      81. 25
 305.68 *
* Avg. Vel. (ft/s)
                                                                                       1.43
* Max Chl Dpth (ft)
                                17.88
                                         * Hydr. Depth (ft)
                                                                                      16.02
* Conv. Total (cfs)
                       *115611. 3
                                         * Conv. (cfs)
                                                                                  *115611.3
                                         * Wetted Per. (ft)
                                                                                      35.94
* Length Wtd. (ft)
                                50.00
* Min Ch El (ft)
                            * 156.80
                                        * Shear (lb/sq ft)
                                                                                       0.05
* Al pha
                                 1.00
                                        * Stream Power (lb/ft s) *
                                                                                       0.07
* Frctn Loss (ft)
                                 0.00 * Cum Volume (acre-ft) *
                                                                        891.48 *
                                                                                     230. 78
1265. 81 *
* C & E Loss (ft)
                                  0.01 * Cum SA (acres)
                                                                          96. 18
                                                                                      10.88
```

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Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

#### CROSS SECTION OUTPUT Profile #Floodway

****	* * *	****	* *	*******	***	*****	* *	*****	<b>*</b> *
*********  * E. G. El ev (ft)	*	175. 58	*	Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft) *	*	0. 03	*	Wt. n-Val.	*		*	0. 045	*
* W.S. Elev (ft) 50.00 *	*	175. 55	*	Reach Len. (ft)	*	50.00	*	50.00	*
* Crit W.S. (ft)	*	161. 19	*	Flow Area (sq ft)	*		*	591. 28	*
* E.G. Slope (ft/ft)	*0	. 000092	*	Area (sq ft)	*		*	591. 28	*
* Q Total (cfs)	*	800.00	*	Flow (cfs)	*		*	800.00	*
* Top Width (ft)	*	35.00	*	Top Width (ft)	*		*	35.00	*
* Vel Total (ft/s)	*	1. 35	*	Avg. Vel. (ft/s)	*		*	1. 35	*
* Max Chl Dpth (ft)	*	18. 75	*	Hydr. Depth (ft)	*		*	16. 89	*
* Conv. Total (cfs)	*	83244. 4	*	Conv. (cfs)	*		*	83244. 4	*
* Length Wtd. (ft)	*	50.00	*	Wetted Per. (ft)	*		*	67. 16	*
* Min Ch El (ft)	*	156. 80	*	Shear (Ib/sq ft)	*		*	0. 05	*
* Al pha	*	1. 00	*	Stream Power (lb/ft s)	*		*	0. 07	*
* Frctn Loss (ft) 690.48 *	*	0. 01	*	Cum Volume (acre-ft)	*	97. 80	*	236. 47	*
* C & E Loss (ft)	*	0. 01	*	Cum SA (acres)	*	2. 30	*	10. 60	*
28. 87 * *********** *******	***	*****	**	*******	***	*****	* *	*****	**

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth

with the lowest, valid, water surface was used.

#### CROSS SECTION OUTPUT Profile #10%

^^^^^	. ^ ^ ^ ^		` ^ ′		^ ^ ^ ′		. ^ ^ /		` ^
*****									
* E.G. Elev (ft) Right OB * * Vel Head (ft)	* 1	169. 84	*	Element	*	Left 0	3 *	Channel	*
* Vel Head (ft)	*	0. 22	*	Wt. n-Val.	*		*	0. 045	*
* W.S. Elev (ft) 50.00 *	* 1	169. 62	*	Reach Len. (ft)	*	50.00	*	50.00	*
* Crit W.S. (ft)	* 1	162. 42	*	Flow Area (sq ft)	*		*	383. 62	*
* E.G. Slope (ft/ft)	*0.0	000558	*	Area (sq ft) Page 77	*	55. 83	*	728. 91	*

75. 29 *		FI	hose	u - NO-KI Se					
* 0 Total (cfs)	*	1450.00	* FI	ow (cfs)	*		*	1450. 00	*
* Top Width (ft) 31.30 *	*	136. 26	* Tc	p Width (ft)	*	23. 72	*	81. 25	*
* Vel Total (ft/s)	*	3. 78	* Av	g. Vel. (ft/s)	*		*	3. 78	*
* Max Chl Dpth (ft)	*	12. 82	* Ну	dr. Depth (ft)	*		*	10. 96	*
* Conv. Total (cfs)	*	61409. 1	* Cc	onv. (cfs)	*		*	61409. 1	*
* Length Wtd. (ft)	*	50.00	* We	etted Per. (ft)	*		*	35. 94	*
* Min Ch El (ft)	*	156. 80	* Sh	ear (Ib/sq ft)	*		*	0. 37	*
* Al pha	*	1. 00	* St	ream Power (lb/ft s)	*		*	1. 40	*
* Frctn Loss (ft) 558.50 *	*	0. 04	* Cu	m Volume (acre-ft)	*	436. 80	*	164. 36	*
* C & E Loss (ft) 94.36 *	*	0. 03	* Cu	ım SA (acres)	*	58. 05	*	11. 01	*
94. 30 ************************************	****	*****	***	*****	***	*****	**:	*****	**

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

### CROSS SECTION OUTPUT Profile #2%

CROSS SECTION OUTPUT												
********* * E.G. Elev (ft)	* 173. 18	* Element	* Left OB	} * (	Channel	*						
Right OB * * Vel Head (ft)	* 0.05	* Wt. n-Val.	*	*	0. 045	*						
* W.S. Elev (ft) 50.00 *	* 173.13	* Reach Len. (ft)	* 50.00	*	50.00	*						
* Crit W.S. (ft)	* 161.50	* Flow Area (sq ft)	*	* į	506. 51	*						
* E.G. Slope (ft/ft) 222.57 *	*0.000095	* Area (sq ft)	* 2594.23	* 10	014. 16	*						
* Q Total (cfs)	* 950.00	* Flow (cfs)	*	* (	950. 00	*						
* Top Width (ft) 64.81 *	* 2117.41	* Top Width (ft)	* 1971.36	*	81. 25	*						
* Vel Total (ft/s)	* 1.88	* Avg. Vel. (ft/s)	*	*	1. 88	*						
* Max Chl Dpth (ft)	* 16.33	* Hydr. Depth (ft)	*	*	14. 47	*						
* Conv. Total (cfs)	* 97581.0	* Conv. (cfs)	*	* 9	7581. 0	*						
* Length Wtd. (ft)	* 50.00	* Wetted Per. (ft)	*	*	35. 94	*						
* Min Ch El (ft)	* 156.80	* Shear (Ib/sq ft)	*	*	0.08	*						
* Al pha *	* 1.00	* Stream Power (Ib/ft s)	*	*	0. 16	*						
* Frctn Loss (ft) 1046.63 *	* 0.01	* Cum Volume (acre-ft)	* 730.78	* :	210. 91	*						
* C & E Loss (ft) 101.25 *	* 0.01	* Cum SA (acres)	* 83. 16	*	10. 88	*						

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Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

#### CROSS SECTION OUTPUT Profile #0.2%

******	* * *	*****	<b>*</b>	******	* * :	*****	* * *	*****	**
*****									
* E.G. Elev (ft) Right OB *	*	178. 48	*	Element	*	Left OE	3 *	Channel	*
* Vel Head (ft) 0.070 *	*	0.00	*	Wt. n-Val.	*	0. 070	*	0. 045	*
* W.S. Elev (ft)	*	178. 48	*	Reach Len. (ft)	*	50.00	*	50.00	*
* Crit W.S. (ft)	*	160. 98	*	Flow Area (sq ft)	* *	18991. 26	*	1448. 50	*
* E.G. Slope (ft/ft)	*0	. 000000	*	Area (sq ft)	* *	18991. 26	*	1448. 50	*
4003.43 * * 0 Total (cfs)	*	700.00	*	Flow (cfs)	*	488. 63	*	127. 44	*
* Top Width (ft)	*	4650. 76	*	Top Width (ft)	*	3553. 94	*	81. 25	*
1015.58 * * Vel Total (ft/s)	*	0. 03	*	Avg. Vel. (ft/s)	*	0. 03	*	0. 09	*
0.02 * * Max Chl Dpth (ft) 3.94 *	*	21. 68	*	Hydr. Depth (ft)	*	5. 34	*	17. 83	*
* Conv. Total (cfs) *211660.7 *	*1	765311. 0		* Conv. (cfs)	;	*1232263.	0	*321386.	7
* Length Wtd. (ft)	*	50.00	*	Wetted Per. (ft)	*	3555. 14	*	83. 16	*
* Min Ch El (ft)	*	156. 80	*	Shear (Ib/sq ft)	*	0.00	*	0.00	*
* Al pha	*	2. 35	*	Stream Power (lb/ft s)	*	0.00	*	0.00	*
* Frctn Loss (ft)	*	0.00	*	Cum Volume (acre-ft)	*	1373. 46	*	279. 95	*
1844.77 * * C & E Loss (ft)	*	0.00	*	Cum SA (acres)	*	125. 20	*	11. 22	*
124.59 * **********************************	* * *	*****	٠*	******	* * :	*****	**	*****	**

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

**BRI DGE** 

RIVER: RIVER-1

REACH: Reach-1 RS: 244.19

Description: Bridge #1 - Taxiway

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Proposed - No-Rise
                                   171. 45 2129. 16 171. 28 2132. 44
171. 24 2175. 09 171. 35 2184. 93
171. 4 2230. 86 171. 22 2240. 7
171. 2 2293. 19 171. 24 2306. 31
171. 15 2352. 24 171. 47 2378. 49
                                                                               171. 19 2142. 28
171. 28 2191. 49
171. 32 2253. 82
171. 17 2312. 87
171. 59 2388. 33
171. 852457. 697
             171. 29 2109. 47
 2102.91
                                                                                                      171. 22
             171. 36 2155. 4
171. 29 2211. 17
171. 36 2286. 63
171. 2 2335. 84
 2148.84
                                                                                                      171. 4
 2204. 61
                                                                                                      171.56
 2280. 07
2322. 72
                                                                                                       171.31
                                                                                                       171.49
 2401.45
              171. 562406. 918
                                    171. 542417. 074
                                                          171. 742427. 229
                                                                                                       171.88
             171. 852478. 008
171. 292538. 943
                                    171. 73 2498. 32
171. 232549. 099
2467.853
                                                          171. 432508. 476
                                                                                171. 432518. 631
                                                                                                      171.29
                                                          171. 23 2569. 41
                                                                                171. 172579. 566
2528.787
                                                                                                       171.17
2589.722
              171. 22610. 033
                                    171. 16 2640. 5
                                                          171. 162670. 968
                                                                                171.08 2691.28
                                                                                                      171.08
2711. 591
2802. 993
2904. 551
2955. 33
             171. 12721. 747
171. 062813. 149
                                                                                171. 042792. 837
                                    171. 062742. 058
                                                          171. 082752. 214
                                                                                                       171.09
                                    171. 1 2833. 46
171. 212924. 862
                                                          171. 072843. 616
171. 332935. 018
171. 832985. 797
                                                                                171. 092884. 239
                                                                                                       171.06
                                                                                171. 482945. 174
171. 86 3026. 42
173. 793117. 822
172. 833341. 249
             171. 122914. 707
171. 682965. 485
                                                                                                       171. 6
                                    171. 832975. 641
                                                                                                       172.69
3036. 576
3219. 38
                                   172. 833067. 043
173. 09 3290. 47
173. 973422. 495
                                                          172. 983107. 666
172. 833331. 093
             172. 833056. 887
                                                                                                       173.83
             173. 833270. 158
                                                                                                       173.15
 3361.56
                                                                                174. 813493. 585
             173. 533381. 872
                                                         174. 673432. 651
                                                                                                      174.83
3503. 741
                                                         174. 223544. 364
                                                                                173. 94 3554. 52
                                    174. 413534. 208
             174. 713524. 053
                                                          172. 723605. 299
                                                                                172. 373615. 455
3564.676
              173. 63574. 832
                                    173. 343595. 143
                                                                                171. 953727. 168
172. 253798. 259
                                    171. 843686. 545
                                                          171. 893706. 857
3666. 234
             171. 833676. 389
                                                                                                      171.97
                                   171. 643660. 343
172. 113777. 947
172. 743828. 726
173. 33940. 439
162. 183991. 218
162. 884052. 153
3757.635
             172.063767.791
                                                          172. 213788. 103
                                                                                                       172.22
             172. 27 3818. 57
173. 333899. 816
164. 573981. 063
3808.414
                                                          172. 853838. 882
170. 553950. 595
                                                                                173. 113859. 193
169. 153960. 751
                                                                                                       173.13
 3889.66
                                                                                                       166.96
3970. 907
                                                                                 156. 84021. 686
                                                          159.83 4016
                                                                                                       159.83
                                                                                166. 394072. 464
4031.841
              160. 714041. 997
                                                           164. 74062. 309
                                                                                                       167.98
                                                          172. 834113. 087
 4082.62
             169. 464092. 776
                                    171. 44102. 932
                                                                                172. 974123. 243
                                                                                                       173.39
                                                                                                       175.28
4133.399
             173.654143.555
                                    173. 834174. 022
                                                          174. 314184. 178
                                                                                174. 494255. 268
                                                          175. 114397. 449
4265.424
             175. 34 4275. 58
                                    175. 324306. 047
                                                                                175. 084417. 761
                                                                                                       174.99
                                                         175. 054509. 163 175. 14
175. 054509. 163 175. 14
175. 044752. 901 174. 774
174. 234874. 771 173. 964
174. 77 4996. 64 175. 085
176. 2 5067. 73 176. 26
                                                                                175. 14600. 564
174. 774793. 524
4438.072
             174. 854448. 228
                                    174. 854488. 851
                                                                                                       175.07
             175. 134691. 966
174. 794854. 459
173. 714915. 394
                                   175. 124712. 278
174. 324864. 615
173. 794986. 484
                                                                                                      174.73
4641. 188
4813. 836
4905. 238
                                                                                173. 964884. 926
175. 085006. 795
                                                                                                       173.83
                                                                                                       175.55
5016. 951
             175. 885027. 107
                                    176. 025047. 418
. 073970. 907
                                                           . 07
                                     . 0454052. 153
Bank Sta: Left Right Coeff Contr. 3970. 9074052. 153 . 3
Ineffective Flow num= 2
                                                      Expan.
. 5
   Sta L Sta R
0 3996
                           Elev Permanent
                                   F
                          176. 9
     4031 5067.73 176.6
Downstream Deck/Roadway Coordinates
     num= 9
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
                                                                               177. 3
      0 180 0 619 177.3 0 1969
     3169 176. 9 0
                                      3964 177. 16 0 3964
3994 177. 16 0 5099
     3994 177.16 170.93
                                                                               177. 16 170. 93
                                      3994 177. 16
                                                                                 176. 6
Downstream Bridge Cross Section Data
Station Elevation Data num= 486
Sta Elev Sta Elev S
                                               Sta
                                                         El ev Sta
                                                                                El ev
                                                                                           Sta
                                                                                                       Elev
    *****
              *****
                          **********
                                                        181. 9
         0 182.05 3.28
                                    181. 94
                                               16. 4
                                                                       26.25
                                                                                182.24
                                                                                             29.53
                                                                                                       181.94
                        39. 37
    32. 81 180. 94
                                    181. 2
                                               49. 21 181. 16
                                                                      59.05
                                                                                180.91
                                                                                            68.89
                                                                                                       181.02
             180.48
                                   180.69
                                                          180. 4
                        104. 98
                                               108. 26
                                                                     127.94
    82.02
                                                                                180.32
                                                                                           131. 22
                                                                                                       179.72
   137.79
             179.68
                        150. 91
                                    179.84
                                               164.03
                                                         179.86
                                                                     183.71
                                                                                179.02
                                                                                           190. 28
                                                                                                       178. 2
   203.4
             177. 96
                         209.96
                                   178.84
                                               216. 52 179. 29
                                                                     236. 2
                                                                                179. 94
                                                                                           242.77
                                                                                                      179.98
  249. 33 180. 34
                                   180. 25 269. 01 181. 59
                                                                     275. 57
                        252.61
                                                                               181. 62
                                                                                           288. 69
                                                                                                      182.16
                                                    Page 81
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Proposed - No-Rise 182. 7 181. 77 178. 6 177. 23 175. 67 175. 01 182. 21 179. 13 177. 5 176. 09 175. 1 182. 41 179. 89 295. 26 370. 71 321.5 328.06 182.48 334.62 344.46 182.2 178. 9 396.95 410.08 400.24 179.83 426.48 173. 37 178. 38 176. 99 175. 75 174. 7 433. 04 485. 53 547. 86 449. 44 521. 62 557. 71 472. 41 524. 9 574. 11 442.88 178.08 478.97 177. 26 176. 31 175. 46 174. 58 488.81 531.46 176.05 551. 14 610. 2 175.01 583.95 600.35 620.04 173.58 652.84 173.81 643 174. 32 174. 2 173. 95 174. 52 173. 97 174. 02 688. 93 728. 3 780. 79 705.33 662.69 682.37 174.33 698.77 174.54 174.31 734. 86 787. 35 721.74 718.46 173.94 174.19 741.42 174.05 761. 1 810. 31 862. 8 915. 29 967. 78 1030. 12 767.67 173. 83 790. 63 172. 91 843. 12 173. 29 905. 45 172. 67 957. 94 172. 28 1016. 99 172. 08 1062. 92 171. 47 1102. 29 172. 21 1158. 06 172. 72 1200. 71 173. 58 1276. 16 174. 52 1331. 93 175. 84 1377. 86 175. 76 1420. 51 174. 48 1486. 12 173. 46 1538. 61 171. 6 1600. 95 173.83 173.69 790.63 173.65 173. 69 787. 35 173. 06 830 173. 35 895. 61 173. 04 948. 1 171. 89 1007. 15 172. 14 1059. 64 171. 73 1095. 73 172. 4 1144. 94 172. 5 1194. 15 173. 1 1266. 32 174. 64 1318 81 173. 95 173. 57 173. 35 173. 31 172. 79 172. 14 171. 89 816. 88 869. 36 918. 57 980. 91 820. 16 872. 65 934. 98 994. 03 173.36 173.4 173. 4 173. 5 172. 98 172. 39 171. 94 171. 69 173. 36 173. 43 172. 93 172. 07 171. 92 171. 81 1043. 24 1082. 61 1049. 8 1089. 17 1076.04 171. 89 1082. 61 171. 66 1121. 97 172. 54 1174. 46 172. 94 1223. 67 174. 04 1299. 13 175. 2 1348. 34 175. 92 1390. 98 175. 77 1453. 32 174. 38 1505. 81 172. 72 1574. 7 171. 69 1089. 17 171. 74 1135. 1 172. 6 1181. 02 172. 81 1233. 51 174. 5 1312. 25 175. 17 1361. 46 175. 84 1407. 39 174. 99 1469. 72 174. 68 1515. 65 172. 33 172. 68 1108.85 1164.62 1104. 62 1213. 83 1289. 29 1341. 78 1384. 42 1436. 91 1502. 53 1561. 58 173.96 174.64 1318.81 174.74 174. 04 1316. 61 175. 5 1368. 02 175. 92 1413. 95 174. 61 1479. 56 174. 41 1525. 49 171. 87 1587. 82 175.72 175. 88 174. 56 172.88 171. 6 1600. 95 170. 59 1646. 87 172.39 1581. 26 171.32 171. 24 1627. 19 170. 29 1699. 36 170. 52 1748. 57 170. 8 1640. 31 170. 24 1702. 64 170. 5 1761. 7 171.51 1610.79 170.38 1604.23 1676. 4 1719. 05 170. 08 1686. 24 170. 44 1725. 61 170. 61 1712. 49 170. 2 1771. 54 170.63 170.27 170. 44 1725. 61 170. 47 1784. 66 170. 92 1837. 15 170. 6 1896. 2 170. 46 1942. 13 170. 76 1984. 78 170. 8 2020. 87 170. 66 2070. 07 170. 52 1748. 57 170. 24 1797. 78 170. 79 1856. 83 170. 25 1899. 48 170. 31 1958. 53 170. 36 1994. 62 170. 93 2027. 43 170. 25 2073. 35 170. 5 1761. 7 170. 6 1801. 06 170. 75 1863. 4 170. 75 1915. 89 170. 38 1965. 09 170. 43 1997. 9 170. 69 2033. 99 170. 41 2083. 2 170. 2 1771. 54 171. 06 1814. 19 170. 91 1873. 24 170. 78 1925. 73 170. 76 1974. 94 170. 97 2011. 02 170. 81 2043. 83 171. 18 170. 53 1778. 1 1824. 03 1876. 52 1938. 85 1978. 22 2017. 58 170. 44 170. 66 170.99 170. 67 1 170. 41 2083. 2 173. 96 2135. 68 175. 7 2171. 77 176. 55 2250. 5 2202. 99 170.57 170. 25 2073. 35 172. 65 2119. 28 175. 85 2168. 49 176. 57 2220. 98 176. 48 2293. 15 175. 74 2345. 64 174. 18 2391. 56 173. 162431. 657 171. 832481. 282 171. 52530. 908 171. 372580. 534 171. 612630. 159 171. 772679. 785 171. 662729. 411 171. 632779. 036 171. 572828. 662 171. 432878. 288 170.46 2093.04 2047.11 171.03 170. 46 2093. 04 175. 02 2142. 25 175. 91 2181. 61 176. 81 2257. 06 176. 23 2312. 83 175. 4 2362. 04 173. 87 2411. 25 172. 582451. 507 171. 682501. 133 171. 422550. 759 171 472600 384 170. 66 2070. 07 171. 97 2106. 16 175. 61 2161. 93 176. 37 2214. 42 176. 64 2276. 75 175. 85 2335. 8 174. 72 2388. 28 172. 97 2429 2096.32 175.61 2096. 32 2152. 09 2191. 45 2270. 19 2319. 39 2378. 44 176 176. 65 175. 8 176. 55 2250. 5 176. 48 2302. 99 175. 52 2358. 76 174. 53 2404. 69 175. 18 173. 33 172. 21 2421.09 172. 932441. 582 171. 732491. 208 2461.432 1722471.357 171.63 171. 562520. 983 171. 352570. 609 171. 472540. 833 171. 422590. 459 2511.058 171.38 171. 422550. 759 171. 472600. 384 171. 73 2650. 01 171. 82699. 635 171. 732749. 261 171. 62798. 887 171. 482848. 512 171. 292898. 138 2560.684 171.48 2610. 684 2610. 309 2659. 935 2709. 561 2759. 186 2808. 812 171. 692640. 085 171. 532620. 234 171. 75 171. 692840. 083 171. 78 2689. 71 171. 692739. 336 171. 582788. 962 171. 52838. 587 171. 342888. 213 171. 76 2669. 86 171. 712719. 486 171. 712769. 111 171. 632818. 737 171. 76 171. 77 171. 63 171. 47 171. 572828. 662 171. 432878. 288 171. 052927. 913 171. 382977. 539 171. 543027. 165 171. 52 3076. 79 171. 933126. 416 171. 953176. 042 171. 763225. 667 171. 313275. 293 171. 353324, 919 2858. 438 2908. 063 171. 462868. 363 171. 29 171. 142947. 764 171. 562997. 389 171. 152917. 988 171. 292967. 614 171. 12937. 839 171. 482987. 464 171.17 2957.689 171.53 171. 53 3037. 09 171. 63086. 716 3007. 314 3056. 94 171.55 3017.24 171. 523047. 015 171. 683096. 641 171.5 171. 483066. 865 171.76 3106. 566 3156. 191 3205. 817 171. 993136. 341 171. 893185. 967 171. 723235. 593 171. 273285. 218 171. 843116. 491 172. 113146. 266 172.07 171. 833195. 892 171. 73245. 518 171. 283295. 143 172. 013166. 116 171. 813215. 742 171. 393265. 368 171. 84 171. 55 171. 23 3255. 443 3305.068 171. 193314. 993 171. 353324. 919 171. 413334. 844 171. 533344. 769 171.88 173. 323394. 395 171. 86 3444. 02 172. 093493. 646 3354.694 172. 363364. 619 172. 943374. 544 173. 463384. 469 173.17 3404.32 172. 13 3424. 17 171. 963434. 095 172.693414.245 171.91 172. 013483. 721 172. 53533. 346 3453.945 171.94 3463.87 171. 953473. 796 172.12 3503.571 172. 223513. 496 172. 283523. 421 172. 73543. 271 172.8

```
Proposed - No-Ri se
3553. 197
            172. 713563. 122
                                172. 693573. 047
                                                   172. 763582. 972
                                                                       172. 863592. 897
                                                                                           172.95
                                                                                           173.33
3602.822
                                                                       173. 193642. 523
            173. 023612. 747
                                173. 113622. 673
                                                   173. 183632. 598
                                                                       172. 923692. 148
172. 113741. 774
171. 27 3791. 4
                                173. 223672. 298
172. 523721. 924
171. 56 3771. 55
170. 873821. 175
3652. 448
                                                                                           172.78
            173. 343662. 373
                                                   173. 083682. 223
3702.073
            172. 663711. 999
                                                   172. 333731. 849
                                                                                            171.9
3751.699
                                                   171. 423781. 475
            171. 743761. 624
                                                                                           171.07
            170.94 3811.25
                                                                       170. 923841. 025
3801.325
                                                   170.88 3831.1
                                                                                           170.98
 3850.95
            171. 123860. 876
                                171. 243870. 801
                                                   171. 223880. 726
                                                                       171. 113890. 651
                                                                                           170.74
3900.576
            170.643910.501
                                168. 923920. 427
                                                   165. 943930. 352
                                                                       162. 883940. 277
                                                                                           160.34
3950.202
            159. 383960. 127
                                158.83
                                            3979
                                                     156. 73989. 902
                                                                       158. 833999. 827
                                                                                           160.49
4009. 753
            162. 314019. 678
                                164. 564029. 603
                                                   166. 434039. 528
                                                                        167. 74049. 453
                                                                                           170.29
            171. 134069. 303
                                170. 774079. 229
                                                                                           169.69
                                                                       170. 324099. 079
4059.378
                                                   170. 674089. 154
                                                   168. 714138. 779
167. 924188. 405
167. 314238. 031
167. 034287. 656
            169. 164118. 929
168. 264168. 555
4109.004
                                168. 824128. 854
                                                                        168. 64148. 705
                                                                                           168.44
                                                                       167. 73 4198. 33
167. 264247. 956
167. 144297. 582
4158.629
                                 168. 1 4178. 48
                                                                                           167.58
                                167. 384228. 105
166. 954277. 731
4208. 255
4257. 881
                                                                                           167.18
            167.47 4218.18
            167. 074267. 806
                                                                                           167. 23
4307.506
            167. 334317. 432
                                167. 514327. 357
                                                    167. 734337. 282
                                                                           1684347. 207
                                                                                           168.25
4357.132
            168. 244367. 057
                                168. 024376. 982
                                                     168, 24386, 908
                                                                       168. 354396. 833
                                                                                           168.48
4406.758
                                168. 644426. 608
                                                    168. 554436. 533
                                                                       168. 464446. 458
            168. 624416. 683
                                                                                           168.38
                                                                       169. 574496. 084
4456.383
                                                   169. 364486. 159
170. 064535. 785
            168. 484466. 309
                                169.054476.234
                                                                                           169.73
                                                                       170. 34545. 709
171. 234595. 335
172. 164644. 961
4506.009
            169. 874515. 934
                                170. 014525. 859
                                                                                           170.49
4555.635
                                170.874575.485
                                                   171. 05 4585. 41
1724635. 036
            170.68 4565.56
                                                                                           171.42
                                171. 834625. 111
172. 464674. 736
            171. 624615. 186
 4605.26
                                                                                           172.28
                                                                       172. 674694. 586
173. 274744. 212
            172. 374664. 811
172. 944714. 437
                                                   172. 564684. 662
                                                                                           172.82
4654.886
4704.512
                                173.044724.362
                                                   173. 154734. 287
                                                                                           173.44
                                173. 934773. 988
4754.137
                                                   174. 194783. 913
                                                                       174. 434793. 838
            173. 674764. 063
                                                                                           174.67
                                175. 214823. 613
                                                                                           175.84
4803.763
            174. 894813. 688
                                                   175. 474833. 539
                                                                       175. 664843. 463
                                175. 994873. 239
                                                                        176. 24893. 089
4853.389
            175. 914863. 314
                                                   176. 124883. 164
                                                                                           176.25
            176. 254912. 939
4903.014
                                 176. 24922. 865
                                                   176. 28 4932. 79
                                                                       176. 394942. 715
                                                                                           176. 49
 4952.64
             176.6
Manning's n Values
                                num=
a n Val
                                             Sta
                                                    n Val
               . 073930. 352
                                 . 0454009. 753
                                                      . 07
Bank Sta: Left
                    Ri ght
                                Coeff Contr.
                                                  Expan.
       3930. 3524009. 753
                                          . 3
                                                     . 5
                                       2
Ineffective Flow
                         num=
                                Permanent
   Sta L
             Sta R
                        El ev
              3954
        0
                         176
                                     F
    4009 4952.64
                         176
Upstream Embankment side slope
                                                               4 horiz. to 1.0 vertical
Downstream Embankment side slope
                                                               4 horiz. to 1.0 vertical
                                                             . 98
Maximum allowable submergence for weir flow =
Elevation at which weir flow begins
                                                           176. 6
Energy head used in spillway dešign
Spillway height used in design
Weir crest shape
                                                     = Broad Crested
Number of Bridge Coefficient Sets = 1
Low Flow Methods and Data
        Energy
Selected Low Flow Methods = Highest Energy Answer
High Flow Method
        Energy Only
Additional Bridge Parameters
        Add Friction component to Momentum
        Do not add Weight component to Momentum
        Class B flow critical depth computations use critical depth
                                               Page 83
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#### Proposed - No-Rise inside the bridge at the upstream end Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #		*****	**	*******	***	*****	*****
********  * E. G. US. (ft)	*	174. 71	*	Element	*In	side BR US	
*Inside BR DS *  * W.S. US. (ft)	*	174. 68	*	E.G. Elev (ft)	*	174. 69	*
* 0 Total (cfs)	*	800.00	*	W.S. Elev (ft)	*	174. 62	*
174.56 * * Q Bridge (cfs) 160.65 *	*	800.00	*	Crit W.S. (ft)	*	161. 42	*
* Q Weir (cfs) 17.86 *	*		*	Max Chl Dpth (ft)	*	17. 82	*
* Weir Sta Lft (ft) 2.04 *	*		*	Vel Total (ft/s)	*	2. 15	*
* Weir Sta Rgt (ft) 392.46 *	*		*	Flow Area (sq ft)	*	371. 36	*
* Weir Submerg 0.09 *	*		*	Froude # Chl	*	0. 09	*
* Weir Max Depth (ft) 4048.74 *	*		*	Specif Force (cu ft)	*	3724. 05	*
* Min El Weir Flow (ft)	*	176. 68	*	Hydr Depth (ft)	*		*
* Min El Prs (ft) 84.31 *	*	170. 99	*	W.P. Total (ft)	*	83. 61	*
* Delta EG (ft) 36128.9 *	*	0. 13	*	Conv. Total (cfs)	*	33132. 3	*
* Del ta WS (ft)	*	0. 11	*	Top Width (ft)	*		*
* BR Open Area (sq ft) 0.01 *	*	371. 36	*	Frctn Loss (ft)	*	0. 07	*
* BR Open Vel (ft/s) 0.03 *	*	2. 15	*	C & E Loss (ft)	*	0. 00	*
* BR Sluice Coef 0.14 *	*		*	Shear Total (lb/sq ft)	*	0. 16	*
* BR Sel Method 0.29 *	*Ener	gy only	*	Power Total (lb/ft s)	*	0. 35	*
********* *******	*****	*****	**	*******	***	*****	*****

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile			******	****	******	*****
* E.G. US. (ft) *Inside BR DS *	*	175. 58	* Element	*Insi	ide BR US	
* W. S. US. (ft) 175. 48 *	*	175. 55	* E.G. Elev (ft)	*	175. 56	*
* Q Total (cfs) 175.42 *	*	800.00	* W.S. Elev (ft)	*	175. 49	*
* Q Bridge (cfs) 160.65 *	*	800.00	* Crit W.S. (ft)	*	161. 42	*
* Q Weir (cfs)	*		* Max Chl Dpth (ft) Page 84	*	18. 69	*

	FIOPC	350 - NO-KI 36				
18.72 * * Weir Sta Lft (ft)	*	* Vel Total (ft/s)	*	2. 15	*	
2.04 * * Weir Sta Rgt (ft)	*	* Flow Area (sq ft)	*	371. 36	*	
392.46 * * Weir Submerg	*	* Froude # Chl	*	0.09	*	
* Weir Max Depth (ft)	*	* Specif Force (cu ft)	*	4045. 19	*	
4388.13 * * Min El Weir Flow (ft)	* 177. 16	* Hydr Depth (ft)	*		*	
* Min El Prs (ft) 84.31 *	* 170. 99	* W.P. Total (ft)	*	83. 61	*	
* Delta EG (ft) 36128.9 *	* 0.13	* Conv. Total (cfs)	*	33132. 3	*	
* Del ta WS (ft)	* 0.12	* Top Width (ft)	*		*	
* BR Open Area (sq ft) 0.01 *	* 371.36	* Frctn Loss (ft)	*	0. 07	*	
* BR Open Vel (ft/s) 0.03 *	* 2. 15	* C & E Loss (ft)	*	0.00	*	
* BR SIuice Coef 0.14 *	*	* Shear Total (Ib/sq ft)	*	0. 16	*	
* BR Sel Method 0.29 *	*Energy only	* Power Total (lb/ft s)	*	0. 35	*	
~· —·	*****	******	***	******	*****	*
*****						

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest valid water surface was used.

with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #		*****	*******	****	*****	****
* E. G. US. (ft)	*	169. 84	* Element	*In	side BR US	
*Inside BR DS * * W.S. US. (ft)	*	169. 62	* E.G. Elev (ft)	*	169. 78	*
169.60 * * 0 Total (cfs)	*	1450. 00	* W.S. Elev (ft)	*	169. 47	*
169.32 * * 0 Bridge (cfs)	*	1450. 00	* Crit W.S. (ft)	*	162. 78	*
162.03 * * Q Weir (cfs)	*		* Max Chl Dpth (ft)	*	12. 67	*
12.62 * * Weir Sta Lft (ft)	*		* Vel Total (ft/s)	*	4. 45	*
4.21 * * Weir Sta Rgt (ft)	*		* Flow Area (sq ft)	*	325. 75	*
344.25 * * Weir Submerg	*		* Froude # Chl	*	0. 22	*
0.21 * * Weir Max Depth (ft)	*		* Specif Force (cu ft)	*	1992. 14	*
2173.20 * * Min El Weir Flow (ft)	*	176. 68	* Hydr Depth (ft)	*	10. 86	*
11.47 * * Min El Prs (ft)	*	170. 99	* W.P. Total (ft)	*	41. 74	*
51.10 * * Delta EG (ft) 40549.0 *	*	0. 37	* Conv. Total (cfs)	*	42320. 1	*

* Delta WS (ft) 30.00 *		osed - No-Rise * Top Width (ft)	* 30.00	*
* BR Open Area (sq ft)	* 371.36	* Frctn Loss (ft)	* 0.16	*
* BR Open Vel (ft/s)	* 4. 45	* C & E Loss (ft)	* 0.02	*
* BR SI ui ce Coef 0.54 *	*	* Shear Total (Ib/sq ft)	* 0. 57	*
* BR Sel Method 2.27 *	*Energy only	* Power Total (lb/ft s)	* 2. 55	*
********* *******	* * * * * * * * * * * * *	********	*******	*****

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used. Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

### BRIDGE OUTPUT Profile #2%

******	****	*****	**	*******	****	*****	*****
* E.G. US. (ft)	*	173. 18	*	Element	*I ns	ide BR US	
*Inside BR DS * * W.S. US. (ft)	*	173. 13	*	E.G. Elev (ft)	*	173. 16	*
173.06 * * Q Total (cfs)	*	950.00	*	W.S. Elev (ft)	*	173. 06	*
172.97 * * Q Bridge (cfs)	*	950. 00	*	Crit W.S. (ft)	*	161. 76	*
160.99 * * Q Weir (cfs)	*		*	Max Chl Dpth (ft)	*	16. 26	*
16.27 * * Weir Sta Lft (ft)	*		*	Vel Total (ft/s)	*	2. 56	*
2.42 * * Weir Sta Rgt (ft)	*		*	Flow Area (sq ft)	*	371. 36	*
392.46 * * Weir Submerg	*			Froude # Chl	*	0. 11	*
0.11 * * Weir Max Depth (ft)	*		*	Specif Force (cu ft)	*	3165. 88	*
3445.54 * * Min El Weir Flow (ft)	*	176. 68		Hydr Depth (ft)	*		*
* Min El Prs (ft)	*	170. 99		W. P. Total (ft)	*	83. 61	*
84.31 * * Del ta EG (ft)	*	0. 18		Conv. Total (cfs)	*	33132. 3	*
36128.9 * * Del ta WS (ft)	*	0. 15		Top Width (ft)	*	33132.3	*
*		0. 13					
* BR Open Area (sq ft) 0.02 *	*	371. 36	*	Frctn Loss (ft)	*	0. 10	*
* BR Open Vel (ft/s)	*	2. 56	*	C & E Loss (ft)	*	0. 01	*
* BR SIuice Coef	*		*	Shear Total (Ib/sq ft)	*	0. 23	*
0.20 * * BR Sel Method	*Ener	gy only	*	Power Total (lb/ft s)	*	0. 58	*
0.49 * *********	*****	*****	* *	*******	****	*****	*****
* * * * * * * *							

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

#### BRIDGE OUTPUT Profile #0.2%

*****	*****	*****	**	******	***	*****	*****
*****							
* E.G. US. (ft) *Inside BR DS *	*	178. 48	*	Element	*Ir	nside BR US	
* W.S. US. (ft)	*	178. 48	*	E.G. Elev (ft)	*	178. 48	*
178. 47 * * Q Total (cfs)	*	700.00	*	W.S. Elev (ft)	*	178. 48	*
178.47 * * Q Bridge (cfs)	*	111. 40	*	Crit W.S. (ft)	*	161. 18	*
160.41 * * Q Weir (cfs)	*		*	Max Chl Dpth (ft)	*	21. 68	*
21. 77 *							
* Weir Sta Lft (ft) 0.11 *	*		*	Vel Total (ft/s)	*	0. 10	*
* Weir Sta Rgt (ft) 6444.04 *	*		*	Flow Area (sq ft)	*	6874. 81	*
* Weir Submerg	*		*	Froude # Chl	*	0.00	*
0.01 * * Weir Max Depth (ft)	*		*	Specif Force (cu ft)	*	9841. 51	*
9696.78 * * Min El Weir Flow (ft)	*	176. 68	*	Hydr Depth (ft)	*	1. 48	*
1.43 * * Min El Prs (ft)	*	170. 99	*	W.P. Total (ft)	*	4736. 27	*
4600.08 *	a.				.1.	000/17 /	at.
* Del ta EG (ft) 188487.8 *	*	0.00	^	Conv. Total (cfs)	*	203617. 6	*
* Delta WS (ft) 4513.96 *	*	0.00	*	Top Width (ft)	*	4650. 74	*
* BR Open Area (sq ft)	*	371. 36	*	Frctn Loss (ft)	*	0.00	*
0.00 * * BR Open Vel (ft/s)	*	0. 30	*	C & E Loss (ft)	*	0.00	*
0.00 * * BR Sluice Coef	*		*	Shear Total (lb/sq ft)	*	0.00	*
0.00 * * BR Sel Method	*Ener	av onlv	*	Power Total (lb/ft s)	*	0. 00	*
0.00 *							and an analysis of the
**********************************	****	*****	* *	******	***	******	*****

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used. Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

#### CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 243.38

I NPUT

Description: XS 243.38

MANASSAS MUNICIPAL AIRPORT - TAXIWAY AND RUNWAY Page 87

THE DOWNSTREAM FACE OF THE SMALL RUNWAY FROM EFFECTIVE MODEL Station Elevation Data num= 486 Sta \*\*\*\*\* Sta El ev El ev Sta El ev Sta El ev Sta El ev 16.4 29.53 182.05 3.28 181.94 181.9 26.25 182.24 181.94 32. 81 82. 02 137. 79 49. 21 108. 26 39. 37 104. 98 180. 91 180.94 181. 2 181.16 59.05 68.89 181.02 180.48 180.69 127.94 180.32 131. 22 180.4 179.72 179.68 150.91 179.84 164.03 179.86 183.71 179.02 190.28 178. 2 203. 4 249. 33 295. 26 370. 71 177. 96 180. 34 178. 84 180. 25 216. 52 269. 01 236. 2 275. 57 209.96 179. 29 179.94 179.98 242.77 252. 61 321. 5 396. 95 288. 69 181.59 181.62 182.16 182. 7 181. 77 178. 6 177. 23 182. 41 179. 89 178. 38 176. 99 182. 48 179. 83 178. 08 182. 21 179. 13 177. 5 176. 09 182. 2 178. 9 177. 26 328. 06 400. 24 334. 62 410. 08 344.46 426.48 433. 04 485. 53 442. 88 488. 81 449. 44 521. 62 472. 41 524. 9 478. 97 176. 31 531.46 176.05 551. 14 610. 2 682. 37 721. 74 767. 67 175. 75 174. 7 174. 52 175. 1 173. 58 174. 54 175. 67 175. 01 547. 86 600. 35 557. 71 620. 04 574.11 583.95 175.46 175.01 174. 58 174. 33 643 652.84 173.81 705. 33 174. 32 662.69 688.93 698.77 174.31 174. 52 173. 97 174. 02 173. 4 173. 5 172. 98 172. 39 174. 2 173. 95 728. 3 780. 79 734. 86 787. 35 174. 19 173. 83 173. 94 718.46 741.42 174.05 761. 46 761. 1 810. 31 862. 8 915. 29 967. 78 173.69 790.63 173.65 173. 75 173. 57 173. 35 173. 31 172. 79 816. 88 869. 36 918. 57 980. 91 173. 03 172. 91 173. 29 172. 67 173. 06 830 173. 35 895. 61 173. 04 948. 1 171. 89 1007. 15 820. 16 872. 65 843.12 173. 36 173. 43 905. 45 957. 94 934. 98 172.93 171. 89 1007. 15
172. 14 1059. 64
171. 73 1095. 73
172. 4 1144. 94
172. 5 1194. 15
173. 1 1266. 32
174. 64 1318. 81
175. 5 1368. 02
175. 92 1413. 95
174. 61 1479. 56
174. 41 1525. 49
171. 87 1587. 82
170. 8 1640. 31
170. 24 1702. 64
170. 5 1761. 7
170. 6 1801. 06 794.03 171.94 1049.8 171.69 1089.17 171.74 1135 994.03 172. 28 1016. 99 172.07 172. 14 1043. 24 171. 89 1082. 61 171. 66 1121. 97 1030.12 172.08 1062.92 171.92 171.47 1102.29 1076.04 171.81 171. 47 1102. 29 172. 21 1158. 06 172. 72 1200. 71 173. 58 1276. 16 174. 52 1331. 93 175. 84 1377. 86 175. 76 1420. 51 174. 48 1486. 12 1108.85 172.33 171. 66 1121. 97 172. 54 1174. 46 172. 94 1223. 67 174. 04 1299. 13 175. 2 1348. 34 175. 92 1390. 98 175. 77 1453. 32 174. 38 1505. 81 171. 74 1135. 1 172. 6 1181. 02 172. 81 1233. 51 174. 5 1312. 25 175. 17 1361. 46 175. 84 1407. 39 174. 99 1469. 72 1164. 62 1213. 83 1289. 29 1341. 78 1384. 42 172. 68 173. 96 174. 74 175. 72 175. 88 174. 56 1436. 91 174. 99 1469. 72 174. 68 1515. 65 172. 39 1581. 26 171. 24 1627. 19 170. 29 1699. 36 170. 52 1748. 57 170. 24 1797. 78 170. 79 1856. 83 173. 46 1538. 61 1502.53 172.88 174. 38 1505. 81 172. 72 1574. 7 171. 51 1610. 79 170. 08 1686. 24 170. 44 1725. 61 170. 47 1784. 66 170. 92 1837. 15 170. 6 1896. 2 1561. 58 1604. 23 171. 6 1600. 95 171.32 170.59 1646.87 170. 38 170. 59 1646. 87 170. 61 1712. 49 170. 2 1771. 54 171. 06 1814. 19 170. 91 1873. 24 170. 78 1925. 73 170. 24 1702. 64 170. 5 1761. 7 170. 6 1801. 06 170. 75 1863. 4 170. 75 1915. 89 170. 38 1965. 09 170. 43 1997. 9 170. 69 2033. 99 170. 41 2083. 2 173. 96 2135. 68 175. 7 2171. 77 176. 55 2250. 5 176. 48 2302. 99 175. 52 2358. 76 174. 53 2404. 69 172. 932441. 582 171. 732491. 208 171. 472540. 833 171. 422590. 459 1676.4 170.63 1719. 05 1778. 1 1824. 03 170.27 171.18 170.53 170. 25 1899. 48 170. 31 1958. 53 1876. 52 170.44 170. 31 1958. 53 170. 36 1994. 62 170. 93 2027. 43 170. 25 2073. 35 172. 65 2119. 28 175. 85 2168. 49 176. 57 2220. 98 176. 48 2293. 15 175. 74 2345. 64 174. 18 2391. 56 173. 162431. 657 171. 832481. 282 171. 52530. 908 171. 372580. 534 171. 612630. 159 171. 772679. 785 171. 662729. 411 171. 632779. 036 171. 572828. 662 170. 46 1942. 13 1938.85 170.76 1974.94 170.66 170. 76 1984. 78 170. 8 2020. 87 170. 66 2070. 07 170.97 2011.02 1978. 22 170.99 2017. 58 2047. 11 170. 81 2043. 83 170.57 170. 46 2093. 04 171.03 170. 46 2093. 04 175. 02 2142. 25 175. 91 2181. 61 176. 81 2257. 06 176. 23 2312. 83 175. 4 2362. 04 173. 87 2411. 25 172. 582451. 507 171. 682501. 133 171. 422550. 759 171 472600 384 170. 66 2070. 07 171. 97 2106. 16 175. 61 2161. 93 176. 37 2214. 42 176. 64 2276. 75 175. 85 2335. 8 174. 72 2388. 28 172. 97 2429 2096. 32 2152. 09 2191. 45 2270. 19 175.61 176 176. 65 175. 8 2319.39 175.18 2378. 44 2421. 09 173.33 172.21 172. 97 2429 1722471. 357 171. 562520. 983 171. 352570. 609 171. 532620. 234 171. 76 2669. 86 171. 712719. 486 171. 712769. 111 2461. 432 2511. 058 171.63 171.38 2560. 684 2610. 309 2659. 935 2709. 561 171. 422590. 459 171. 692640. 085 171. 78 2689. 71 171. 692739. 336 171. 472600. 384 171. 73 2650. 01 171. 82699. 635 171. 732749. 261 171.48 171.75 171. 76 171. 77 2759. 186 171. 582788. 962 171. 62798. 887 171.63 171. 572828. 662 171. 432878. 288 171. 52838. 587 171. 342888. 213 171. 482848. 512 171. 292898. 138 2808.812 171. 632818. 737 171.47 2858.438 171. 462868. 363 171.29 171. 052927. 913 171. 382977. 539 171. 142947. 764 171. 562997. 389 2908.063 171. 152917. 988 171. 12937. 839 171.17 171. 482987. 464 171. 292967. 614 2957.689 171.53

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Proposed - No-Rise
                                   171. 543027. 165
3007. 314
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171. 953176. 042
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171. 893185. 967
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4208.255
             167.47 4218.18
                                   167. 384228. 105
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                                                        169. 364486. 159
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                                   169. 054476. 234
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                                   170. 014525. 859
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             170. 68 4565. 56
171. 624615. 186
                                                        171. 05 4585. 41
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4605. 26
                                   170. 874575. 485
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                                   171. 834625. 111
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4754.137
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175. 994873. 239
4803. 763
4853. 389
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                                                        175. 474833. 539
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             175. 914863. 314
176. 254912. 939
                                                        176. 124883. 164
176. 28 4932. 79
                                                                               176. 24893. 089
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4903.014
                                    176. 24922. 865
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 4952.64
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        Sta: Left Right 3930. 3524009. 753
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                                           2
Ineffective Flow
                           num=
              Sta R
                          Elev Permanent
    Sta L
                3954
                          176
                                      F
F
     4009 4952.64
                            176
CROSS SECTION OUTPUT Profile #1%
                                              * E.G. Elev (ft)
                                * 174.58 * Element
                                                                                      Left OB *
                                                                                                     Channel *
Right OB *
  Vel Head (ft)
                                        0.01
                                                * Wt. n-Val.
                                                                                                      0.045
* W.S. Elev (ft)
                                     174. 57
                                                * Reach Len. (ft)
                                                                                      585.00
                                                                                                     585.00
 585.00 *
                       * 160.45 * Flow Area (sq ft)
* Crit W.S. (ft)
                                                                                                     865. 13
                                                   Page 89
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* E.G. Slope (ft/ft) 3829.18 *	*0.000020	* Area (sq ft)	* 746	0. 92	* 1207.09	*
* Q Total (cfs)	* 800.00	* Flow (cfs)	*		* 800.00	*
* Top Width (ft) 779.90 *	* 3749. 91	* Top Width (ft)	* 289	0. 61	* 79.40	*
* Vel Total (ft/s)	* 0.92	* Avg. Vel. (ft/s)	*		* 0.92	*
* Max Chl Dpth (ft)	* 17.87	* Hydr. Depth (ft)	*		* 15.73	*
* Conv. Total (cfs)	*177989. 9	* Conv. (cfs)	*		*177989. 9	*
* Length Wtd. (ft)	* 585.00	* Wetted Per. (ft)	*		* 55.63	*
* Min Ch El (ft)	* 156. 70	* Shear (Ib/sq ft)	*		* 0.02	*
* Al pha *	* 1.00	* Stream Power (Ib/ft s)	*		* 0.02	*
* Frctn Loss (ft) 1263.48 *	* 0.01	* Cum Volume (acre-ft)	* 88	3.75	* 227.89	*
* C & E Loss (ft) 102.83 *	* 0.01	* Cum SA (acres)	* 9	2. 99	* 10. 79	*
102. 63	******	********	*****	****	* * * * * * * * *	**

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Pr					***	*****	***	*****	**
* E.G. Elev (ft)	*	175. 45	*	Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft) *	*	0. 01	*	Wt. n-Val.	*		*	0. 045	*
* W.S. Elev (ft)	*	175. 43	*	Reach Len. (ft)	*	585.00	*	585.00	*
585.00 * * Crit W.S. (ft)	*	160. 45	*	Flow Area (sq ft)	*		*	912. 71	*
* E.G. Slope (ft/ft)	*0	. 000030	*	Area (sq ft)	*		*	912. 71	*
* Q Total (cfs)	*	800.00	*	Flow (cfs)	*		*	800.00	*
* Top Width (ft)	*	55. 00	*	Top Width (ft)	*		*	55.00	*
* Vel Total (ft/s)	*	0. 88	*	Avg. Vel. (ft/s)	*		*	0.88	*
* Max Chl Dpth (ft)	*	18. 73	*	Hydr. Depth (ft)	*		*	16. 59	*
* Conv. Total (cfs)	*1	46512. 4	*	Conv. (cfs)	*		*1	46512. 4	*
* Length Wtd. (ft)	*	585.00	*	Wetted Per. (ft)	*		*	85. 15	*
* Min Ch El (ft)	*	156. 70	*	Shear (Ib/sq ft)	*		*	0. 02	*
* Al pha	*	1. 00	*	Stream Power (lb/ft s)	*		*	0. 02	*
* Frctn Loss (ft)	*	0. 01	*	Cum Volume (acre-ft) Page 90	*	97. 80	*	234. 05	*

/00 /0 *	Proposed - No-Rise	
690.48 * * C & E Loss (ft) 28.87 *	* 0.00 * Cum SA (acres)	* 2.30 * 10.55 *
	**********	* * * * * * * * * * * * * * * * * * * *
^^^^^		
is less than 0.7 or gre		-
Note: Multiple criti	y indicate the need for additional cr ical depths were found at this locati , water surface was used.	on. The critical depth
CROSS SECTION OUTPUT	Profile #10% ************************************	*****
*******	* 169 17 * Flement	* 1-5+ OD * Observal *
* E.G. Elev (ft) Right OB * * Vel Head (ft)	* 169.47 * Element * 0.10 * Wt. n-Val.	* Left OB * Channel *  * 0.045 *
*		* 585.00 * 585.00 *
* W.S. Elev (ft) 585.00 * * Crit W.S. (ft)	<ul><li>* 169.38 * Reach Len. (ft)</li><li>* 161.55 * Flow Area (sq ft)</li></ul>	* * 579.53 *
* E.G. Slope (ft/ft)	*0.000252 * Area (sq ft)	* 69. 21 * 794. 80 *
634. 32 * * Q Total (cfs)	* 1450.00 * Flow (cfs)	*
* Top Width (ft)	* 510.13 * Top Width (ft)	* 22.48 * 79.40 *
408. 24 * * Vel Total (ft/s)	* 2.50 * Avg. Vel. (ft/s)	* * 2.50 *
* Max Chl Dpth (ft)	* 12.68 * Hydr. Depth (ft)	* * 10.54 *
* Conv. Total (cfs)	* 91283.7 * Conv. (cfs)	* * 91283.7 *
* Length Wtd. (ft)	* 585.00 * Wetted Per. (ft)	* * 55.63 *
* Min Ch El (ft)	* 156.70 * Shear (Ib/sq ft)	* * 0.16 *
* Al pha	* 1.00 * Stream Power (lb/ft s	* 0.41 *
* Frctn Loss (ft)	* 0.09 * Cum Volume (acre-ft)	* 436.73 * 162.12 *
558.12 * * C & E Loss (ft) 94.12 *	* 0.04 * Cum SA (acres)	* 58.02 * 10.79 *
	**********	******
Warrainan Dividad Elam	tod Con this course continu	
Warning: The conveyance	computed for this cross-section. e ratio (upstream conveyance divided	by downstream conveyance)
is less than 0.7 or gro 1.4. This may	y indicate the need for additional cr	oss sections.
Note: Multiple criti with the lowest, valid	ical depths were found at this locati , water surface was used.	on. The critical depth
	Profile #2% *************	*******
*********  * E.G. Elev (ft)	* 173.01 * Element	* Left OB * Channel *
Right OB * * Vel Head (ft) *	* 0.02 * Wt. n-Val.	* * 0.045 *
* W.S. Elev (ft)	* 172.98 * Reach Len. (ft) Page 91	* 585.00 * 585.00 *

595 00 *			Op	osca - No-Krsc					
585.00 * * Crit W.S. (ft) *	*	160. 74	*	Flow Area (sq ft)	*		*	777. 85	*
* E.G. Slope (ft/ft) 2645.25 *	*0	. 000041	*	Area (sq ft)	*	3323. 64	*	1081. 10	*
* Q Total (cfs)	*	950. 00	*	Flow (cfs)	*		*	950.00	*
* Top Width (ft)	*	3037. 64	*	Top Width (ft)	*	2259. 32	*	79. 40	*
698.92 * * Vel Total (ft/s)	*	1. 22	*	Avg. Vel. (ft/s)	*		*	1. 22	*
* Max Chl Dpth (ft)	*	16. 28	*	Hydr. Depth (ft)	*		*	14. 14	*
* Conv. Total (cfs)	*1	49080. 9	*	Conv. (cfs)	*		* *	149080. 9	*
* Length Wtd. (ft)	*	585. 00	*	Wetted Per. (ft)	*		*	55. 63	*
* Min Ch El (ft)	*	156. 70	*	Shear (Ib/sq ft)	*		*	0. 04	*
* Al pha	*	1. 00	*	Stream Power (lb/ft s)	*		*	0. 04	*
* Frctn Loss (ft)	*	0. 01	*	Cum Volume (acre-ft)	*	727. 50	*	208. 16	*
1045.08 * * C & E Loss (ft) 100.84 *	*	0. 01	*	Cum SA (acres)	*	80. 81	*	10. 79	*
100.84	***	*****	**	******	* * :	****	* * :	*****	**
*****									

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth
with the lowest, valid, water surface was used.

		0% ***********	*****	*****
******** * E.G. Elev (ft) Right OB *	* 178.47	* Element	* Left OB *	Channel *
* Vel Head (ft) 0.070 *	* 0.00	) * Wt. n-Val.	* 0.070 *	0. 045 *
* W.S. Elev (ft) 585.00 *	* 178.47	* Reach Len. (ft)	* 585.00 *	585.00 *
* Cri t W. S. (ft) 7295.71 *	* 160. 25	s * Flow Area (sq ft)	*20304.27 *	1517. 15 *
* E.G. Slope (ft/ft) 7295.71 *	*0.000000	) * Area (sq ft)	*20304.27 *	1517. 15 *
* Q Total (cfs) 179.93 *	* 700.00	) * Flow (cfs)	* 414.40 *	105. 66 *
* Top Width (ft) 942.89 *	* 4533.10	) * Top Width (ft)	* 3510.81 *	79. 40 *
* Vel Total (ft/s) 0.02 *	* 0.02	? * Avg. Vel. (ft/s)	* 0.02 *	0. 07 *
* Max Chl Dpth (ft) 7.74 *	* 21.77	' * Hydr. Depth (ft)	* 5.78 *	19. 11 *
* Conv. Total (cfs) *604606.3 *	*2352110.	0 * Conv. (cfs)	*1392457.0	*355047. 4
* Length Wtd. (ft) 945.81 *	* 585.00	) * Wetted Per. (ft)	* 3513.24 *	80. 41 *
* Min Ch El (ft) 0.00 *	* 156. 70	) * Shear (Ib/sq ft)	* 0.00 *	0.00 *
* Al pha	* 1.96	<pre>* Stream Power (lb/ft s) Page 92</pre>	* 0.00 *	0.00 *

		r i	ohosed	1 - NO-KI SE					
0.00 *			-						
<pre>* Frctn Loss (ft)</pre>	*	0.00	* Cur	n Volume (acre-ft)	*	1332.36	*	276. 24	*
1832.09 * ` ´				,					
* C & E Loss (ft)	*	0.00	* Cur	n SA (acres)	*	106, 59	*	10. 79	*
119.42 *									
*****	****	*****	****	******	***	*****	***	*****	* *
****									

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RI VER: RI VER-1 REACH: Reach-1

RS: 243.2

I NPUT

Description: XS 243.2

INSERTED\_XS TO EVALUATE IMPACT OF PROPOSED SITE(5/21/01)

Station Elevation		num=	483	•	,			
Sta Elev				Elev		Elev		Elev
1112. 15	*********** 6	181. 89 180. 94 180. 68 180. 56 179. 3 179. 42 179. 17 178. 92 178. 94 179. 51 179. 47 179. 51 179. 47 179. 19 179. 26 179. 11 179. 08 179. 07 178. 78 178. 92 178. 94 178. 78 178. 92 178. 94 179. 11 179. 08 179. 17 179. 48 179. 17 179. 48 180. 69 181. 11 182. 19	22. 96 68. 89 118. 1 173. 88 216. 52 262. 45 308. 38 364. 15 426. 49 482. 26 541. 31 590. 52 633. 17 685. 66 731. 59 767. 68 830. 01 882. 5 925. 15 974. 36 1023. 57 1082. 62 1128. 55 1174. 48 1223. 69 1272. 9 1312. 27 1358. 19 1407. 4 1443. 49 1528. 79 1561. 59 1643. 61	******** 181. 71 180. 83 180. 99 180. 38 179. 64 179. 31 179. 31 179. 04 179. 64 179. 45 179. 45 179. 46 179. 21 179. 36 179. 14 178. 97 178. 97 178. 93 178. 8 178. 8 179. 21 179. 13 179. 18 179. 13 179. 8 180. 88 181. 31 182. 12	29. 53 75. 46 121. 38 180. 44 229. 65 275. 58 318. 22 374 433. 05 495. 38 557. 71 597. 08 639. 73 698. 78 738. 15 777. 52 833. 29 885. 78 938. 27 987. 48 1033. 41 1092. 46 1135. 11 1187. 6 1243. 37 1276. 18 1318. 83 1364. 76 1410. 68 1466. 46 1532. 07 1584. 56 1656. 73	******** 181. 75 180. 48 180. 9 180. 179. 41 179. 35 179. 16 178. 93 178. 91 179. 25 179. 69 179. 46 179. 43 179. 25 179. 25 179. 89 179. 12 178. 98 179. 04 178. 84 178. 77 178. 68 179. 04 178. 77 178. 84 178. 77 178. 84 178. 77 178. 84 178. 77 178. 84 178. 77 178. 84 179. 04 181. 55 181. 04 181. 55 182. 17	42. 65 82. 02 127. 95 190. 28 236. 21 282. 14 324. 79 393. 68 449. 45 508. 5 567. 55 606. 92 649. 57 705. 34 744. 71 784. 08 852. 97 902. 18 944. 83 994. 04 1053. 09 1099. 02 1141. 67 1190. 88 1256. 49 1286. 02 1322. 11 1371. 32 1417. 25 1476. 3 1538. 63 1600. 96 1660. 01	******  181. 57  180. 27  180. 97  179. 85  179. 5  179. 44  179. 23  179. 15  179. 17  179. 35  179. 47  179. 36  179. 37  179. 47  179. 36  179. 27  178. 93  178. 93  178. 91  178. 89
	7 1676. 42		1682. 98		1656. <i>73</i> 1689. 54	182. 17	1696. 1	182. 3
			Pag	ge 93				

Proposed - No-Ri se 182. 49 1735. 47 1705.94 182. 43 1728. 91 182. 31 1745. 31 182. 42 1751. 87 182.22 182. 49 1735. 47 182. 53 1791. 24 182. 72 1827. 33 182. 62 1892. 94 182. 98 1974. 96 182. 21 2020. 89 182.51 1774.84 182.81 1797.8 182. 78 1810. 92 182.52 1765 1814. 2 1866. 7 1925. 75 1997. 92 182. 68 1820. 77 182. 61 1886. 38 182. 86 1955. 27 182. 34 2011. 04 182. 91 1843. 73 182. 83 1906. 06 182. 91 1988. 08 181. 99 2027. 45 182. 69 1856. 85 182. 74 1912. 62 182. 82 1991. 36 181. 99 2040. 57 182. 83 182. 58 182. 27 181.65 181. 3 2060. 25 180. 76 2116. 02 177. 41 2161. 95 181. 32 2070. 1 179. 89 2129. 15 176. 63 2178. 36 181. 1 2076. 66 178. 95 2132. 43 181. 55 180. 91 2056. 97 2093. 06 2050. 41 2079. 94 181.06 180. 91 2093. 06 178. 02 2152. 11 175. 59 2201. 32 174. 93 2257. 09 174. 81 2306. 3 174. 51 2342. 39 174. 5 2388. 32 174. 22 2427. 68 174. 35 2467. 05 174. 27 2512. 98 173. 98 2572. 03 173. 84 2604. 84 173. 79 2647. 48 173. 44 2703. 26 172. 38 2762. 31 172. 15 2795. 11 171. 92 2831. 2 171. 47 2900. 09 178.83 177. 41 2161. 95 175. 08 2211. 16 174. 9 2270. 21 174. 61 2309. 58 174. 56 2348. 95 174. 39 2391. 6 174. 25 2430. 96 174. 2 2473. 61 174. 06 2529. 38 174. 11 2581. 87 173. 91 2614. 68 173. 77 2663. 89 173. 03 2709. 82 172. 51 2768. 87 172. 24 2801. 67 172. 1 2847. 6 171. 23 2909. 93 170. 87 2965. 7 176. 63 2178. 36
174. 71 2221
174. 71 2289. 9
174. 68 2319. 42
174. 46 2358. 79
174. 46 2401. 44
174. 14 2437. 52
174. 36 2490. 01
174. 29 2542. 5
174. 04 2585. 15
173. 8 2621. 24
173. 55 2673. 73
173. 07 2732. 78
172. 51 2775. 43
172. 05 2808. 24
171. 89 2854. 16
171. 19 2919. 78
170. 78 2975. 55 2142.27 176. 16 2184. 92 175.86 176. 16 2184. 92 174. 81 2230. 85 174. 72 2293. 18 174. 44 2322. 7 174. 79 2362. 07 174. 28 2414. 56 174. 32 2453. 93 174. 17 2499. 86 174. 34 2552. 35 2142. 27 2194. 76 2250. 53 2299. 74 2332. 55 2375. 19 2421. 12 174.67 174. 6 174.56 174.8 174. 4 174. 26 2463.77 174. 29 174.29 2506.42 174. 34 2552. 35 174. 15 2591. 71 173. 86 2631. 08 173. 65 2680. 29 172. 62 2739. 34 172. 71 2781. 99 171. 98 2811. 52 171. 7 2867. 29 2565.47 173.97 2601. 56 2640. 92 173.7 173.44 2690. 13 2749. 18 172. 59 172. 32 2788. 55 172. 1 2824.64 171.58 172. 1 2847. 6
171. 23 2909. 93
170. 87 2965. 7
170. 86 3041. 16
169. 43 3083. 81
166. 57 3126. 46
164. 95 3165. 82
164. 03 3208. 47
164. 65 3277. 36
163. 68 3339. 68
163. 95 3382. 31
164. 31 3418. 38
164. 76 3461. 01
163. 3 3487. 25
160. 87 3575. 79
166. 18 3611. 86
166. 67 3680. 73
167. 74 3736. 47
169. 2 3785. 65
169. 36 3847. 96
168. 49 3920. 09
167. 76 3985. 67
167. 43 4034. 86
166. 75 4080. 76
165. 53 4152. 9
166. 15 4205. 36
166. 94 4254. 55
167. 06 4375. 87 171. 35 2926. 34 170. 86 2995. 23 2900.09 2893.53 171.47 171.1 171. 19 2919. 78 170. 78 2975. 55 170. 58 3044. 44 169 3090. 37 166. 07 3136. 3 164. 41 3169. 1 163. 92 3221. 59 164. 34 3297. 05 163. 78 3388. 87 164. 44 3421. 66 2946. 02 3018. 19 170. 98 2952. 58 170. 91 3028. 04 170.63 170. 44 3054. 28 170.37 170. 91 3028. 04 169. 71 3070. 68 167. 12 3119. 89 165. 13 3159. 26 164. 3 3198. 63 164. 83 3270. 8 163. 68 3333. 12 163. 74 3375. 75 163 46 3411 82 170. 44 3054. 28 168. 42 3096. 93 165. 55 3142. 86 164. 28 3182. 23 164. 3 3244. 56 163. 94 3303. 61 163. 47 3352. 8 163. 06 3395. 43 3067. 4 3110. 05 3149. 42 3188. 79 168.03 165. 4 164. 11 164. 63 3251. 12 3323. 28 163.93 163.43 3359.35 162.89 163. 74 3375. 75 163. 46 3411. 82 164. 86 3454. 45 164. 08 3480. 55 160 3572. 51 164. 58 3608. 58 166. 46 3651. 21 167. 19 3726. 63 168. 75 3779. 1 3405. 26 3447. 9 164. 44 3421. 66 165. 6 3464. 29 164. 36 3438. 06 165. 87 3470. 85 164.56 165.36 165. 6 3464. 29 161. 53 3496 162. 8 3579. 07 166. 37 3618. 42 167. 15 3693. 84 167. 98 3743. 03 169. 47 3795. 49 3477.41 160 155.1 3531 163. 53 3592. 18 166. 49 3628. 26 167. 13 3703. 68 168. 26 3749. 59 3571 3598. 74 3634. 82 163.93 166. 53 167. 26 3710.24 168. 26 3749. 59 169. 44 3808. 61 168. 7 3870. 91 168. 08 3952. 88 167. 71 4002. 07 167. 14 4054. 53 166. 34 4113. 55 165. 79 4172. 57 166. 23 4218. 48 167. 38 4284. 06 167. 37 4339. 8 166. 07 4392. 26 168.4 3759. 42 169.52 168. 75 3779. 1 169. 37 3834. 84 168. 51 3893. 86 167. 84 3969. 28 167. 36 4025. 02 166. 95 4074. 2 165. 88 4136. 5 165. 88 4198. 8 166. 5 4247. 99 167. 78 4313. 57 167. 23 4369. 31 165. 68 4421. 77 3828.28 169.04 3857.79 168.68 168. 15 3936. 49 167. 76 3992. 23 3880.74 167.81 167. 76 3992. 23 167. 76 3992. 23 167. 16 4041. 41 166. 72 4097. 16 165. 73 4166. 01 166. 09 4211. 92 167. 02 4264. 38 167. 42 4333. 24 166. 62 4388. 98 164. 93 4464. 4 165. 27 4507. 03 166. 55 4556. 21 167. 04 4611. 95 167. 73 4657. 86 167. 78 4713. 6 167. 18 4756. 23 164. 75 4795. 57 166. 8 4834. 92 171. 98 4890. 66 175. 03 3966 167.51 4015. 18 4064. 37 166.95 166. 23 165. 76 166. 23 4126. 67 4185. 69 167. 67 4231.59 167. 38 4284. 06 167. 37 4339. 8 166. 07 4392. 26 164. 73 4474. 24 165. 56 4520. 14 166. 34 4569. 33 167. 27 4625. 07 167. 98 4661. 14 167. 8 4720. 16 167. 69 4323. 4 167. 06 4375. 87 4300.45 167.15 4356.19 166.05 167. 06 4375. 87 165. 22 4434. 89 164. 99 4497. 19 165. 87 4549. 65 166. 84 4589 167. 71 4651. 3 168. 03 4700. 48 167. 23 4746. 39 165. 98 4789. 02 165. 68 4421. 77 164. 86 4490. 63 165. 76 4533. 26 166. 76 4582. 44 167. 5 4641. 46 167. 89 4674. 25 4411. 94 4480. 79 164.69 165.8 4526.7 166.53 4575.88 167.5 4631. 63 4670. 97 167.89 167. 87 4729.99 167. 55 4736. 55 166.89 4762.78 166.56 4766.06 4775.9 164.52 4802.13 166.54 164.76 167. 48 4841. 48 172. 99 4897. 22 165. 28 4818. 53 4808.69 166. 2 4821. 81 167.68 169. 05 4867. 71 174. 02 4907. 06 170.55 4880.83 4851.32 173.39 174. 49 4913. 62 175.03 4903.78

```
Manning's n Values
                        num=
                         n Val
    Sťa n Val
                     Sta
                                     Sta
                                           n Val
                    3496
                            . 045 3575. 79
       0
             . 07
                                             . 07
                          Lengths: Left Channel
                                                  Ri ght
                                                            Coeff Contr.
Bank Sta: Left
                 Ri ght
                                                                           Expan.
          3496 3575.79
                                                    Ž00
                                                                  . 1
                                                                             . 3
                                    760
                                            760
Ineffective Flow
                     num=
           Sta R
                          Permanent
                    El ev
   Sta L
       0
            3456
                     180
                               F
                               F
    4156 4913.62
                     180
CROSS SECTION OUTPUT Profile #1%
*****
* E.G. Elev (ft)
                         * 174.57 * Element
                                                                Left OB *
                                                                           Channel *
Right OB *
  Vel Head (ft)
                              0.00
                                    * Wt. n-Val.
                                                                 0.070
                                                                            0.045
  0.070
* W.S. Elev (ft)
                            174.57
                                    * Reach Len. (ft)
                                                                760.00
                                                                           760.00
 200.00
* Crit W.S. (ft)
                            158. 78
                                    * Flow Area (sq ft)
                                                                435. 24
                                                                         * 1339.52
4128. 29
* E.G. Slope (ft/ft)
                         *0.000001
                                    * Area (sq ft)
                                                              * 5505.23
                                                                         * 1339.52
9837.14
                                    * Flow (cfs)
                                                                 54.76
* Q Total (cfs)
                            800.00
                                                                           349.80
 395. 43
* Top Width (ft)
                         * 2573.90
                                    * Top Width (ft)
                                                               1161.88
                                                                            79.79
1332. 23
                                                                  0.13
* Vel Total (ft/s)
                                    * Avg. Vel. (ft/s)
                              0.14
                                                                             0.26
  0. 10
 Max Chl Dpth (ft)
                             19.47
                                    * Hydr. Depth (ft)
                                                                             16.79
                                                                 10.88
   7. 12
* Conv. Total (cfs)
                         *655595.1
                                    * Conv. (cfs)
                                                               44878.5
                                                                         *286661.0
*324055.6
* Length Wtd. (ft)
                                    * Wetted Per. (ft)
                            453.05
                                                                 40.65
                                                                            81.19
 580. 55
* Min Ch El (ft)
                            155. 10
                                    * Shear (lb/sq ft)
                                                                  0.00
                                                                             0.00
   0.00
 Al pha
                              1.93
                                    * Stream Power (lb/ft s) *
                                                                  0.00
                                                                             0.00
  0.00
                              0.00
                                                                796.69
* Frctn Loss (ft)
                                    * Cum Volume (acre-ft)
                                                                            210.79
1171. 71
 C & E Loss (ft)
                              0.00 * Cum SA (acres)
                                                                 65.78
                                                                              9.72
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
              This may indicate the need for additional cross sections.
         Multiple critical depths were found at this location. The critical depth
with the lowest, valid, energy was used.
CROSS SECTION OUTPUT Profile #Floodway
* E.G. Elev (ft)
                         * 175.43 * Element
                                                                Left OB *
                                                                           Channel *
Right OB *
* Vel Head (ft)
                              0. 01
                                    * Wt. n-Val.
                                                                 0.070 *
                                                                            0.045 *
```

* W.S. Elev (ft)	*	Pr 175. 43		osed - No-Rise Reach Len. (ft)	*	760. 00	*	760. 00	*
200.00 * * Crit W.S. (ft)	*	158. 78	*	Flow Area (sq ft)	*	3. 08	*	1342. 23	*
* E.G. Slope (ft/ft)	*0	. 000009	*	Area (sq ft)	*	3. 08	*	1342. 23	*
* Q Total (cfs)	*	800.00	*	Flow (cfs)	*	0. 07	*	799. 93	*
* Top Width (ft)	*	75. 30	*	Top Width (ft)	*	0. 20	*	75. 10	*
* Vel Total (ft/s)	*	0. 59	*	Avg. Vel. (ft/s)	*	0. 02	*	0. 60	*
* Max Chl Dpth (ft)	*	20. 33	*	Hydr. Depth (ft)	*	15. 41	*	17. 87	*
* Conv. Total (cfs)	*2	66343. 9	*	Conv. (cfs)	*	22. 2	* :	266321. 7	*
* Length Wtd. (ft)	*	759. 92	*	Wetted Per. (ft)	*	15. 59	*	91. 12	*
* Min Ch El (ft)	*	155. 10	*	Shear (Ib/sq ft)	*	0.00	*	0. 01	*
* Al pha	*	1. 00	*	Stream Power (lb/ft s)	*	0.00	*	0. 00	*
* Frctn Loss (ft)	*	0. 01	*	Cum Volume (acre-ft)	*	97. 78	*	218. 91	*
690.48 * * C & E Loss (ft) 28.87 *	*	0.00		Cum SA (acres)	*	2. 30	*	9. 68	*
**************************	***	*****	**	*******	***	*****	* * :	*****	**

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# 

******	****	******	× × :	*****	× × :	*****	× ×
*****							
* E.G. Elev (ft) Right OB *	* 169.34	* Element	*	Left OB	*	Channel	*
* Vel Head (ft)	* 0.02	* Wt. n-Val.	*	0. 070	*	0.045	*
0.070 * * W.S. Elev (ft) 200.00 *	* 169.33	* Reach Len. (ft)	*	760. 00	*	760. 00	*
* Crit W.S. (ft)	* 159.77	* Flow Area (sq ft)	*	225. 62	*	921. 40	*
1093.84 * * E.G. Slope (ft/ft)	*0.000049	* Area (sq ft)	*	1985. 78	*	921. 40	*
3001.66 * * Q Total (cfs)	* 1450.00	* Flow (cfs)	*	105. 28	*	1077. 43	*
267.29 *` * Top Width (ft)	* 1726.67	* Top Width (ft)	*	422. 22	*	79. 79	*
1224.66 * * Vel Total (ft/s)	* 0.65	* Avg. Vel. (ft/s)	*	0. 47	*	1. 17	*
0.24 * * Max Chl Dpth (ft)	* 14. 23	* Hydr. Depth (ft)	*	5. 64	*	11. 55	*
* Conv. Total (cfs)	*206780.0	* Conv. (cfs)	*	15013.1	* *	153649. 6	*
* Length Wtd. (ft)	* 603.38	* Wetted Per. (ft)	*	40. 65	*	81. 19	*
* Min Ch El (ft)	* 155.10	* Shear (Ib/sq ft)	*	0. 02	*	0. 03	*
* Al pha	* 2.49	* Stream Power (lb/ft s)	*	0. 01	*	0. 04	*
0:00 * * Frctn Loss (ft)	* 0.03	* Cum Volume (acre-ft)	*	422. 93	*	150. 60	*
533. 70 *		D 0/					

## 83. 15 \* \*

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth Note: with the lowest, valid, energy was used.

#### CROSS SECTION OUTPUT Profile #2%

*****									
* E.G. Elev (ft)	*	172. 98	*	Element	*	Left OB	*	Channel	*
Right OB * * Vel Head (ft)	*	0.00	*	Wt. n-Val.	*	0. 070	*	0. 045	*
0. 070 *									
* W.S. Elev (ft) 200.00 *	*	172. 98	*	Reach Len. (ft)	*	760. 00	*	760. 00	*
* Crit W.S. (ft)	*	159. 05	*	Flow Area (sq ft)	*	371. 68	*	1212. 74	*
3206. 38 *			.1.	. ( 61)	.1.			1010 71	
* E.G. Slope (ft/ft) 7732.13 *	* C	0. 000004	*	Area (sq ft)	*	4074. 42	*	1212. 74	*
* Q Total (cfs)	*	950.00	*	Flow (cfs)	*	66. 88	*	470. 86	*
412.21	.1.	0.177 . 15	.1.	T	.1.	704 50			
* Top Width (ft) 1314.77 *	*	2176. 15	*	Top Width (ft)	*	781. 58	*	79. 79	*
* Vel Total (ft/s)	*	0. 20	*	Avg. Vel. (ft/s)	*	0. 18	*	0. 39	*
0.13 * * Max Chl Dpth (ft)	*	17. 88	*	Hydr. Depth (ft)	*	9. 29	*	15. 20	*
5.53 *		17.00		nyur. Deptii (11)		9. 29		13. 20	
* Conv. Total (cfs)	*4	90044.5	*	Conv. (cfs)	*	34496.6	*2	242884. 1	
*212663. 8 *	.1.	404 00	.1.	W	.1.	40 (5		04 40	
* Length Wtd. (ft) 580.55 *	*	481. 90	*	Wetted Per. (ft)	*	40. 65	*	81. 19	*
* Min Ch El (ft)	*	155. 10	*	Shear (Ib/sq ft)	*	0.00	*	0.00	*
0.00 * * Al pha	*	2. 14	*	Stream Power (lb/ft s)	*	0.00	*	0.00	*
0.00 *				,					
* Frctn Loss (ft) 975.39 *	*	0.00	*	Cum Volume (acre-ft)	*	677. 82	*	192. 75	*
* C & E Loss (ft)	*	0.00	*	Cum SA (acres)	*	60. 39	*	9. 72	*
87. 31 *									
******	* * *	*****	* *	********	* * ;	*****	* * >	******	* *

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

# 

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****										
* E.G. Elev (ft)	*	178. 47	*	Element		*	Left OB	*	Channel	*
Right OB *										
* Vel Head (ft)	*	0. 00	*	Wt. n-Val.		*	0. 070	*	0. 045	*
0.070 * * W.S. Flank (£+)	*	170 47	*	Doogle Lon	(£+)	*	7/0 00	*	7/0 00	*
* W.S. Elev (ft) 200 00 *		178.47		Reach Len.	(11)		760. 00		760. 00	

	Pr	oposed - No-Rise					
* Crit W.S. (ft) 6393.82 *		* Flow Area (sq ft)	*	591. 42	*	1651. 08	*
* E.G. Slope (ft/ft) *15059.64 *	*0.000000	* Area (sq ft)	* -	10656. 68	*	1651. 08	
* Q Total (cfs) 407.94 *	* 700.00	* Flow (cfs)	*	45. 43	*	246. 63	*
* Top Width (ft) 1337.83 *	* 2779.42	* Top Width (ft)	*	1361. 80	*	79. 79	*
* Vel Total (ft/s) 0.06 *	* 0.08	* Avg. Vel. (ft/s)	*	0. 08	*	0. 15	*
* Max Chl Dpth (ft) 11.02 *	* 23. 37	* Hydr. Depth (ft)	*	14. 79	*	20. 69	*
* Conv. Total (cfs) *671847.1 *	*1152855.0	* Conv. (cfs)	7	* 74816.0	;	*406191. 4	
* Length Wtd. (ft) 580.55 *	* 412.61	* Wetted Per. (ft)	*	40. 65	*	81. 19	*
* Min Ch El (ft) 0.00 *	* 155. 10	* Shear (Ib/sq ft)	*	0.00	*	0.00	*
* Al pha 0.00 *	* 1.62	* Stream Power (lb/ft s)	*	0.00	*	0. 00	*
* Frctn Loss (ft) 1681.98 *	* 0.00	* Cum Volume (acre-ft)	*	1124. 46	*	254. 96	*
* C & E Loss (ft) 104.10 *	* 0.00	* Cum SA (acres)	*	73. 87	*	9. 72	*
	*****	******	* * *	*****	* * :	*****	<b>*</b> *
*****							

Warning: Divided flow computed for this cross-section. Warning: The cross-section end points had to be extended vertically for the computed

water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

## CROSS SECTION

RIVER: RIVER-1 REACH: Reach-1

RS: 243

Description: XS 243

JUST UPST	REAM OF	CANNON B	RANCH						
Station E	I evati on	Data	num=	482					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
*****	*****	*****	*****	*****	*****	*****	*****	*****	****
0	182. 52	3. 28	182. 48	6. 56	182. 57	9. 83	182. 52	19. 67	182. 62
26. 22	182. 59	42. 61	182. 65	45. 89	182. 62	55. 72	182. 73	65. 55	182. 73
75. 39	182. 91	85. 22	182. 96	95. 05	182. 94	104. 89	183. 07	111. 44	183. 11
118	183. 27	131. 11	183. 26	134. 39	183. 34	140. 94	183. 35	147. 5	182. 99
154. 05	182. 36	160. 61	182. 1	163. 89	181. 63	167. 16	181. 04	173. 72	179. 67
177	179. 11	180. 28	178. 67	186. 83	177. 41	190. 11	176. 97	196. 66	176. 44
203. 22	175. 75	206. 5	175. 61	213. 05	175. 48	216. 33	175. 47	229. 44	175. 17
236	174. 87	245. 83	174. 03	252. 39	173. 85	255. 66	173. 95	258. 94	174. 23
262. 22	174. 81	265. 5	175. 51	268. 77	176. 32	275. 33	178. 08	281. 88	179. 62
288. 44	181. 77	295	184. 31	298. 27	185. 52	301. 55	187. 73	304.83	189. 52
314. 66	192. 62	317. 94	193. 49	321. 22	194. 66	324. 5	195. 66	327. 77	196. 53
334. 33	197. 08	347. 44	196. 93	353. 99	196. 96	360. 55	196. 8	363.83	196. 82
367. 11	196. 72	373. 66	196. 71	376. 94	196. 63	380. 22	196. 34	386. 77	195. 46
390. 05	195. 16	396. 61	194. 78	399. 88	194. 7	403. 16	194. 76	409. 72	194. 59
416. 27	194. 59	422.83	194. 53	432. 66	194. 66	435. 94	194. 64	439. 22	194. 97
				Pag	je 98				

Proposed - No-Rise 196. 28 194. 5 196. 02 195. 37 449.05 458. 88 475. 27 196. 29 191. 24 445.77 452.33 196.41 462.16 195.94 449. 05 468. 72 485. 1 511. 33 547. 38 589. 99 465.44 471.99 478.55 189.17 193.05 194. 5 184. 41 172. 67 168. 23 167. 02 167. 3 165. 36 161. 48 481. 83 504. 77 540. 83 494. 94 524. 44 563. 77 599. 83 186. 88 175. 04 168. 35 167. 28 491. 66 521. 16 557. 21 180. 15 170. 18 167. 9 178. 51 169. 28 167. 57 498. 22 527. 72 570. 33 177.2 168.84 167.54 166. 98 167. 38 166. 82 167. 26 596.55 603.1 576.88 166.86 622.77 606.38 167.19 609.66 619.49 626.05 167.02 619. 49 642. 44 671. 94 694. 88 721. 1 747. 31 776. 77 629.32 164.41 

 166. 67
 635. 88

 161. 6
 662. 1

 161. 37
 688. 32

 161. 57
 714. 55

 161. 2
 744. 03

 160. 63
 773. 5

 161. 21
 799. 7

 161. 97
 819. 34

 161. 23
 845. 54

 161. 15
 871. 73

 161. 55
 891. 38

 160. 94
 924. 12

 161. 03
 953. 59

 161. 3
 979. 78

 160. 84
 1028. 9

 161. 11
 1055. 09

 160. 79
 1078. 01

 160. 74
 1104. 21

 635.88 645.71 163.6 655.55 166.67 161.86 675. 21 698. 16 724. 38 750. 58 780. 05 658.82 161.52 161.31 678.49 161.23 161. 48 161. 76 161. 25 161. 4 160. 55 161. 16 161. 31 161. 65 161. 07 161. 77 160. 75 161. 91 161. 39 161. 2 161. 72 160. 59 681. 77 707. 99 737. 48 770. 23 701. 44 730. 93 161. 52 161. 29 763. 68 783. 32 809. 52 838. 99 161. 2 161. 03 162. 25 161. 07 806. 24 832. 44 852. 08 789. 87 812. 79 802. 97 825. 89 161. 46 161. 36 161. 09 838. 99 161. 1 858. 63 161 884. 83 161. 06 907. 75 160. 84 937. 22 161. 17 969. 96 160. 87 1005. 98 161. 16 1045. 27 160. 98 1068. 19 160. 84 1094. 38 161. 25 1130. 4 159. 9 1156. 59 160. 48 1182. 79 159. 65 1218. 8 848. 81 878. 28 897. 92 927. 39 956. 86 161. 2 161. 18 161. 75 161. 05 160. 99 842.26 161.33 160. 99 881. 55
161. 51 904. 47
160. 8 930. 67
161. 02 963. 41
160. 87 996. 15
161. 07 1038. 72
160. 82 1064. 91
160. 89 1087. 83
160. 97 1127. 12
160. 06 1153. 32
160. 24 1176. 24
159. 6 1212. 26
163. 67 1235. 18
162. 42 1254. 82
164. 63 1334. 49
165. 79 1369. 42
165. 83 1405. 44
166. 15 1438. 18
165. 82 1470. 93
165. 79 1506. 97
165. 59 1546. 28
165. 36 1572. 49
164. 54 1615. 08
164. 96 1644. 57
165. 78 1696. 99
165. 52 1723. 19
164. 95 1775. 61
165. 29 1837. 86
164. 87 1880. 45
165. 29 1837. 86
164. 87 1880. 45
165. 2 1913. 21
165. 57 1959. 07
166. 08 2004. 94
166. 65 2040. 98
167. 86 2080. 29
169. 04 2119. 6
169. 4 2162. 19
168. 92 2208. 06
168. 64 2244. 1
168. 09 2283. 41
168. 13 2329. 27
167. 78 2362. 04
167. 9 2404. 62
167. 13 2447. 21
166. 17 2483. 25
165. 78 2532. 39
165. 78 2574. 98 865.18 161.22 888. 1 914. 3 947. 04 973. 23 1019. 07 1051. 82 160.9 161. 04 161. 19 160. 9 160. 9 927. 37 161. 1 956. 86 161. 11 992. 88 161. 04 1035. 44 160. 85 1058. 37 160. 87 1084. 56 160.7 161.06 160.84 1074.74 160.95 1097.66 160. 74 1104. 21 160. 89 1146. 77 160. 24 1166. 42 159. 92 1195. 88 161. 47 1228. 63 163. 03 1248. 27 153. 2 1331. 46 165. 96 1346. 5 165. 8 1389. 07 165. 9 1425. 08 166. 05 1454. 55 165. 8 1493. 87 165. 51 1529. 9 165. 44 1559. 39 164. 91 1601. 98 164. 63 1631. 46 165. 51 1683. 88 160.74 1104.21 160.66 1117.3 161.17 160. 41 1150. 05
160. 41 1150. 05
160. 18 1169. 69
159. 86 1199. 16
163. 36 1231. 9
162. 82 1252. 36
158. 84 1333. 4
166. 11 1362. 87
165. 7 1395. 62
165. 99 1431. 63
166. 05 1464. 38
165. 85 1500. 42
165. 48 1539. 73
165. 46 1565. 94
164. 59 1611. 81
164. 91 1634. 74
165. 79 1690. 43
165. 71 1716. 64
165. 09 1765. 77
164. 96 1795. 27
165. 15 1831. 31
164. 86 1873. 9
165. 59 1949. 25
166 1998. 39
166. 52 2031. 15
167. 26 2073. 74
168. 38 2106. 5
169. 48 2158. 92
169. 09 2201. 51
168. 65 2237. 54
168. 24 2270. 3
168. 13 2322. 72
167. 76 2348. 93
167. 91 2391. 52
167. 23 2437. 39
166. 33 2470. 15 1133.67 159.91 1163. 14 1189. 34 1222. 08 160.26 160. 48 1182. 79 159. 65 1218. 8 163. 73 1241. 72 162. 14 1258. 83 164. 79 1339. 95 165. 84 1372. 7 165. 83 1408. 71 160.68 160. 68 163. 42 157. 87 165. 64 165. 76 1245 1290 1343. 23 1379. 24 166. 23 1444. 73 165. 86 1480. 76 165. 8 1516. 8 1418.54 166. 2 1451. 28 1484. 04 165.86 165.6 1523. 35 1556. 11 1588. 87 1628. 19 1670. 78 165. 48 1549. 56 165. 32 1585. 6 164. 43 1621. 63 165 1660. 95 165.53 165.07 164.46 165.25 165. 51 1683. 88 165. 81 1713. 37 165. 83 1700. 26 165. 43 1729. 75 165. 78 1706.81 165.27 165. 81 1713. 37 165. 04 1752. 68 165. 06 1791. 99 165. 22 1824. 75 165. 09 1867. 34 164. 98 1900. 1 165. 51 1942. 69 166. 02 1988. 56 164. 99 1778. 89 165. 23 1808. 37 165. 25 1844. 41 164. 78 1887 165. 25 1926. 31 165. 63 1972. 18 166. 23 2011. 49 166. 83 2050. 81 167. 84 2083. 57 169. 34 2129. 43 169. 42 2172. 02 168. 94 2214. 61 168. 37 2253. 92 168. 12 2299. 79 167. 97 2332. 55 168. 05 2365. 31 167. 56 2411. 18 166. 88 2450. 49 164.99 1778.89 1742.85 164.94 1785.44 165.15 1821.48 165.15 1854. 24 1893. 55 1936. 14 1985. 28 165. 01 165. 27 165. 8 166. 25 166. 52 2027. 87 167. 09 2060. 63 168. 05 2090. 12 2021.32 166.95 2054.08 168.08 2086.84 169.26 168. 05 2090. 12 169. 46 2145. 81 169. 14 2194. 95 168. 76 2227. 72 168. 18 2267. 03 167. 98 2309. 62 167. 86 2342. 38 168. 17 2384. 97 2139. 26 2181. 85 169.23 168.77 2221. 16 2257. 2 2303. 07 2335. 83 168.27 167. 96 167. 97 168.05 2375.14 167.56 167. 4 2427. 56 2463. 59 166. 88 2450. 49 165. 79 2493. 08 2417.73 166.84 166.68 2453.77 165.79 165. 82 2525. 84 165. 85 2571. 71 165. 59 2502.91 165.64 2516.01 2545.5 165.53 2555.33 165.8 2558.6 165.68 2581.53 165.77

```
Proposed - No-Rise
                              165. 49 2607. 74 165. 67 2614. 3
 2591.36
           165. 74 2601. 19
                                                                   165. 71 2624. 12
                                                                                       165.83
                                                    166 2656.89
                              166.05 2643.78
 2630.68
           166.02
                     2640.5
                                                                    166. 14 2663. 44
                                                                                       166, 41
 2669. 99
2702. 75
2738. 79
           166. 57 2676. 54
166. 38 2712. 58
166. 54 2745. 34
166. 21 2794. 48
                              166. 55 2683. 09
166. 49 2719. 13
                                                 166. 47 2692. 92
166. 44 2725. 68
                                                                    166. 45
                                                                             2696. 2
                                                                                       166.53
                                                                    166. 56 2732. 24
166. 6 2774. 83
166. 18 2810. 86
                              166. 49 2719. 13
166. 43 2758. 44
                                                                                       166.48
                                                             2765
                                                 166.47
                                                                                       166.44
                              166. 16 2801. 03
165. 6 2830. 52
                                                 166.09 2807.59
 2784.65
                                                                                       166.13
 2817.41
           165.86 2827.24
                                                 165.64 2837.07
                                                                    165.53 2840.35
                                                                                       165.58
                                                 165. 42 2863. 28
 2843.62
            165. 5 2850. 18
                              165.51 2853.45
                                                                    165. 28 2869. 83
                                                                                       165, 11
                              165.06 2889.49
                                                 164.96 2896.04
 2876.38
           165. 14 2886. 21
                                                                    164. 93 2902. 59
                                                                                       165.07
           165. 51 2918. 97
166. 44 2951. 74
166. 91 2997. 6
 2909.15
                              165.53
                                       2928.8
                                                 165.82 2935.35
                                                                    166. 11 2938. 63
                                                                                       166.18
                                                  166. 5 2974. 67
                                                                    166.61
                                                                                       166.92
 2945. 18
                              166. 52
                                      2964.84
                                                                             2984. 5
           166. 91 2997. 6
167. 43 3027. 09
167. 26 3072. 95
167. 37 3125. 37
                              167. 15 3004. 15
167. 27 3040. 19
167. 33 3095. 88
167. 34 3131. 92
                                                 167. 25 3007. 43
167. 33 3043. 47
167. 41 3102. 44
167. 18 3138. 47
                                                                    167. 24 3013. 98
167. 42 3053. 29
167. 24 3112. 26
167. 16 3148. 3
 2991. 05
3017. 26
                                                                                       167.55
                                                                                       167.49
  3066.4
                                                                                       167.23
 3115. 54
                                                                                       166.97
 3151.58
                                                                    164.61 3177.79
           166.85 3167.96
                              165.99 3171.23
                                                  165. 5 3174. 51
                                                                                       164.48
                              164. 76 3190. 89
 3181.06
           164. 52 3184. 34
                                                 165.08 3194.17
                                                                    165. 4
                                                                               3204
                                                                                       167.16
                              168. 21 3223. 65
 3210.55
           167. 74 3213. 82
                                                 169. 39 3233. 48
                                                                    170. 43 3246. 58
                                                                                        172.4
 3249.86
            172. 8 3259. 69
                              173.82
Manning's n Values
                              num=
     Sta
                                                  n Val
           . 07 1254. 82 . 045 1334. 49
                                                  . 07
      1254.82 1334.49 Lengths: Left Channel Right
2 4920 3930 1480
ective Flow num= 2
Bank Sta: Left
                                                                      Coeff Contr.
                                                                                        Expan.
                                                                       . 1
                                                                                         . 3
Ineffective Flow
            Sta R
                       Elev Permanent
   Sta L
             1070
                      180
                              F
    2500 3259.69
                        180
CROSS SECTION OUTPUT Profile #1%
                                      *****
* E.G. Elev (ft)
                           * 174.57 * Element
                                                                        * Left OB *
                                                                                        Channel *
Right OB *
  Vel Head (ft)
                                   0.00 * Wt. n-Val.
                                                                            0.070
                                                                                         0.045
0.070 *
* W.S. Elev (ft)
                            * 174.57
                                         * Reach Len. (ft)
                                                                        * 4920.00
                                                                                     * 3930.00
1480.00 *
* Crit W.S. (ft)
                            * 159. 29
                                         * Flow Area (sq ft)
                                                                        * 2521.56
                                                                                     * 1456.25
9413.18 *
* E.G. Slope (ft/ft) *0.000003
*15497.25 *
                                          * Area (sq ft)
                                                                        * 9127.01
                                                                                     * 1456, 25
* Q Total (cfs)
                                                                                        590.99
                             * 2665.00
                                         * Flow (cfs)
                                                                           570.20
1503.82
* Top Width (ft)
                                                                           770.05
                                                                                         79.67
* Vel Total (ft/s) * 0.20
                                          * Avg. Vel. (ft/s)
                                                                             0.23
                                                                                           0.41
  0.16
 Max Chl Dpth (ft)
                                  21.37
                                          * Hydr. Depth (ft)
                                                                            13.64
                                                                                          18.28
   8.08 *
* Conv. Total (cfs)
                            *1425180.0 * Conv. (cfs)
                                                                         *304928.5
                                                                                      *316045.5
*804205.9
* Length Wtd. (ft)
                            * 2469.02 * Wetted Per. (ft)
                                                                           185. 45
                                                                                         86.43
1165. 83
 Min Ch El (ft)
                                153.20 * Shear (lb/sq ft)
                                                                             0.00
                                                                                           0.00
  0.00
 Al pha
                                   1. 56
                                         * Stream Power (lb/ft s) *
                                                                             0.00
                                                                                           0.00
  0.00
* Frctn Loss (ft)
                                   0.01 * Cum Volume (acre-ft) * 669.04 *
                                                                                        186. 40
1113.55
                                            Page 100
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## Proposed - No-Rise \* C & E Loss (ft) \* 0.00 \* Cum SA (acres) \* 48.92 \* 8.33 \*

81. 17 \* \*

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water šurface.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

	33									
CROSS SECTION OUTPUT Profile #Floodway										
********* * E. G. El ev (ft)	* 175.42	* Element	*	Left OB	*	Channel	*			
Right OB *  * Vel Head (ft)	* 0.04	* Wt. n-Val.	*	0. 070	*	0. 045	*			
0.070 * * W.S. Elev (ft) 1480.00 *	* 175.38	* Reach Len. (ft)	*	4920. 00	*	3930. 00	*			
* Crit W.S. (ft) 5.38 *	* 159.30	* Flow Area (sq ft)	*	244. 23	*	1520. 65	*			
* E.G. Slope (ft/ft) 5.38 *	*0.000055	* Area (sq ft)	*	244. 23	*	1520. 65	*			
* Q Total (cfs) 0.52 *	* 2665.00	* Flow (cfs)	*	150. 19	*	2514. 29	*			
* Top Width (ft) 0.51 *	* 100.00	* Top Width (ft)	*	19. 82	*	79. 67	*			
* Vel Total (ft/s) 0.10 *	* 1.51	* Avg. Vel. (ft/s)	*	0. 61	*	1. 65	*			
* Max Chl Dpth (ft) 10.55 *	* 22. 18	* Hydr. Depth (ft)	*	12. 32	*	19. 09	*			
* Conv. Total (cfs) 70.8 *	*360041.6	* Conv. (cfs)	*	20290. 8	*;	339680. 0	*			
* Length Wtd. (ft) 11.02 *	* 3279.12	* Wetted Per. (ft)	*	31. 54	*	86. 43	*			
* Min Ch El (ft) 0.00 *	* 153. 20	* Shear (Ib/sq ft)	*	0. 03	*	0. 06	*			
* Al pha 0.00 *	* 1.15	* Stream Power (lb/ft s)	*	0. 02	*	0. 10	*			
* Frctn Loss (ft) 690.47 *	* 0.11	* Cum Volume (acre-ft)	*	95. 62	*	193. 93	*			
* C & E Loss (ft) 28.87 *	* 0.01	* Cum SA (acres)	*	2. 12	*	8. 33	*			
	*****	*******	* * *	*****	* * :	*****	* *			
*****										

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT **********************************			**	*******	***	*****	* * :	*****	* *
* E.G. Elev (ft)	*	169. 32	*	Element	*	Left OB	*	Channel	*
Right OB *  * Vel Head (ft) 0.070 *	*	0. 01	*	Wt. n-Val.	*	0. 070	*	0. 045	*
* W. S. Elev (ft) 1480.00 *	*	169. 31	*	Reach Len. (ft)	*	4920. 00	*	3930. 00	*
* Crit W.S. (ft)	*	159. 60	*	Flow Area (sq ft) Page 101	*	1549. 13	*	1037. 07	*

2225 22 *	PI	oposed - No-Rise			
3285.02 * * E.G. Slope (ft/ft) 5455.72 *	*0.000042	* Area (sq ft)	* 5222. 48	8 * 1037.07	*
* Q Total (cfs) 981.48 *	* 3015.00	* Flow (cfs)	* 874.34	4 * 1159. 18	*
* Top Width (ft) 1846.38 *	* 2656.52	* Top Width (ft)	* 730.47	7 * 79.67	*
* Vel Total (ft/s) 0.30 *	* 0.51	* Avg. Vel. (ft/s)	* 0.56	6 * 1.12	*
* Max Chl Dpth (ft) 2.92 *	* 16.11	* Hydr. Depth (ft)	* 8.38	8 * 13.02	*
* Conv. Total (cfs) *151971.9 *	*466840.8	* Conv. (cfs)	*135381.8	8 *179487.1	
* Length Wtd. (ft) 1123.75 *	* 2945.30	* Wetted Per. (ft)	* 185.45	5 * 86.43	*
* Min Ch El (ft) 0.01 *	* 153. 20	* Shear (Ib/sq ft)	* 0.02	2 * 0.03	*
* Al pha 0.00 *	* 2. 28	* Stream Power (lb/ft s)	* 0.0	1 * 0.03	*
* Frctn Loss (ft) 514.29 *	* 0.13	* Cum Volume (acre-ft)	* 360.05	5 * 133.51	*
* C & E Loss (ft) 76.10 *	* 0.00	* Cum SA (acres)	* 44.98	8 * 8.33	*
	*****	*****	****	*****	**
*****					

Warning: Divided flow computed for this cross-section. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

## CROSS SECTION OUTPUT Profile #2%

	)TIIE #2% :*****	******	**	*****	**>	****	* *
*****							
* E.G. Elev (ft) Right OB *	* 172. 98	* Element	*	Left OB	*	Channel	*
* Vel Head (ft)	* 0.00	* Wt. n-Val.	*	0. 070	*	0. 045	*
0.070 * * W.S. Elev (ft) 1480.00 *	* 172. 98	* Reach Len. (ft)	*	4920. 00	*	3930. 00	*
* Crit W.S. (ft) 7559.69 *	* 159.42	* Flow Area (sq ft)	*	2227. 64	*	1329. 56	*
* E.G. Slope (ft/ft) *12439.05 *	*0.000007	* Area (sq ft)	*	7929. 91	*	1329. 56	
* Q Total (cfs) 1452.52 *	* 2805.00	* Flow (cfs)	*	645. 61	*	706. 87	*
* Top Width (ft)	* 2741.09	* Top Width (ft)	*	744. 34	*	79. 67	*
1917.08 * * Vel Total (ft/s) 0.19 *	* 0. 25	* Avg. Vel. (ft/s)	*	0. 29	*	0. 53	*
* Max Chl Dpth (ft) 6.49 *	* 19.78	* Hydr. Depth (ft)	*	12. 05	*	16. 69	*
* Conv. Total (cfs) *558015.6 *	*1077598.0	* Conv. (cfs)	7	*248022. 9	7	271559. 7	
* Length Wtd. (ft) 1165.83 *	* 2561.56	* Wetted Per. (ft)	*	185. 45	*	86. 43	*
* Min Ch El (ft)	* 153. 20	* Shear (Ib/sq ft)	*	0. 01	*	0. 01	*
* Al pha	* 1.72	* Stream Power (lb/ft s)	*	0.00	*	0.00	*
* Frctn Loss (ft)	* 0.02	* Cum Volume (acre-ft)	*	573. 10	*	170. 58	*
929.09 * * C & E Loss (ft) 79.90 *	* 0.00	* Cum SA (acres)	*	47. 08	*	8. 33	*
17.70		D 100					

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CDOSS SE	CTLON	OUTDUT	Profile	#0 20/
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*****							
* E.G. Elev (ft) Right OB *	* 178.47	* Element	*	Left OB	*	Channel	*
* Vel Head (ft) 0.070 *	* 0.00	* Wt. n-Val.	*	0. 070	*	0. 045	*
* W.S. Elev (ft) 1480.00 *	* 178.47	* Reach Len. (ft)	*	4920. 00	*	3930. 00	*
* Crit W.S. (ft) *13965.41 *	* 158.77	* Flow Area (sq ft)	*	3243. 43	*	1767. 43	
* E.G. Slope (ft/ft) *23016.65 *	*0. 000001	* Area (sq ft)	* *	12339. 78	*	1767. 43	
* Q Total (cfs) 1329.02 *	* 2100.00	* Flow (cfs)	*	397. 25	*	373. 73	*
* Top Width (ft) 1925.20 *	* 2860.36	* Top Width (ft)	*	855. 49	*	79. 67	*
* Vel Total (ft/s) 0.10 *	* 0.11	* Avg. Vel. (ft/s)	*	0. 12	*	0. 21	*
* Max Chl Dpth (ft) 11.98 *	* 25. 27	* Hydr. Depth (ft)	*	17. 55	*	22. 18	*
* Conv. Total (cfs) *1552015.0 *	*2452352.0	) * Conv. (cfs)	,	*463898. 0	;	*436439. 3	
* Length Wtd. (ft) 1165.83 *	* 2385.05	* Wetted Per. (ft)	*	185. 45	*	86. 43	*
* Min Ch El (ft) 0.00 *	* 153. 20	* Shear (Ib/sq ft)	*	0.00	*	0.00	*
* Al pha 0.00 *	* 1.35	* Stream Power (Ib/ft s)	*	0.00	*	0.00	*
* Frctn Loss (ft) 1594.56 *	* 0.00	* Cum Volume (acre-ft)	*	923. 85	*	225. 14	*
* C & E Loss (ft) 96.61 *	* 0.00	* Cum SA (acres)	*	54. 53	*	8. 33	*
	*****	*******	**:	*****	**	*****	**

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)

is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1 RS: 190

Description: XS 190 (LETTERED CROSS SECTION T) THE DIVIDED FLOW SECTION STARTS

AS A TRIBUTARY WITH COMMON XS-180

Station Elevation Data num= 307

El ev El ev Sta Elev Sta El ev Sta El ev Sta Sta Page 103

Proposed - No-Ri se 3. 27 22. 9 39. 26 55. 62 75. 24 91. 6 213.82 16.36 214.16 214.07 9. 81 213.97 13.09 0 213.69 214. 16 213. 58 212. 23 207. 9 200. 51 194. 77 19. 63 35. 99 52. 34 71. 97 26. 17 42. 53 58. 89 78. 52 212. 87 209. 87 204. 17 213. 43 211. 64 29. 44 45. 8 213.2 212.56 32.72 210. 84 205. 31 198. 08 49.07 208.98 206. 58 199. 29 62. 16 81. 79 65.43 203.07 196. 92 191. 86 85.06 195.85 193. 72 189. 21 88. 33 104. 69 101. 42 117. 77 190.85 94.87 192. 91 98.15 187. 85 177. 94 166. 42 111. 23 127. 59 190.14 114.5 186.37 184.88 189. 21 181. 12 169. 03 153. 8 162. 79 163. 61 163. 08 121. 05 137. 4 183. 46 169. 26 124.32 134.13 130.86 174.85 172.17 134. 13 147. 22 217. 68 235. 55 251. 91 268. 26 143. 95 215. 92 232. 28 248. 64 140. 67 163. 65 158. 89 137.67 160. 33 159. 56 157. 4 158 222. 46 238. 82 255. 18 271. 54 155 161. 55 163. 91 163. 16 163. 04 208 229. 01 245. 36 261. 72 278. 08 188 225. 73 242. 09 155 158. 89 163. 67 163. 31 162. 98 162. 91 162. 92 162. 72 162. 54 162. 54 163. 57 163. 38 163. 01 162. 98 163. 78 163. 25 163. 03 162. 83 162. 98 242. 09 258. 45 274. 81 291. 16 307. 52 323. 88 343. 51 363. 14 382. 77 399. 12 418. 75 435. 47 264. 99 281. 35 284. 62 300. 98 163. 03 162. 91 162. 93 162. 79 162. 51 162. 49 162. 46 162. 52 162. 43 162. 53 162. 8 162. 97 162. 84 162. 95 162. 91 162. 75 297. 71 314. 07 294. 44 310. 79 287.89 304.25 317.34 162.87 310. 79 327. 15 346. 78 366. 41 386. 04 402. 4 422. 02 438. 38 304. 25 320. 61 340. 24 356. 59 379. 5 395. 85 412. 21 431. 84 333. 69 330.42 162.67 162. 84 162. 53 162. 43 162. 55 162. 37 162. 48 162. 73 162. 75 162. 53 162. 59 162. 41 162. 43 333. 69 353. 32 372. 95 392. 58 408. 94 428. 57 444. 93 162. 45 162. 53 350.05 369. 68 389. 31 405. 67 425. 3 441. 65 162. 61 162. 35 162. 4 162. 74 162. 65 162. 34 162. 41 162. 69 435. 11 451. 47 467. 83 487. 46 510. 36 526. 71 546. 34 562. 7 579. 06 601. 96 618. 32 448. 2 464. 55 162. 7 454. 74
162. 41 474. 37
162. 24 494
162. 28 513. 63
161. 85 529. 98
162. 16 549. 61
162. 34 565. 97
162. 35 585. 6
162. 37 605. 23
162. 79 621. 59
163. 3 637. 94
163. 79 657. 57
164671. 5897
163. 81692. 4681
164. 03709. 8669
164. 35 734. 225
164. 831023. 043
164. 191040. 442
162. 831057. 841 162. 7 454.74 162.7 458.01 162.68 461.28 162.57 162. 68 162. 25 162. 35 162. 15 161. 83 162. 31 162. 16 162. 5 162. 96 162. 7 162. 27 162. 32 162. 22 161. 8 162. 23 162. 35 162. 19 162. 47 162. 24 477. 64 497. 27 480. 91 500. 54 162. 25 162. 35 484. 18 484. 18 503. 81 523. 44 543. 07 559. 43 575. 79 595. 41 162. 24 162. 32 162. 01 162. 08 162. 35 162. 37 497.27 516.9 533.26 552.89 569.24 588.87 608.5 624.86 641.22 500. 54 520. 17 539. 8 556. 16 572. 51 592. 14 611. 77 162. 09 161. 99 162. 38 162. 31 162. 17 162. 6 162.71 618. 32 162.86 628.13 163. 1 631. 4 647. 76 667. 39 682. 0289 702. 9073 723. 7858 163. 26 163. 61 634. 67 654. 3 163. 38 163. 9 644. 49 664. 12 163.49 164 164.02 103. 01 654. 3 163. 96 670. 66 163. 67688. 9884 163. 95706. 3871 164. 31727. 2656 164. 79755. 1035 164. 331036. 962 164 664.12 163.46678.5492 163.83699.4276 164.14720.3061 164.59744.6642 164.721030.003 163.861047.402 163. 36675. 0695 163. 83695. 9479 164. 09713. 3466 164. 45741. 1845 163.57 163.88 164.26 164.65 751. 6237 164. 831026. 523 164. 51 164. 041043. 922 163. 41 1033.483 164. 331036. 962 162. 871054. 361 162. 76 1071. 76 162. 661096. 118 160. 831137. 875 162. 361165. 713 162. 841186. 591 162. 98 1207. 47 163. 131256. 186 163. 931357. 098 164. 191384. 936 164. 821423. 214 165. 671458. 011 167. 11492. 808 164. 041043. 922 162. 831061. 321 162. 711082. 199 162. 621103. 077 160. 951144. 834 162. 571176. 152 162. 89 1197. 03 163. 051217. 909 163. 321346. 659 164. 031364. 058 164. 381405. 815 162. 831057. 841 162. 73 1075. 24 162. 641099. 598 1050. 881 162. 81 1064. 8 162. 711085. 679 162. 561130. 915 162.78 1068. 28 1089. 158 162.69 162. 561130. 915
161. 871148. 314
162. 791179. 632
162. 93 1200. 51
163. 081221. 389
163. 821350. 139
164. 061371. 017
164. 631409. 294
165. 221440. 612
166. 811485. 849
167. 541506. 727
169. 81558. 923
171. 141583. 281
172. 2 1607. 64
172. 911628. 518
173. 491670. 275
174. 221705. 072
174. 51729. 431 162. 641099. 598 160. 831141. 354 162. 471169. 193 162. 861190. 071 163. 011214. 429 163. 311259. 666 163. 971360. 578 164. 341388. 416 164. 831426. 693 165. 911478. 889 167. 251496. 288 169. 341548. 484 170. 871576. 322 171. 77 1600. 68 172. 771621. 559 173. 21638. 957 161.84 1134. 395 1162. 233 1183. 111 1203. 99 1224. 868 161.96 162. 83 162. 96 163. 1 163.88 1353. 619 164.16 164. 031364. 058 164. 381405. 815 164. 891437. 132 166. 691482. 369 167. 391499. 768 169. 641551. 964 1711579. 802 172. 05 1604. 16 172. 831625. 038 1353. 619 1374. 497 1419. 734 1451. 051 1489. 328 1534. 565 1562. 403 1586. 761 164.67 165.34 166.96 167. 82 170. 22 167. 11492. 808 169. 021541. 525 170. 391572. 842 171. 431593. 721 171. 27 172. 34 1611.119 172. 491618. 079 173.01 173. 11635. 478 174. 051687. 674 174. 331718. 991 174. 54 1736. 39 173. 21638. 957 174. 091694. 633 174. 451722. 471 174. 57 173. 281649. 396 174. 191698. 113 174. 481725. 951 1631. 998 1684. 194 173.85 174.3 1708.552 174.53 1732.91

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Manning's n Values
                          num=
                          n Val
    Sťa n Val
                     Sta
                                      Sta
                                           n Val
              . 1 147. 22
                                   217.68
                            . 045
Bank Sta: Left
                          Lengths: Left Channel
                                                   Ri ght
                                                             Coeff Contr.
                 Ri ght
                                                                             Expan.
       147. 22 217. 68
                                    735
                                                     735
                                                                    . 1
                                                                               . 3
                                            735
Blocked Obstructions
                         num=
Sta L Sta R
    1200 1736. 39 177. 48
CROSS SECTION OUTPUT Profile #1%
*****
* E.G. Elev (ft)
                          * 174.56 * Element
                                                                 Left OB *
                                                                             Channel *
Right OB *
  Vel Head (ft)
                              0.00
                                    * Wt. n-Val.
                                                                   0.100
                                                                              0.045
  0.100
* W.S. Elev (ft)
                            174. 56
                                    * Reach Len. (ft)
                                                                  735.00
                                                                             735.00
 735.00
* Cri t W. S. (ft)
                                     * Flow Area (sq ft)
                                                                  110.31
                                                                          * 1356.35
*10977.24
* E.G. Slope (ft/ft)
*10977.24 *
                                     * Area (sq ft)
                          *0.00006
                                                                  110.31
                                                                          * 1356.35
* Q Total (cfs)
                          * 2665.00
                                     * Flow (cfs)
                                                                   11.55
                                                                             743.81
1909.64 *
* Top Width (ft)
                          * 1068.78
                                     * Top Width (ft)
                                                                   16.00
                                                                              70.46
 982. 32
* Vel Total (ft/s)
                              0. 21
                                     * Avg. Vel. (ft/s)
                                                                    0.10
                                                                               0.55
  0. 17
 Max Chl Dpth (ft)
                              20.76
                                     * Hydr. Depth (ft)
                                                                    6.89
                                                                              19. 25
  11. 17
* Conv. Total (cfs)
                          *1127841.0 * Conv. (cfs)
                                                                   4887.1
                                                                           *314783.6
*808170.1
 Length Wtd. (ft) 995.34 *
                            735.00 * Wetted Per. (ft)
                                                                   21.43
                                                                              72.79
* Min Ch El (ft)
                             153.80
                                    * Shear (lb/sq ft)
                                                                    0.00
                                                                               0.01
   0.00
                                     * Stream Power (lb/ft s) *
 Al pha
                               2.30
                                                                    0.00
                                                                               0.00
  0.00
* Frctn Loss (ft)
                               0.01
                                     * Cum Volume (acre-ft)
                                                                  147.37
                                                                              59.52
 663.80
 C & E Loss (ft)
                              0.00 * Cum SA (acres)
                                                                    4.53
                                                                               1. 56
  31. 78 *
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
         1.4. This may indicate the need for additional cross sections.
CROSS SECTION OUTPUT Profile #Floodway
* E.G. Elev (ft)
Right OB *
* Vel Head (ft)
                             175.30 * Element
                                                                 Left OB *
                                                                             Channel *
                                     * Wt. n-Val.
                              0.01
                                                                   0.100
                                                                              0.045
  0. 100
* W.S. Elev (ft)
                            175. 29
                                     * Reach Len. (ft)
                                                                  735.00
                                                                             735.00
 735.00 *
* Crit W.S. (ft)
                                     * Flow Area (sq ft)
                                                                   42.91
                                                                          * 1408.05
                                       Page 105
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5272 88 *	ГІ	oposed - No-Ki se				
5273.88 * * E.G. Slope (ft/ft) 5273.88 *	*0.000012	* Area (sq ft)	*	42. 91	* 1408.05	*
* Q Total (cfs) 1477.91 *	* 2665.00	* Flow (cfs)	*	4. 29	* 1182.80	*
* Top Width (ft) 414.32 *	* 488.00	* Top Width (ft)	*	3. 22	* 70.46	*
* Vel Total (ft/s) 0.28 *	* 0.40	* Avg. Vel. (ft/s)	*	0. 10	* 0.84	. *
* Max Chl Dpth (ft) 12.73 *	* 21.49	* Hydr. Depth (ft)	*	13. 33	* 19. 98	*
* Conv. Total (cfs) *418622.6 *	*754871. 2	* Conv. (cfs)	*	1216. 5	*335032. 1	
* Length Wtd. (ft) 427.15 *	* 735.00	* Wetted Per. (ft)	*	16. 28	* 72.79	*
* Min Ch El (ft) 0.01 *	* 153.80	* Shear (Ib/sq ft)	*	0.00	* 0.02	*
* Al pha 0.00 *	* 2. 27	* Stream Power (Ib/ft s)	*	0.00	* 0.01	*
* Frctn Loss (ft) 600.78 *	* 0.01	* Cum Volume (acre-ft)	*	79. 41	* 61.82	*
* C & E Loss (ft) 21.82 *	* 0.00	* Cum SA (acres)	*	0. 82	* 1.56	*
	*****	********	***	*****	*****	***

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

## CROSS SECTION OUTPUT Profile #10%

	FOTITE #1U% ******	******	***	*****	**	*****	**
*****							
* E.G. Elev (ft) Right OB *	* 169. 19	* Element	*	Left OB	*	Channel	*
* Vel Head (ft)	* 0.01	* Wt. n-Val.	*	0. 100	*	0.045	*
0.100 * * W.S. Elev (ft) 735.00 *	* 169. 18	* Reach Len. (ft)	*	735. 00	*	735. 00	*
* Crit W.S. (ft)	*	* Flow Area (sq ft)	*	41. 48	*	977. 49	*
5695.29 * * E.G. Slope (ft/ft) 5695.29 *	*0.000044	* Area (sq ft)	*	41. 48	*	977. 49	*
* Q Total (cfs) 1798.93 *	* 3015.00	* Flow (cfs)	*	8. 77	*	1207. 30	*
* Top Width (ft) 982.32 *	* 1062.51	* Top Width (ft)	*	9. 72	*	70. 46	*
* Vel Total (ft/s) 0.32 *	* 0.45	* Avg. Vel. (ft/s)	*	0. 21	*	1. 24	*
* Max Chl Dpth (ft) 5.80 *	* 15.38	* Hydr. Depth (ft)	*	4. 26	*	13. 87	*
* Conv. Total (cfs) *271712.1 *	*455388.8	* Conv. (cfs)	*	1324. 8	* *	182351. 8	
* Length Wtd. (ft)	* 735.00	* Wetted Per. (ft)	*	13. 16	*	72. 79	*
* Min Ch El (ft)	* 153.80	* Shear (Ib/sq ft)	*	0. 01	*	0. 04	*
* Al pha	* 3.33	* Stream Power (lb/ft s)	*	0.00	*	0. 05	*
* Frctn Loss (ft)	* 0.03	* Cum Volume (acre-ft)	*	62. 77	*	42. 64	*
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	*	3. 18	*	1. 56	*
28. 05 *		D 40/					

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

#### CROSS SECTION OUTPUT Profile #2%

**************************************									
****									
* E.G. Elev (ft) Riaht OB *	* 172. 96	* Element	*	Left OB	*	Channel	*		
* Vel Head (ft)	* 0.00	* Wt. n-Val.	*	0. 100	*	0. 045	*		
* W.S. Elev (ft)	* 172. 96	* Reach Len. (ft)	*	735. 00	*	735. 00	*		
* Crit W.S. (ft)	*	* Flow Area (sq ft)	*	86. 26	*	1243. 59	*		
9405.18 * * E.G. Slope (ft/ft)	*0.000010	* Area (sq ft)	*	86. 26	*	1243. 59	*		
9405.18 *  * Q Total (cfs)	* 2805.00	* Flow (cfs)	*	10. 98	*	847. 79	*		
* Top Width (ft)	* 1066.83	* Top Width (ft)	*	14. 05	*	70. 46	*		
982.32 * * Vel Total (ft/s)	* 0. 26	* Avg. Vel. (ft/s)	*	0. 13	*	0. 68	*		
0.21 * * Max_Chl_Dpth (ft)	* 19. 16	* Hydr. Depth (ft)	*	6. 14	*	17. 65	*		
9.57 * * Conv. Total (cfs)	*901219.0	* Conv. (cfs)	*	3526. 8	* 2	272387. 5			
*625304.8 * * Length Wtd. (ft)	* 735.00	* Wetted Per. (ft)	*	18. 90	*	72. 79	*		
993.74 * * Min Ch El (ft)	* 153.80	* Shear (Ib/sq ft)	*	0.00	*	0. 01	*		
0. 01 * * Al pha	* 2.49	* Stream Power (lb/ft s)	*	0. 00	*	0. 01	*		
0.00 * * Frctn Loss (ft)	* 0.01	* Cum Volume (acre-ft)	*	120. 39	*	54. 50	*		
558.00 * * C & E Loss (ft)	* 0.00	* Cum SA (acres)	*	4. 25	*	1. 56	*		
30. 64 *		*****	***		**:		**		
*****									

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

### CROSS SECTION OUTPUT Profile #0.2%

****************************											
*****											
* E.G. Elev (ft) Right OB *	* 178.47	* Element	*	Left OB	*	Channel	*				
* Vel Head (ft) 0.100 *	* 0.00	* Wt. n-Val.	*	0. 100	*	0. 045	*				
* W.S. Elev (ft) 735.00 *	* 178.47	* Reach Len. (ft)	*	735. 00	*	735. 00	*				
* Crit W.S. (ft) *15353.23 *	*	* Flow Area (sq ft)	*	181. 22	*	1632. 14					
* E.G. Slope (ft/ft) *15353.23 *	*0.000002	* Area (sq ft)	*	181. 22	*	1632. 14					
* Q Total (cfs) 1485.40 *	* 2100.00	* Flow (cfs)	*	13. 39	*	601. 21	*				
* Top Width (ft)	* 1609.35	* Top Width (ft) Page 107	*	20. 18	*	70. 46	*				

		110	Ψ	73CU - 110-1113C					
1518. 71 *									
* Vel Total (ft/s)	*	0. 12	*	Avg. Vel. (ft/s)	*	0. 07	*	0. 37	*
0. 10 *									
* Max Chl Dpth (ft)	*	24. 67	*	Hydr. Depth (ft)	*	8. 98	*	23. 16	*
10. 11 *									
* Conv. Total (cfs)	*1	496851. 0	,	<sup>k</sup> Conv. (cfs)	*	9546. 4	* 2	128535. 2	
*1058769.0 *									
* Length Wtd. (ft)	*	735. 00	*	Wetted Per. (ft)	*	27. 15	*	72. 79	*
1535. 65 *									
* Min Ch El (ft)	*	153. 80	*	Shear (lb/sq ft)	*	0.00	*	0.00	*
0.00 *									
* Al pha	*	3.04	*	Stream Power (lb/ft s)	*	0.00	*	0.00	*
0.00 *				· · · · · ·					
* Frctn Loss (ft)	*	0.00	*	Cum Volume (acre-ft)	*	216. 74	*	71. 79	*
942. 73 * ` ´				·					
* C & E Loss (ft)	*	0.00	*	Cum SA (acres)	*	5. 08	*	1. 56	*
38. 11 * ` ´				, ,					
******	* * *	******	* * *	******	***	*****	***	******	*
*****									

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

#### CROSS SECTION

RI VER: RI VER-1

RS: 182 REACH: Reach-1

I NPUT

Description: XS 182

CROSS SECTION XS-182 ADDED

90

XS INSERTED TO EVALUATE IMPACT OF PROPOSED

FILL IN THE FLOODWAY									
Station E	l evati on	Data	num=	434					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
******			*****	*****	*****	*****	*****	*****	****
0	181. 14	3. 27	180. 81	13. 07	180. 06	19. 6	179. 82	22. 87	179. 6
26. 14	179. 65	29. 4	179. 59	35. 94			179. 66	42. 47	179. 48
49. 01	179. 3	52. 27	179. 06	58. 81			68. 61	177. 74	
71. 88	177. 29	75. 14	176. 96	78. 41	176. 91	84. 95	176. 74	91. 48	176. 69
94. 75	176. 37	101. 28	175. 66	104.55	175. 42	107.82	175. 26	124. 15	174. 2
133. 95	173.82	140. 49	173. 42	150. 29	172. 93	156. 82	172.82	160. 09	172. 69
166. 62	172. 2	169. 89	172.05	176. 43	172. 07	182. 96	171. 95	196. 03	171. 45
202.56	171. 11	209. 1	170. 92	218. 9	170. 52	222. 17	170. 43	231. 97	170. 46
238. 5	170. 18	245.04	169. 76	248. 3	169. 75	254.84	169. 56	258. 11	169. 55
264.64	169. 28	267. 91	169. 4	271. 17	169. 33	277. 71	168. 59	280. 98	168. 34
284. 24	168. 18	290. 78	168. 09	297. 31	167. 88	300. 58	167. 93	307. 11	168. 2
310. 38	168. 18	323.45	167. 59	336. 52	166. 69	339. 78	166. 5	343.05	166. 41
349. 59	166. 46	359. 39	166. 41	365. 92	166. 23	369. 19	166. 1	372. 46	166. 06
378. 99	166. 14	382. 26	166. 08	385. 52	165. 95	392.06	165. 56	395. 33	165. 47
405. 13	165. 45	408. 39	165. 41	414. 93	165. 26	421. 46	165. 3	428	165. 27
431. 26	165. 15	434. 53	164. 95	437.8	164. 86	447. 6	164. 83	454. 13	165. 1
457. 4	165. 18	460. 67	165. 17	467. 2	164. 99	470. 47	164. 94	473. 74	164. 97
477	164. 86	483. 54	164. 22	490. 07	164. 22	493. 33	164. 26	503. 12	164. 01
509. 65	163. 87	516. 18	163. 52	519. 44	163. 48	522. 7	163. 35	525. 97	163. 15
529. 23	163. 22	532. 5	163. 4	535. 76	163. 5	542. 29	163. 41	545. 55	163. 5
552.08	163. 93	558. 61	164. 03	561.87	163. 97	568. 4	163. 64	574. 93	163. 7
578. 19	163. 55	584. 72	163. 01	587. 98	162. 96	591. 24	163. 24	594. 51	163. 61
				Pag	e 108				
				•					

Proposed - No-Rise 162. 4617. 0814 597.77 163. 43 601. 04 162. 53601. 8448 161. 83624. 6997 161.83 639.9363 161. 16647. 5546 160. 3655. 1729 157. 34662. 7912 154. 83670. 4095 154.83 154. 83693. 2643 154. 83731. 3558 161. 39769. 4473 162. 34807. 5387 154. 83700. 8826 154. 83738. 9741 161. 79777. 0656 678.0278 154. 83708. 5009 154. 83746. 5923 154.83 154. 83685. 6461 716. 1192 754. 2106 154. 83723. 7375 160. 91761. 8289 156.84 161. 83784. 6838 161.83 792.3021 162.05799.9204 162. 831051. 324 162. 831058. 942 162.73 162. 341089. 415 1066.561 162. 551074. 179 162. 421081. 797 162. 281104. 652 162.11 1119.889 161. 961142. 743 161.85 1157.98 1621127.507 161. 91165. 598 161.94 1173. 217 162.081180.835 161. 451188. 453 161. 541196. 071 162.04 1203.69 161.89 161. 541176. 071 161. 541234. 163 161. 831302. 728 162. 211462. 712 161. 131531. 276 160. 011637. 932 1211. 308 1249. 399 1439. 857 1493. 185 161. 281241. 781 162. 831432. 238 162. 041477. 948 160. 971554. 131 161. 691226. 545 161. 81218. 926 161.58 161. 81257. 018 161. 831295. 109 162.83 162. 711447. 475 161. 331500. 803 160. 771607. 459 159. 631660. 787 162. 421455. 093 161. 21508. 421 160. 21630. 314 158. 831668. 405 161.66 160.85 1561. 749 1653. 169 159. 961645. 551 159. 89 160. 28 158. 831676. 024 159. 851683. 642 162. 21729. 352 162. 71896. 954 160. 941965. 519 162.39 1691.26 160.861698.879 161. 381706. 497 161. 851721. 733 1736.97 162. 631744. 588 162. 831881. 718 162.55 162. 831866. 481 162. 291912. 191 1904.572 161. 911919. 809 161.71 1957.9 160.83 1973. 137 2041. 702 2155. 976 2201. 686 160. 912011. 228 162. 832079. 793 161. 692018. 847 161. 862026. 465 162. 222034. 083 162.6 162. 832087. 411 163. 182171. 212 165. 612216. 922 165. 83 2280. 3 162. 782102. 648 163. 922178. 831 165. 772224. 541 162. 552110. 266 162.55 162. 72163. 594 165. 422209. 304 165. 84 2275. 3 166. 35 2310. 29 164. 622186. 449 165. 83 2260. 31 166. 36 2290. 3 166. 03 2335. 28 164.98 165.83 2265. 3 2300. 29 165. 89 2285. 3 166. 23 2325. 29 166.37 166. 26 2315. 29 165.63 2340.28 165.49 2345.28 165. 4 2355. 28 165.09 2360.28 165.04 2365.27 164.96 164. 46 2390. 27 164. 04 2415. 26 164.82 164.59 2385.27 2370.27 2380. 27 164.39 2395.26 164.27 104. 82 2380. 27 164. 18 2405. 26 163. 74 2430. 25 163. 39 2455. 25 163. 22 2490. 24 163. 02 2520. 23 163. 72 2550. 22 164. 27 2580. 21 163. 97 2420. 26 2400.26 164. 16 2410. 26 163.82 164. 04 2415. 26 163. 61 2440. 25 163. 35 2470. 24 163. 11 2505. 23 163. 41 2535. 22 163. 93 2560. 21 165. 03 2595. 2 163. 71 2435. 25 163. 4 2460. 24 163. 19 2500. 23 163. 09 2530. 22 163. 48 2445. 25 163. 34 2475. 24 2425. 26 2450. 25 163.41 163.26 2480. 24 2515. 23 2545. 22 2570. 21 163. 13 2510. 23 163. 59 2540. 22 163.05 163.67 163. 85 2555. 22 164. 61 2590. 2 164. 08 2565. 21 165. 2 2600. 2 164.15 165.45 166. 19 2645. 19 166. 29 2685. 18 166. 27 2720. 16 166.04 2635.19 2605.2 165.64 2620.2 166.02 2625.19 166.24 166. 31 2670. 18 166. 2 2705. 17 166. 37 2680. 18 166. 22 2710. 17 2650. 19 2690. 17 166. 29 2660. 18 166. 24 2700. 17 166.28 166.33 166. 2 2705. 17 166. 53 2750. 16 166. 69 2790. 14 167. 25 2825. 13 167. 55 2865. 12 167. 84 2910. 11 167. 75 2940. 1 100. 22 2/10. 1/ 166. 6 2755. 15 166. 82 2795. 14 167. 26 2835. 13 167. 65 2875. 12 167. 7 2945. 1 166. 24 2700. 17 166. 34 2745. 16 166. 58 2780. 15 167. 03 2820. 13 167. 47 2855. 12 167. 75 2900. 11 166. 63 2760. 15 166. 84 2805. 14 167. 38 2845. 13 167. 68 2885. 11 2725. 16 2765. 15 2810. 14 2850. 13 166.59 166.98 167. 45 167. 68 2890. 11 168.03 2920.1 168.02 2930.1 167.88 2935.1 167.88 2950.09 168.11 168.41 3000.08 2955.09 168.25 2960.09 168. 31 2975.09 168. 35 2980. 08 168.47 3020.07 3025.07 3030.07 3010.08 168.55 168.75 168.81 168.84 3040.07 168.94 168. 9 168. 96 3075. 06 3070.06 168.96 3085.05 3050.06 168.87 3060.06 169.05 168. 96 3073. 06 169. 26 3105. 05 169. 63 3130. 04 169. 9 3180. 02 170. 12 3235. 01 171. 08 3279. 99 169. 06 169. 38 169. 78 169. 96 170. 98 3095. 05 3120. 04 169. 11 169. 47 169. 85 170. 03 169. 32 3110. 04 169. 7 3135. 04 169. 89 3190. 02 170. 26 3255 3100.05 3090.05 169.48 9. 47 3125. 04 9. 85 3175. 02 9. 03 3230. 01 171 3274. 99 3115.04 169.72 3155. 03 3220. 01 169. 73 170. 68 3140. 04 3215. 01 3270 3299. 99 3339. 97 3265 171.04 3284.99 171.1 171. 42 3309. 98 171. 99 3344. 97 3294.99 171.33 171.65 3319.98 171.71 3329.98 171.9 3334.98 171. 93 172.09 3349.97 172. 16 3354. 97 172.28 171. 93 172. 32 172. 73 173. 32 173. 94 174. 25 174. 41 171. 99 172. 37 172. 96 173. 56 174. 07 174. 21 174. 77 175. 34 2. 49 3379. 96 173 3414. 95 3374. 96 3409. 95 3364.97 3369.97 172. 49 172. 53 3384. 96 173. 08 3419. 95 172.61 3404. 95 3439. 94 3484. 93 3509. 92 3544. 91 3389. 96 3429. 95 173.12 173. 06 3419. 95 173. 43 3459. 94 174. 17 3499. 93 174. 28 3529. 92 174. 92 3574. 9 175. 31 3609. 89 3444. 94 3489. 93 3514. 92 3449. 94 3494. 93 3519. 92 3564. 91 173. 51 174. 07 174. 29 174. 9 173.59 3474.93 174.23 3504. 92 3534. 91 174.4 3554. 91 175.01 3594.9 3579.9 175.04 3589.9 175. 41 3604.89 175.23 175. 28 176. 27 3614.89 3619.89 3634.88 175.71 3644.88 175.9 3649.88 175.07 175.98 3659.88 176. 39 3674. 87 3654.88 176. 1 3664.87 176.6 3679.87 176.77 177. 25 3709. 86 177. 15 3699. 86 3689.87 177. 01 3694.87 177. 41 3714. 86 177.58 177. 95 3734. 85 178. 31 3739. 85 178. 36 3744. 85 3719.86 177.8 3724.86 178.19

3749. 85 178. 33 3754. 85 3784. 84 179. 31 3789. 84	178. 58 37	oposed - No-Rise 64.84 178.74 3769.84 1 94.94 179.94 3801.49 1	78. 95  3779. 84 80. 11	179. 17
Manning's n Values Sta n Val Sta	num= n Val ******		n Val Sta	n Val *****
0 . 1639. 9363	. 045761	. 8289 . 031637. 932	. 0251683. 642	. 1
Bank Sta: Left Right 639. 9363754. 2106	Lengths:	Left Channel Ri ght 635 635 635	Coeff Contr. .1	Expan. . 3
CROSS SECTION OUTPUT Pr	ofile #1% ******	*******	*****	*****
* E.G. Elev (ft)	* 174.55	* Element	* Left OB *	Channel *
Right OB *  * Vel Head (ft) O 045 *	* 0.01	* Wt. n-Val.	* 0.100 *	0. 045 *
* W. S. Elev (ft)	* 174.54	* Reach Len. (ft)	* 635.00 *	635.00 *
635.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	* 3987.76 *	2129. 44
*26652.71 *  * E.G. Slope (ft/ft)	*0.000018	* Area (sq ft)	* 3987.76 *	2129. 44
*26652.71 * * Q Total (cfs)	*19965.00	* Flow (cfs)	* 962.12 *	2040. 88
*16962.00 * * Top Width (ft)	* 3419.79	* Top Width (ft)	* 521.09 *	114. 27 *
2784.43 * * Vel Total (ft/s)	* 0.61	* Avg. Vel. (ft/s)	* 0.24 *	0. 96 *
0.64 * * Max Chl Dpth (ft)	* 19.71	* Hydr. Depth (ft)	* 7.65 *	18. 63 *
9.57 * '	*4771374.0	* Conv. (cfs)	*229933.8	*487743. 9
*4053696.0 * * Length Wtd. (ft)	* 635.00	* Wetted Per. (ft)	* 521.69 *	116. 56 *
2785.19	* 154.83	* Shear (lb/sq ft)	* 0.01 *	0. 02 *
0. 01 * * Al pha	* 1.19	* Stream Power (lb/ft s	) * 0.00 *	0. 02 *
0.01 * * Frctn Loss (ft)	* 0.02	* Cum Volume (acre-ft)	* 112.80 *	30. 11 *
346.33 * * C & E Loss (ft)	* 0.00	* Cum SA (acres)	* *	*
* *******	*****	******	*****	*****
*****				
	ofile #Floo *****	dway *********	*****	*****
********* * E.G. Elev (ft)	* 175. 28	* Element	* Left OB *	Channel *
Right OB * * Vel Head (ft)	* 0.01	* Wt. n-Val.	* 0.100 *	0. 045 *
0.045 *	* 175. 28	* Reach Len. (ft)	* 635.00 *	635.00 *
635.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	* 1168.15 *	2213. 22
*25980.54 *` * E.G. Slope (ft/ft)	*0. 000015	* Area (sq ft)		2213. 22
*25980.54	*19965.00	* Flow (cfs)		2047. 59
*17578.87 `* ´ * Top Width (ft)	* 2380.00	* Top Width (ft) Page 110	* 93.94 *	

```
2171.79 *
                            0.68 * Avg. Vel. (ft/s)
                                                                              0.93 *
 Vel Total (ft/s)
                                                                  0. 29 *
  0.68
 Max Chl Dpth (ft)
                             20.45 * Hydr. Depth (ft)
                                                                  12.44 *
                                                                             19.37 *
11.96 *
* Conv. Total (cfs)
                         *5071660.0 * Conv. (cfs)
                                                               * 85997.4 *520144.5
*4465518.0
* Length Wtd. (ft)
                            635.00 * Wetted Per. (ft)
                                                                 105.93
                                                                            116.56 *
2179. 82
 Min Ch El (ft)
                            154.83
                                    * Shear (lb/sq ft)
                                                                   0.01
                                                                               0.02
  0.01
                              1.06
* Al pha
                                    * Stream Power (lb/ft s) *
                                                                   0.00 *
                                                                               0.02 *
  0.01
* Frctn Loss (ft)
                              0.02
                                    * Cum Volume (acre-ft)
                                                                             31.27 *
                                                                  69. 19 *
 337. 10 *
* C & E Loss (ft)
                              0.00 * Cum SA (acres)
CROSS SECTION OUTPUT Profile #10%
* E.G. Elev (ft)
                         * 169.16 * Element
                                                              * Left OB *
                                                                            Channel *
Right OB *
 Vel Head (ft)
                             0. 01
                                     * Wt. n-Val.
                                                                  0.100
                                                                             0.045
 0.041 *
* W.S. Elev (ft)
                         * 169.15
                                    * Reach Len. (ft)
                                                                 635.00
                                                                         * 635.00
635.00 *
* Cri t W.S. (ft)
*12777.64 *
                                     * Flow Area (sq ft)
                                                              * 1541.47
                                                                         * 1513.29
* E.G. Slope (ft/ft)
*12777.64 *
                         *0.000033 * Area (sq ft)
                                                              * 1541.47
                                                                          * 1513. 29
* Q Total (cfs)
                         *10495.00 * Flow (cfs)
                                                                 342.94
                                                                          * 1589, 42 *
8562.64
* Top Width (ft)
                         * 2823.72
                                    * Top Width (ft)
                                                                 367. 20
                                                                         * 114. 27
2342. 25
 Vel Total (ft/s)
                            0. 66
                                    * Avg. Vel. (ft/s)
                                                                   0. 22
                                                                              1.05
  0. 67
* Max Chl Dpth (ft)
                                    * Hydr. Depth (ft)
                         * 14. 32
                                                                   4. 20
                                                                             13. 24
5.46 *
* Conv. Total (cfs)
                         *1822617.0 * Conv. (cfs)
                                                               * 59556.3
                                                                          *276027.1
*1487034.0
* Length Wtd. (ft)
                         * 635.00
                                    * Wetted Per. (ft)
                                                                 367.66
                                                                            116, 56
2342. 96 *
                                    * Shear (lb/sq ft)
 Min Ch El (ft)
                         * 154.83
                                                                   0.01
                                                                               0.03
  0.01
* Al pha
                            1. 22
                                    * Stream Power (lb/ft s) *
                                                                   0.00
                                                                               0.03
  0. 01
* Frctn Loss (ft)
                              0.03
                                    * Cum Volume (acre-ft)
                                                                  49.42 *
                                                                             21.62 *
 169.00 *
* C & E Loss (ft)
                              0.00 * Cum SA (acres)
CROSS SECTION OUTPUT Profile #2%
* E.G. Elev (ft)
                        * 172.95 * Element
                                                              * Left OB *
                                                                            Channel *
Right OB *
                        * 0.01 * Wt. n-Val.
 Vel Head (ft)
                                                                  0. 100 *
                                                                             0.045 *
 0.044
```

```
Proposed - No-Ri se
                          * 172.94
* W.S. Elev (ft)
                                     * Reach Len. (ft)
                                                               * 635.00 * 635.00 *
 635.00 *
* Crit W.S. (ft)
                                     * Flow Area (sq ft)
                                                                          * 1946.24
                                                               * 3177.16
*22303.35 * 
* E.G. Slope (ft/ft)
                                     * Area (sq ft)
                          *0.000021
                                                                3177. 16
                                                                          * 1946.24
*22303.35
* 0 Total (cfs)
*14492.97 *
                          *17155.00
                                     * Flow (cfs)
                                                                  747.98
                                                                          * 1914.05
* Top Width (ft)
                          * 3253.64
                                     * Top Width (ft)
                                                                  489.87
                                                                             114. 27
2649.50 *
                                     * Avg. Vel. (ft/s)
 Vel Total (ft/s)
                              0.63
                                                                    0.24
                                                                               0.98
  0.65
 Max Chl Dpth (ft)
                             18. 11
                                     * Hydr. Depth (ft)
                                                                    6.49
                                                                              17.03
8.42 *
* Conv. Total (cfs)
                                     * Conv. (cfs)
                          *3762818.0
                                                                *164063.6
                                                                           *419831.8
*3178923.0
* Length Wtd. (ft)
                             635.00
                                     * Wetted Per. (ft)
                                                                  490.42
                                                                             116.56
2650. 25
 Min Ch El (ft)
                            154.83
                                     * Shear (lb/sq ft)
                                                                    0.01
                                                                               0.02
  0.01
                              1. 19
                                     * Stream Power (lb/ft s) *
 Al pha
                                                                    0.00
                                                                               0.02
  0.01
* Frctn Loss (ft)
                              0.02
                                     * Cum Volume (acre-ft)
                                                                   92.86
                                                                              27. 59
 290. 48 *
* C & E Loss (ft)
                               0.00 * Cum SA (acres)
**************************
CROSS SECTION OUTPUT Profile #0.2%
* E.G. Elev (ft)
                            178.47 * Element
                                                                  Left OB *
                                                                             Channel *
Right OB *
 Vel Head (ft)
                              0.01
                                     * Wt. n-Val.
                                                                   0.100
                                                                              0.045
  0.047
* W.S. Elev (ft)
                            178. 46
                                    * Reach Len. (ft)
                                                                  635.00
                                                                             635.00
 635.00
* Crit W.S. (ft)
                                     * Flow Area (sq ft)
                                                               * 6148.36
                                                                          * 2577.09
*38040.36
* E.G. Slope (ft/ft)
*38040.36 *
                                                                          * 2577.09
                          *0.000013
                                     * Area (sq ft)
                                                               * 6148.36
* Q Total (cfs)
                          *27500.00
                                     * Flow (cfs)
                                                                1562.89
                                                                          * 2382.47
*23554.64
* Top Width (ft)
                          * 3694.00
                                     * Top Width (ft)
                                                                  581.45
                                                                             114. 27
2998. 27
                                     * Avg. Vel. (ft/s)
* Vel Total (ft/s)
                              0.59
                                                                    0.25
                                                                               0.92
  0.62
 Max Chl Dpth (ft)
                                     * Hydr. Depth (ft)
                             23.63
                                                                   10. 57
                                                                              22. 55
  12.69
* Conv. Total (cfs)
                          *7737592.0
                                     * Conv. (cfs)
                                                                *439746.2
                                                                           *670347.3
*6627498.0
* Length Wtd. (ft)
                             635.00
                                     * Wetted Per. (ft)
                                                                  582.22
                                                                             116.56
2999. 11
 Min Ch El (ft)
                             154.83
                                     * Shear (lb/sq ft)
                                                                    0.01
                                                                               0.02
  0.01
 Al pha
                               1.17
                                     * Stream Power (lb/ft s) *
                                                                    0.00
                                                                               0.02
  0.01
* Frctn Loss (ft)
                              0.01
                                     * Cum Volume (acre-ft)
                                                                  163.34 *
                                                                              36. 27
 492. 27
* C & E Loss (ft)
                               0.00 * Cum SA (acres)
```

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CROSS SECTION

RIVER: RIVER-1 REACH: Reach-2

RS: 180

I NPUT

Description: XS 180 (LETTERED CROSS-SECTION S)

Station E			NUM=	476	UN 3)				
Sta	El ev	Sta	Elev	Sta	El ev	Sta	Elev	Sta	Elev
******									
0 26. 23	197. 84 195. 7	6. 56 32. 78	197. 09 194. 85	9. 83 36. 06	196. 8 194. 56	16. 39 39. 34	196. 36 194. 05	22. 95 45. 9	196. 04 193. 17
49. 17	192. 54	52. 45	192.06	55. 73	191. 49	62. 29	190. 55	65. 56	190. 42
68. 84	190. 12	75. 4	189. 32	85. 23	188. 34	88. 51	187. 79	95. 07	186. 39
98. 35	185. 63	104. 9	183.83	114. 74	181. 54	121. 29	180. 45	127. 85	179. 21
131. 13 154. 08	178. 63 175. 35	134. 41 157. 35	178. 19 174. 71	140. 96 160. 63	177. 45 174. 16	147. 52 163. 91	176. 86 173. 79	150. 8 167. 19	176. 16 173. 53
173. 75	173. 28	180. 3	172. 81	183. 58	172. 63	190. 14	171. 99	193. 42	171. 57
196. 69	171. 25	203. 25	171. 04	206. 53	171. 02	209. 81	171. 16	213.08	171. 22
219. 64	170. 94	222. 92	170. 97	226. 2	170. 88	232. 75	170.6	236. 03	170.54
239. 31 265. 54	170. 37 170. 28	245. 87 268. 81	170. 47 170. 16	249. 15 275. 37	170. 43 169. 75	255. 7 285. 21	170. 48 169. 4	262. 26 298. 32	170. 3 169. 3
304. 88	169. 18	311. 43	169. 14	321. 27	168. 81	327. 82	168. 72	334. 38	168. 73
347. 49	168. 35	354.05	168. 33	360. 61	168. 42	373.72	168. 27	377	168. 27
383. 55	168. 36	393. 39	168. 17	399. 94	168. 2	403. 22	168. 13	409. 78	167.88
416. 34 445. 84	167. 78 166. 95	419. 61 455. 67	167. 67 166. 83	429. 45 465. 51	167. 65 166. 68	436 472. 07	167. 39 166. 78	439. 28 478. 62	167. 37 166. 72
481. 9	166. 84	485. 18	166. 87	488. 46	166. 81	495. 01	166. 56	501.57	166. 49
511. 4	166. 29	514. 68	166. 28	521. 24	166. 36	524. 52	166. 3	534.35	166. 03
540. 91	165. 92	547. 46	165. 74	550. 74	165.7	557.3	165.82	563.86	165. 76
580. 25 613. 03	165. 37 164. 75	586. 8 616. 31	165. 13 164. 74	593. 36 619. 59	165. 04 164. 6	596. 64 629. 42	165. 08 164. 42	606. 47 639. 26	164. 93 164. 64
645. 81	164. 53	649. 09	164. 55	655. 65	164. 5	665. 48	164. 51	672.04	164. 35
681. 87	164. 19	685. 15	164. 18	694. 99	164. 27	698. 26	164. 35	711. 38	164. 3
721. 21	164. 43	724. 49	164. 52	731.05	164. 43	737. 6 783. 5	164. 48	744. 16	164. 4
757. 27 793. 33	164. 03 164. 02	760. 55 796. 61	164. 05 163. 94	767. 11 803. 17	164. 42 164. 28	809. 72	164. 21 164. 26	786. 78 813	164. 08 164. 31
816. 28	164. 18	819. 56	164. 17	826. 12	164. 07	832. 67	163. 65	835. 95	163. 57
842. 51	163. 95	845. 78	164. 07	849.06	164	852. 34	163.83	855. 62	163.83
865. 45 904. 79	164 163. 51	875. 29 911. 35	164. 02 163. 22	878. 57 917. 91	164. 11 163. 26	881. 85 927. 74	164. 08 163. 09	888. 4 934. 3	163. 84 162. 89
944. 13	162. 84	947. 41	162. 92	950. 69	162. 87	957. 74 957. 25	162. 63	960. 52	162. 6
970. 36	162. 72	973. 64	162. 7	980. 19	162. 94	983. 47	162. 84	990. 03	162. 95
999. 86		1003. 14		1006. 42	162. 93	1009.7		1012. 98	163.06
1016. 25 1062. 15		1019. 53 1068. 71		1032. 64 1075. 26		1042. 48 1078. 54		1055. 59 1081. 82	163. 69 163. 49
1088. 37		1000.71		1073. 20		1101. 49		1111. 32	162. 97
1114. 6	162.86	1121. 16	163. 01	1124. 43	162. 97	1130. 99	162. 7	1144. 1	162
1147. 38		1150.66		1157. 22	160. 28	1160.5		1163.77	159.87
1167. 05 1186. 72	160. 87	1170. 33 1190		1176. 89 1193. 28		1180. 16 1199. 83		1183. 44 1206. 39	160. 42 161. 94
1212. 95		1219. 5		1226. 06					161. 74
1265. 4		1291.62	161. 38	1298. 18	161. 32	1311. 27	161. 02	1321. 08	160.82
1334. 17	160. 79	1343. 98		1357. 29		1360. 56		1363.83	160. 21
1367. 1 1389. 99	159. 29 154. 15	1376. 91 1392	156. 46 153. 3	1380. 18 1447		1383. 45 1452. 11		1386. 72 1455. 38	154. 39 156. 03
1458. 65		1461. 92		1465. 19		1468. 46		1471. 73	161. 82
1475	161. 64	1478. 27	162. 03	1481. 54	161. 82	1484. 81	161. 77	1487. 92	162. 09
1497. 74		1507.55		1517. 37		1540. 27		1566. 44	161.84
1572. 98	161. /8	1608. 97	101.35	1635. 14	160.85 e 113	1651. 5	160. /6	1684. 21	160. 46
				ray	CIIJ				

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Proposed - No-Rise
                                                                         160.03
   1694.03
                            160. 36 1710. 38
     1762.7
                             160. 16 1788. 85
                                                                                                                                                                                                                      160. 14
                                                                                                                        160. 33 1844. 4
159. 89 1942. 44
160. 62 2184. 26
160. 34 2275. 96
160. 99 2348. 11
161. 97 2397. 29
162. 52 2430. 09
                            160. 02 1903. 22
159. 84 2138. 51
160. 27 2256. 29
160. 83 2334. 99
   1886. 88
1984. 92
                                                                                                                                                                                                                       159.88
                                                                                                                                                                                                                        160.28
   2230.06
                                                                                                                                                                                                                        160.83
   2325.15
                                                                                                                                                                                                                         161.5
                                                                                                                                                                        162. 28 2403. 85
162. 53 2439. 92
163. 12 2482. 55
                                                                                                                                                                                                                       162.39
   2367.78
                             161.62 2374.34
                                                                            161.81 2384.18
                             162. 43 2413. 69
162. 67 2459. 6
                                                                            162. 38 2420. 25
162. 88 2466. 16
   2410.41
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                                                                                                                        162. 32 2430. 09
163. 03 2472. 71
163. 99 2515. 34
165 2577. 65
164. 8 2620. 28
164. 41 2659. 63
165. 03 2705. 54
166 2738. 33
   2446.48
                                                                                                                                                                                                                        163.46
                           162.67 2459.6
163.66 2495.67
164.65 2548.14
164.83 2600.6
164.4 2649.79
164.62 2682.58
165.57 2728.49
166.29 2767.84
166.49 2810.47
                                                                          162. 88 2466. 16
163. 65 2512. 06
164. 83 2574. 37
164. 78 2610. 44
164. 43 2656. 35
164. 74 2695. 7
165. 77 2735. 05
                                                                                                                                                                      163. 12 2482. 55
164. 1 2531. 74
165. 04 2584. 21
164. 57 2633. 39
164. 36 2662. 91
165. 21 2712. 09
166. 05 2748. 16
  2492. 39
2541. 58
2594. 04
2643. 23
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164. 39
   2672. 74
2718. 65
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      165. 77
      2735. 05
      166
      2738. 33

      166. 4
      2774. 4
      166. 41
      2777. 68

      166. 33
      2820. 31
      166. 28
      2823. 59

      166. 32
      2862. 94
      166. 42
      2869. 49

      166. 81
      2899. 01
      166. 77
      2915. 4

      166. 86
      2944. 91
      166. 75
      2958. 03

      167. 12
      2994. 1
      167. 14
      3010. 5

      167. 32
      3040. 01
      167. 44
      3046. 57

      168. 14
      3118. 71
      168. 28
      3128. 55

      168. 65
      3158. 06
      168. 8
      3167. 0

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                                                                                                                                                                      166. 35 2794. 07
166. 31 2833. 42
   2758
2800. 63
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                           166. 49 2810. 47
166. 39 2853. 1
166. 73 2892. 45
166. 76 2931. 8
167. 05 2980. 99
167. 14 3036. 73
167. 65 3062. 97
168. 08 3112. 15
                                                                                                                                                                      166. 31 2833. 42
166. 44 2876. 05
166. 9 2921. 96
166. 94 2964. 59
167. 13 3017. 06
167. 51 3053. 13
167. 98 3092. 48
168. 43 3138. 39
   2839. 98
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   2885.89
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  2925. 24
2971. 15
3023. 61
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167. 52
   3059.69
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   3102.31
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                                                  3151.5
   3148.22
                             168.65
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                                                                                                                                                                        168.83 3177.74
                                                                                                                                                                                                                        168.94
                                                                         168. 65 3158. 06
169. 16 3200. 69
169. 73 3246. 6
170. 06 3276. 11
170. 5 3308. 9
171. 08 3364. 65
171. 61 3397. 44
172. 12 3436. 79
172. 77 3472. 86
173. 28 3505. 65
173. 5 3531. 89
                                                                                                                                                                      168. 83 3177. 74
169. 4 3223. 64
169. 98 3259. 72
170. 22 3295. 79
170. 64 3325. 3
171. 16 3381. 04
171. 85 3410. 56
172. 62 3453. 19
172. 91 3489. 26
173. 73 3518. 77
173 79 3548 28
                            169. 07 3197. 41
169. 48 3240. 04
                                                                                                                         169. 24 3213. 81
   3184. 29
                                                                                                                                                                                                                        169.47
                                                                                                                       169. 24 3213. 81
169. 82 3253. 16
170. 18 3285. 95
170. 59 3315. 46
171. 11 3367. 93
171. 72 3407. 28
172. 29 3449. 91
172. 87 3479. 42
173. 37 3515. 49
     3230. 2
                                                                                                                                                                                                                        170.06
                            169. 48 3240. 04
170. 01 3272. 83
170. 46 3305. 62
170. 76 3351. 53
171. 49 3394. 16
171. 96 3426. 95
172. 75 3466. 3
173. 23 3502. 37
   3266. 27
3299. 07
                                                                                                                                                                                                                        170. 5
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  3331. 86
3387. 6
3420. 39
3459. 74
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171. 82
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173. 07
   3495.82
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                            173. 23 3502. 37
173. 54 3528. 61
174. 26 3564. 68
175. 28 3617. 14
176. 15 3659. 77
176. 55 3686. 01
177. 44 3725. 36
178. 52 3764. 71
179. 17 3797. 5

    173. 28
    3505. 65
    173. 37
    3515. 49

    173. 5
    3531. 89
    173. 56
    3535. 17

    174. 46
    3571. 24
    174. 65
    3587. 63

    175. 57
    3623. 7
    175. 66
    3636. 82

    176. 12
    3666. 33
    176. 39
    3669. 61

    176. 72
    3689. 29
    176. 75
    3695. 84

    177. 76
    3738. 47
    178. 07
    3741. 75

    178. 7
    3774. 55
    179. 03
    3781. 1

    179. 28
    3804. 06
    179. 52
    3810. 62

    180. 37
    3849. 97
    180. 64
    3856. 52

                                                                                                                                                                      173. 73 3518. 77
173. 79 3548. 28
175. 03 3600. 75
175. 89 3646. 66
176. 43 3676. 17
177 3708. 96
178. 2 3748. 31
179. 19 3784. 38
179. 71 3813. 9
   3522. 05
3554. 84
                                                                                                                                                                                                                       174.24
                                                                                                                                                                                                                       175.23
  3607. 31
3649. 94
3679. 45
3718. 8
                                                                                                                                                                                                                       176.02
                                                                                                                                                                                                                         176. 6
                                                                                                                                                                                                                        177.34
                                                                                                                                                                                                                        178.38
   3758. 15
                                                                                                                                                                                                                       179. 22
   3787.66
                                                                                                                                                                                                                       179.76

    180. 64
    3856. 52
    180. 71
    3863. 08

    181. 15
    3899. 15
    181. 24
    3908. 99

    181. 77
    3938. 5
    181. 92
    3945. 06

                                                                            180. 37 3849. 97
   3823.73
                            180.09 3833.57
                                                                                                                                                                                                                       180.71
                                                                           180. 9 3892. 6
181. 64 3931. 95
                            180. 65 3882. 76
181. 53 3922. 11
   3869.64
                                                                                                                                                                                                                        181. 3
   3918.83
                                                                                                                                                                                                                      182. 13
   3961.46
                              182. 3
. 1 1363. 83 . 045 1465. 19 . 1
                                                                          Lengths: Left Channel Right Coeff Contr. 700 700 700 .1
Bank Sta: Left Right
                                                                                                                                                                                                                          Expan.
                     1363.83 1465.19
CROSS SECTION OUTPUT Profile #1%
                                                                                                 * E.G. Elev (ft)
                                                              * 174.53 * Element
                                                                                                                                                                                  * Left OB *
                                                                                                                                                                                                                          Channel *
Right OB *
                                                             * 0.01
     Vel Head (ft)
                                                                                                        * Wt. n-Val.
                                                                                                                                                                                             0.100 *
                                                                                                                                                                                                                            0.045
      0.100 *
Page 114
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```
700.00 *
* Crit W.S. (ft)
                                    * Flow Area (sq ft)
                                                             *11487. 99 * 2001. 89
*20862.82
* E.G. Slope (ft/ft)
*20862.82 *
                         *0.000056 * Area (sq ft)
                                                             *11487.99
                                                                        * 2001.89
* Q Total (cfs)
                         *19965.00
                                    * Flow (cfs)
                                                             * 5726.09
                                                                        * 3550.64
*10688.27
* Top Width (ft)
                         * 3408.33
                                    * Top Width (ft)
                                                             * 1205.36
                                                                           101.36
2101. 62
 Vel Total (ft/s)
                             0.58
                                    * Avg. Vel. (ft/s)
                                                                  0.50
                                                                             1.77
  0.51
* Max Chl Dpth (ft)
                                    * Hydr. Depth (ft)
                             21. 22
                                                                  9.53
                                                                            19. 75
   9. 93
* Conv. Total (cfs)
*1431673.0 *
                         *2674274.0
                                    * Conv. (cfs)
                                                              *766998.9
                                                                         *475601.3
* Length Wtd. (ft)
                            700.00
                                    * Wetted Per. (ft)
                                                             * 1206.18
                                                                           103.73
2102. 13
 Min Ch El (ft)
                                    * Shear (lb/sq ft)
                            153. 30
                                                                  0.03
                                                                             0.07
  0.03
                              2.28
                                    * Stream Power (lb/ft s) *
 Al pha
                                                                  0.02
                                                                             0.12
  0.02
 Frctn Loss (ft)
                              0.04
                                    * Cum Volume (acre-ft)
                                                                197.56
                                                                            32.99
 285.84
 C & E Loss (ft)
                              0.00
                                   * Cum SA (acres)
                                                                 19.55
                                                                             1.63
  31. 30 *
             ******************
*****
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\*\*\*\*\*\*\*\*\*\*\*

# CROSS SECTION OUTPUT Profile #Floodway

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```
* E.G. Elev (ft)
Right OB *
                           175.27 * Element
                                                               Left OB *
                                                                          Channel *
 Vel Head (ft)
                                   * Wt. n-Val.
                             0.01
                                                                0.100
                                                                           0.045
 0. 100
* W.S. Elev (ft)
                           175. 26
                                   * Reach Len. (ft)
                                                               700.00
                                                                          700.00
700.00
* Crit W.S. (ft)
                                   * Flow Area (sq ft)
                                                            * 8324.19
                                                                       * 2076.39
*20268.52 *
* E.G. Slope (ft/ft)
                                   * Area (sq ft)
                                                            * 8324.19
                                                                       * 2076.39
                        *0.000051
*20268. 52
* 0 Total (cfs)
                        *19965.00
                                   * Flow (cfs)
                                                             4714. 23
                                                                       * 3624.49
*11626. 28
* Top Width (ft)
                        * 2384.00
                                   * Top Width (ft)
                                                               667.83
                                                                          101.36
1614. 81
 Vel Total (ft/s)
                             0.65
                                   * Avg. Vel. (ft/s)
                                                                 0.57
                                                                            1.75
  0.57
* Max Chl Dpth (ft)
                            21.96
                                   * Hydr. Depth (ft)
                                                                12.46
                                                                           20. 49
  12.55
* Conv. Total (cfs)
                        *2784276.0
                                   * Conv. (cfs)
                                                             *657436.3
                                                                        *505463.4
*1621376.0
* Length Wtd. (ft)
                           700.00
                                   * Wetted Per. (ft)
                                                               679.31
                                                                          103.73
1622. 64
 Min Ch El (ft)
                           153. 30
                                   * Shear (lb/sq ft)
                                                                 0.04
                                                                            0.06
  0.04
 Al pha
                             1.94
                                   * Stream Power (lb/ft s) *
                                                                 0.02
                                                                            0.11
  0.02
 Frctn Loss (ft)
                             0.04
                                   * Cum Volume (acre-ft)
                                                               164.64 *
                                                                           34. 19
 269.88
 C & E Loss (ft)
                             0.00 * Cum SA (acres)
                                                                13. 13 *
                                                                            1.63 *
  22.87
```

CROSS SECTION OUTPUT P		*****	******	*****
********* * E C ELov (f+)	* 160 13	* Flomon+	* Laft OR ?	* Channal *
* E.G. Elev (ft) Right OB *	107. 13	* Element	Left Ob	
* Vel Head (ft) 0.100 *	* 0.02	* Wt. n-Val.	* 0.100	* 0.045 *
* W.S. Elev (ft) 700.00 *	* 169.11	* Reach Len. (ft)	* 700.00	* 700.00 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 5238.17	* 1453. 17
*10409.28 * * E.G. Slope (ft/ft) *10409.28 *	*0.000106	* Area (sq ft)	* 5238. 17	* 1453. 17
* Q Total (cfs)	*10495.00	* Flow (cfs)	* 2338.71	* 2873.50 *
5282.79 * * Top Width (ft)	* 2877.45	* Top Width (ft)	* 1051.45	* 101.36 *
1724.64 * * Vel Total (ft/s) 0.51 *	* 0.61	* Avg. Vel. (ft/s)	* 0.45	* 1.98 *
* Max Chl Dpth (ft) 6.04 *	* 15.81	* Hydr. Depth (ft)	* 4.98	* 14.34 *
* Conv. Total (cfs)	*1018457.0	* Conv. (cfs)	*226953.0	*278850. 4
*512653.3 *  * Length Wtd. (ft) 1725 08 *	* 700.00	* Wetted Per. (ft)	* 1052.05	* 103.73 *
1725.08 * * Min Ch El (ft) 0.04 *	* 153.30	* Shear (Ib/sq ft)	* 0.03	* 0.09 *
* Al pha 0. 02 *	* 3.30	* Stream Power (Ib/ft s)	* 0.01	* 0.18 *
* Frctn Loss (ft)	* 0.09	* Cum Volume (acre-ft)	* 94.94	* 24.13 *
130.30 * * C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 17.54	* 1.63 *
	*****	*******	*****	*****
*****				
	ofile #2%	*******	******	*****
******** * E.G. Elev (ft)	* 172.93	* Element	* Left OB <sup>*</sup>	* Channel *
Right OB * ` ´	172. 70			
* Vel Head (ft) 0.100 *	* 0.01	* Wt. n-Val.	* 0.100	0.045
* W.S. Elev (ft) 700.00 *	* 172. 91	* Reach Len. (ft)	* 700.00	* 700.00 *
* Crit W.S. (ft) *17550.06 *	*	* Flow Area (sq ft)	* 9563.10	* 1838. 92
* E.G. Slope (ft/ft) *17550.06 *	*0.000067	* Area (sq ft)	* 9563. 10 ·	* 1838. 92
* Q Total (cfs)	*17155.00	* Flow (cfs)	* 4694.70	* 3391.42 *
* Top Width (ft)	* 3300.79	* Top Width (ft)	* 1184.98	* 101.36 *
2014.46 * * Vel_Total (ft/s)	* 0.59	* Avg. Vel. (ft/s)	* 0.49	* 1.84 *
0.52 * * Max Chl Dpth (ft)	* 19.61	* Hydr. Depth (ft)	* 8.07	* 18.14 *
8.71 * * Conv. Total (cfs) *1103957 0 *	*2088281.0	* Conv. (cfs)	*571486.7	*412837.8
*1103957.0 * * Length Wtd. (ft) 2014.94 *	* 700.00	* Wetted Per. (ft)	* 1185.72	* 103.73 *
* Min Ch El (ft)	* 153.30	* Shear (Ib/sq ft) Page 116	* 0.03	* 0.07 *

	Proposed - No-Rise	
0. 04 * * Al pha	* 2.51 * Stream Power (Ib/ft s)	* 0.02 * 0.14 *
0.02 * * Frctn Loss (ft)	* 0.05 * Cum Volume (acre-ft)	* 166. 20 * 30. 36 *
236.30 * * C & E Loss (ft) 30.03 *	* 0.00 * Cum SA (acres)	* 19.28 * 1.63 *
	*********	******
CROSS SECTION OUTPUT Pr	ofile #0.2%	
	***********	*******
* E.G. Elev (ft) Right OB *	* 178.46 * Element	* Left OB * Channel *
* Vel Head (ft) 0.100 *	* 0.01 * Wt. n-Val.	* 0.100 * 0.045 *
* W. S. Elev (ft) 700.00 *	* 178.45 * Reach Len. (ft)	* 700.00 * 700.00 *
* Crit W.S. (ft) *29497.69 *	* * Flow Area (sq ft)	*16261.14 * 2399.62
* E.G. Slope (ft/ft) *29497.69 *	*0.000039 * Area (sq ft)	*16261.14 * 2399.62
* 0 Total (cfs) *15053.35 *	*27500.00 * Flow (cfs)	* 8428.02 * 4018.63
* Top Width (ft) 2287.72 *	* 3620.41 * Top Width (ft)	* 1231.32 * 101.36 *
* Vel Total (ft/s) 0.51 *	* 0.57 * Avg. Vel. (ft/s)	* 0.52 * 1.67 *
* Max Chl Dpth (ft) 12.89 *	* 25.15 * Hydr. Depth (ft)	* 13. 21 * 23. 67 *
* Conv. Total (cfs) *2409726.0 *	*4402175.0 * Conv. (cfs)	*1349150.0 *643298.6
* Length Wtd. (ft) 2288.29 *	* 700.00 * Wetted Per. (ft)	* 1232. 48 * 103. 73 *
* Min Ch El (ft) 0.03 *	* 153.30 * Shear (Ib/sq ft)	* 0.03 * 0.06 *
* Al pha 0. 02 *	* 1.95 * Stream Power (lb/ft s)	* 0.02 * 0.09 *
* Frctn Loss (ft) 414.42 *	* 0.03 * Cum Volume (acre-ft)	* 275.48 * 39.39 *
* C & E Loss (ft) 33.91 *	* 0.00 * Cum SA (acres)	* 20.12 * 1.63 *
********** ******	***********	* * * * * * * * * * * * * * * * * * * *
CROSS SECTION		
RI VER: RI VER-1 REACH: Reach-2	RS: 170	
INPUT Description: XS 170 (LET Station Elevation Data	num= 490	Flore Cha Flore
	******	
0 199.81 3.28 36.07 196.05 42.63	195. 12 49. 18 194. 27 55. 74 193	7. 73
62. 3 193. 06 68. 86 88. 53 192. 41 91. 81	192. 79 95. 09 192. 88 101. 65 193	2. 58
108. 2 192. 58 111. 48 131. 16 192. 96 134. 44		3. 39 121. 32 193. 34 3. 32 144. 27 193. 29
	<u> </u>	

Proposed - No-Rise 147. 55 170. 5 219. 69 242. 64 281. 99 304. 94 193. 14 192. 39 191. 42 189. 11 185. 85 182. 83 193. 03 192. 62 192. 46 191. 72 189. 27 154. 11 180. 34 226. 25 252. 48 285. 27 311. 5 337. 73 367. 24 403. 31 432. 82 452. 49 488. 56 514. 79 541. 02 570. 53 609. 88 639. 39 682. 02 727. 92 760. 71 800. 06 845. 97 872. 2 898. 43 160.67 192.73 163.95 192. 68 191. 95 167. 23 192. 73 192. 07 190. 25 187. 84 183. 96 182. 55 179. 38 160. 67 190. 18 232. 8 259. 04 291. 83 314. 78 193.46 206.57 192. 62 191. 01 188. 31 185. 36 182. 82 179. 72 177. 53 236. 08 265. 59 295. 1 321. 34 350. 85 239. 36 272. 15 298. 38 189. 58 187. 25 183. 51 181. 89 178. 77 176. 21 172. 21 171. 2 170. 12 169. 03 167. 89 167. 16 166. 42 165. 22 164. 65 163. 91 163. 63 163. 36 186.85 183. 2 324.61 181.51 180. 53 178. 07 331.17 341.01 357.4 178.26 350. 85 380. 36 416. 42 439. 38 465. 61 495. 12 524. 63 550. 86 583. 65 373. 8 409. 87 176. 74 173. 34 386. 91 422. 98 445. 93 472. 17 504. 96 531. 19 557. 42 593. 49 629. 56 662. 35 704. 97 747. 6 783. 67 826. 29 859. 08 888. 59 914. 82 360.68 175.53 175. 08 393. 47 174.18 171.45 175. 08 171. 16 171. 02 169. 81 168. 37 167. 44 166. 99 174. 18 171. 03 170. 72 169. 49 168. 27 167. 48 166. 88 173. 34 171. 06 170. 38 169. 32 168. 31 167. 42 166. 37 426. 26 449. 21 478. 72 511. 51 534. 47 563. 98 600. 05 409.87 436.1 462.33 491.84 518.07 544.3 580.37 171. 43 171. 2 169. 9 168. 7 167. 66 166. 97 580. 37 616. 44 645. 95 688. 58 734. 48 767. 27 806. 62 875. 48 908. 27 927. 94 973. 85 166. 88 165. 53 164. 82 164. 06 163. 57 163. 54 163. 37 163. 06 163. 06 164. 9 164. 4 163. 77 165. 56
164. 81
165. 56
164. 81
1639. 39
164. 33
1682. 02
163. 75
1727. 92
163. 59
160. 71
163. 34
160. 98
162. 9
162. 9
163. 9
162. 9
163. 9
164. 17
163. 26
163. 37
1032. 87
162. 43
1091. 89
162. 23
1124. 68
161. 81
1157. 47
161. 82
1186. 98
161. 68
1209. 93
162. 54
1236. 16
161. 78
1262. 39
162. 52
1288. 62
162. 15
1311. 57
162. 2
1341. 08
162. 21
1357. 48
162. 13
1482. 08
162. 62
1511. 59
161. 83
1588. 66
158. 62
1627. 88
152. 7
1714
159. 99
1742. 26
160. 39
1779. 05
161. 32
1814. 16
161. 39
1853. 35
160. 27
1908. 86
159. 18
1954. 58
159. 04
1997. 03
159. 22
2054. 94
159. 57
2094. 28
160. 77
2150. 02
162. 8
2202. 47 165. 27
164. 78
165. 79
164. 04
163. 52
1741. 04
163. 43
1777. 11
163. 33
164. 98
162. 98
162. 98
162. 98
162. 98
163. 24
163. 24
163. 24
163. 25
163. 24
163. 25
163. 24
163. 25
163. 27
1101. 72
163. 05
1006. 64
162. 17
1101. 72
161. 96
1134. 51
162. 14
1170. 58
161. 96
1193. 53
161. 99
1223. 04
161. 99
1246
162. 18
1275. 51
162. 46
1295. 18
162. 21
1324. 69
162. 17
1347. 64
162. 24
1377. 15
162. 89
1432. 89
162. 67
1455. 85
163. 31
1495. 19
161. 43
1520. 6
162. 83 632.83 672. 18 721. 37 754. 16 793. 5 832. 85 865. 64 163.55 163. 35 163. 48 163. 27 163. 22 162. 88 163. 04 163. 49 163. 12 163. 03 162. 91 163. 14 891.87 162. 98 927. 94
163. 19 973. 85
163. 08 1000. 08
162. 81 1039. 42
162. 4 1098. 45
161. 95 1131. 23
162. 02 1164. 02
162. 04 1190. 26
162 1219. 77
162. 04 1242. 72
162. 04 1268. 95
162. 52 1291. 9
162. 34 1318. 13
162. 04 1344. 36
162. 3 1367. 32
162. 71 1400. 11
162. 4 1426. 34
162. 75 1449. 29
163. 1 1488. 64
162. 79 1517. 39
162. 64 1536. 64
163. 1 1488. 64
162. 79 1517. 39
162. 64 1536. 65
161. 11 1745. 53
160. 8 1784. 74
161. 24 1827. 23
161. 41 1863. 15
159. 65 1921. 92
158. 88 1961. 11
158. 93 2006. 82
159. 09 2058. 22
159. 73 2110. 67
161. 21 2156. 57
163. 12 2209. 03 921. 38 941.06 163.35 163. 14 983. 68
162. 92 1013. 19
162. 56 1078. 77
162. 11 1111. 56
161. 91 1141. 07
162. 05 1177. 14
161. 78 1200. 09
162. 14 1226. 32
161. 73 1249. 28
162. 53 1278. 79
162. 29 1301. 74
162. 23 1331. 25
162. 41 1350. 92
162. 39 1390. 27
162. 72 1409. 94
162. 6 1436. 17
162. 85 1468. 96
163. 05 1498. 47
160. 14 1523. 81
162. 73 1549. 5
161. 17 1621. 34
154. 19 1650. 76
156. 36 1729. 19
159. 68 1752. 06
161. 2 1801. 08
160. 9 1840. 29
160. 89 1876. 21
159. 33 1938. 25
158. 6 1974. 17
159. 04 2029. 68
159. 33 2074. 61
160. 2 2127. 07
161. 92 2192. 63
163. 66 2222. 14
165. 27 2261. 48
166. 56 2323. 77 944. 34 986. 96 163.26 162. 96 1016. 47 1088. 61 1118. 12 1150. 91 1180. 42 162. 96 162. 38 162. 15 161. 69 161. 82 1203. 37 1229. 6 162.42 161. 6 1255. 83 1282. 06 1305. 02 1334. 53 1354. 2 1393. 55 162. 58 162. 13 162. 13 162. 08 162. 23 162. 88 162. 74 162. 46 1416. 5 1439. 45 163.15 1472.24 163.03 1505. 03 1527. 02 160.62 162. 79 1517. 39 161. 43 1520. 6
162. 64 1536. 66 162. 83 1539. 87
161. 83 1601. 74 161. 42 1605
158. 03 1644. 22 154. 77 1647. 49
152. 7 1722. 65 153. 83 1725. 92
161. 11 1745. 53 160. 85 1748. 8
160. 8 1784. 74 160. 98 1794. 55
161. 24 1827. 23 160. 94 1830. 49
161. 41 1863. 15 161. 21 1869. 68
159. 65 1921. 92 159. 4 1928. 45
158. 88 1961. 11 158. 63 1967. 64
158. 93 2006. 82 158. 95 2016. 62
159. 09 2058. 22 159. 12 2068. 06
159. 73 2110. 67 160. 01 2117. 23
161. 21 2156. 57 161. 37 2172. 96
163. 12 2209. 03 163. 36 2215. 58
164. 65 2245. 09 164. 85 2254. 92
166. 16 2290. 99 166. 21 2310. 66
166. 72 2346. 72 166. 83 2359. 83
167. 02 2395. 9 167. 07 2415. 57
Page 118 161.94 159. 1 159. 79 159. 03 159. 62 161. 29 1552. 72 1624. 61 1654 1732. 46 1768. 4 1807.62 161.27 160.39 1846.82 1846. 82 1879. 47 1944. 78 1987. 23 2035. 27 2081. 17 2140. 18 159. 32 159. 27 159. 1 159. 4 160. 37 162. 7 2195.91 163.9 2231. 98 164. 39 2238. 53 165. 84 2284. 43 165.45 2271.32 166.62 166. 82 2366. 39 167. 13 2418. 85 2333.61 166.75 2340.16 166.9 2376.23 166. 92 2386. 06 167.12 Page 118

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Proposed - No-Rise
                                                              167. 23 2474. 58
167. 14 2520. 48
167. 1 2559. 82
167. 2 2602. 44
167. 18 2674. 56
167. 32 2736. 85
167. 44 2782. 75
                                      167. 2 2458. 19
167. 05 2510. 64
                                                                                      167. 13 2487. 69
167. 16 2523. 75
 2445.07
               167. 27 2451. 63
                                                                                                               167. 11
              167. 27 2431. 03
167. 16 2504. 08
167. 11 2546. 7
167. 15 2589. 32
167. 1 2661. 45
167. 24 2710. 62
 2497.53
                                                                                                               167. 11
                                       167. 05 2510. 64
167. 06 2553. 26
167. 22 2595. 88
167. 2 2668
167. 3 2723. 74
167. 5 2776. 19
167. 58 2828. 65
 2540. 15
2576. 21
2625. 39
2704. 07
                                                                                       167. 05 2569. 65
167. 27 2615. 55
167. 23 2677. 84
167. 48 2743. 41
                                                                                                               167. 16
167. 21
                                                                                                                167.2
                                                                                                               167.47
 2749. 96
2799. 14
               167.53 2766.36
                                                                                       167.55 2789.31
                                                                                                               167.49
                167. 6 2812. 25
                                                               167.68 2841.76
                                                                                       167.72 2848.32
                                                                                                               167.71
                                                               167.78 2894.22
                                                                                        167. 9 2904. 05
 2854.87
                                       167.75 2874.54
               167.76 2864.71
                                                                                                               168.02
              167. 76 2864. 71
168. 07 2920. 44
167. 9 2966. 34
168. 11 3008. 96
167. 93 3067. 97
168. 41 3110. 59
 2913. 89
2959. 78
                                       168. 01 2933. 56
167. 97 2969. 62
                                                               167. 99 2943. 39
167. 94 2979. 45
                                                                                       167. 89 2949. 95
                                                                                                               167.87
                                                                                       168.03 2986.01
                                                                                                               167.99
                                                               168. 17 3031. 91
168. 26 3084. 36
168. 76 3123. 7
169. 37 3176. 16
 2999. 12
                                       168. 06 3022. 07
168. 02 3077. 81
                                                                                       167. 93 3048. 3
168. 31 3090. 92
                                                                                                  3048.3
                                                                                                               167.89
  3061.41
                                                                                                               168.42
 3097. 48
               168. 41 3110. 59
169. 26 3156. 49
                                       168. 68 3117. 15
169. 26 3166. 32
                                                 3117. 15
                                                                                       168. 92 3133. 54
169. 55 3195. 83
                                                                                                               169.09
 3149.93
                                                                                                               169.79
 3205.66
               169. 97 3218. 78
                                       170.09 3225.33
                                                               170. 2 3231. 89
                                                                                       170. 17 3238. 45
                                                                                                               170. 3
                                                               170. 66 3267. 95
170. 72 3297. 46
 3245.01
               170.31 3254.84
                                                                                       170.66 3274.51
                                       170.45
                                                  3261.4
                                                                                                               170.82
                                      170. 45 3291. 4
171. 04 3294. 18
171. 23 3343. 36
171. 75 3392. 53
172. 74 3454. 82
173. 51 3494. 16
174. 69 3540. 06
               171. 09 3287. 62
 3281.07
                                                                                       170. 63 3313. 85
                                                                                                               171.05
                                                                                       170. 63 3313. 65
171. 32 3363. 03
172. 09 3418. 76
172. 95 3467. 94
173. 85 3513. 84
175. 13 3556. 45
                                                               171. 24 3353. 19
171. 78 3412. 2
               171. 07
                           3336.8
 3323.69
                                                                                                               171.45
              171. 47 3385. 98
172. 32 3444. 99
173. 34 3484. 33
174. 59 3533. 51
 3369.58
                                                                                                               172. 22
                                                               172. 89 3461. 38
173. 76 3500. 72
174. 89 3549. 9
 3428. 6
3474. 49
                                                                                                                173.1
                                                                                                               174.19
 3526. 95
3566. 29
                                                                                                               175.18
                                                                                       176. 34 3605. 63
               175.48
                         3572.85
                                       175. 72 3585. 96
                                                               175.96 3599.07
                                                                                                               176.63
   3625.3
               177.08
                         3631.86
                                       177. 18 3638. 41
                                                               177.44 3644.97
                                                                                       177.81 3654.81
                                                                                                               178.13
                         3667. 92
3703. 98
 3661.36
               178.38
                                       178.58 3674.48
                                                               178.88 3684.31
                                                                                        179. 1 3690. 87
                                                                                                               179.42
               179.65
                                       179.78 3710.54
                                                               180.07
                                                                                        180. 2 3730. 21
 3697.43
                                                                         3717. 1
                                                                                                               180.66
               180. 95 3756. 44
181. 72 3792. 5
                                       181. 16 3762. 99
181. 94 3808. 89
                                                               181. 36 3772. 83
182. 31 3822. 01
                                                                                       181. 51 3776. 11
182. 47 3828. 56
 3740.05
                                                                                                                181. 6
 3785.94
                                                                                                               182.73
. 1 1627. 88 . 045 1729. 19 . . 1
                                      Lengths: Left Channel Right Coeff Contr.
Bank Sta: Left
                         Ri ght
                                                                                                                Expan.
          1627. 88 1729. 19
                                                     0 0
                                                                                0
                                                                                                                   . 3
CROSS SECTION OUTPUT Profile #1%
* E.G. Elev (ft)
                                   * 174.49 * Element
                                                                                                Left OB *
                                                                                                                Channel *
Right OB *
   Vel Head (ft)
                                 * 0.02
                                                      * Wt. n-Val.
                                                                                                 0.100 *
                                                                                                                  0.045
0.100 *
* W.S. Elev (ft)
                          * 174.47
                                                      * Reach Len. (ft)
                          * 164.09
* Crit W.S. (ft)
*14712.58 *
                                                      * Flow Area (sq ft)
                                                                                          *13099.76
                                                                                                            * 2104.20
* E.G. Slope (ft/ft) *0.000072
*14712.58 *
                                                      * Area (sq ft)
                                                                                            *13099.76
                                                                                                            * 2104.20
* Q Total (cfs)
                                   *19965.00
                                                      * Flow (cfs)
                                                                                            * 8014.20
                                                                                                            * 4393.02
7557.78 *
 Top Width (ft)
                                   * 3122.88
                                                                                            * 1227.74
                                                      * Top Width (ft)
                                                                                                                101. 31
1793. 83
 * Vel Total (ft/s)
                                                      * Avg. Vel. (ft/s)
                                            0.67
                                                                                                   0.61
                                                                                                                    2.09
    0.51
  Max Chl Dpth (ft)
                                           21.77 * Hydr. Depth (ft)
                                                                                                  10.67
                                                                                                                  20.77
8. 20 *
* Conv. Total (cfs)
                                                                                            *942531.6
                                   *2348039.0 * Conv. (cfs)
                                                                                                              *516653.5
*888854.0 *
* Length Wtd. (ft)
                                                      * Wetted Per. (ft)
                                                                                          * 1229.44 *
                                                                                                               103. 78 *
1794. 61
                                                         Page 119
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Proposed - No-Rise
                                                                          0.09 *
* Min Ch El (ft)
                           152.70 * Shear (lb/sq ft)
                                                                0.05 *
  0.04
 Al pha
                             2.72 * Stream Power (lb/ft s) *
                                                                0.03
                                                                           0.19
  0.02
                                   * Cum Volume (acre-ft)
* Frctn Loss (ft)
                                   * Cum SA (acres)
* C & E Loss (ft)
************************
CROSS SECTION OUTPUT Profile #Floodway
* E.G. Elev (ft)
                          175. 23
                                   * Element
                                                              Left OB *
                                                                        Channel *
Right OB *
 Vel Head (ft)
                            0.02
                                   * Wt. n-Val.
                                                               0.100
                                                                         0.045
 0. 100
* W.S. Elev (ft)
                           175. 21
                                   * Reach Len. (ft)
* Crit W.S. (ft)
                           164.08
                                   * Flow Area (sq ft)
                                                           *12165.82
                                                                      * 2179.17
*13320.13
* E.G. Slope (ft/ft)
                        *0.000065
                                   * Area (sq ft)
                                                                      * 2179.17
                                                           *12165.82
*13320.13
* 0 Total (cfs)
                                                           * 7803.99
                        *19965.00
                                   * Flow (cfs)
                                                                      * 4406.88
7754. 13
* Top Width (ft)
                        * 2300.00
                                   * Top Width (ft)
                                                              966.88
                                                                        101.31
1231. 81
 Vel Total (ft/s)
                            0.72
                                   * Avg. Vel. (ft/s)
                                                                0.64
                                                                          2.02
  0. 58
* Max Chl Dpth (ft)
                                   * Hydr. Depth (ft)
                            22.51
                                                               12.58
                                                                         21.51
  10.81
* Conv. Total (cfs)
                        *2481291.0 * Conv. (cfs)
                                                            *969895.5
                                                                       *547695.9
*963699.1
* Length Wtd. (ft)
                                   * Wetted Per. (ft)
                                                              978.95
                                                                        103.78
1239. 80
 Min Ch El (ft)
                           152.70 * Shear (Ib/sq ft)
                                                                0.05
                                                                          0.08
  0.04
                             2.29 * Stream Power (lb/ft s) *
 Al pha
                                                                0.03
                                                                           0.17
  0.03
                                   * Cum Volume (acre-ft)
* Frctn Loss (ft)
* C & E Loss (ft)
                                   * Cum SA (acres)
                                  ************
CROSS SECTION OUTPUT Profile #10%
* E.G. Elev (ft)
Right OB *
                           169.04
                                   * Element
                                                              Left OB *
                                                                        Channel *
 Vel Head (ft)
                            0.04
                                   * Wt. n-Val.
                                                               0.100
                                                                          0.045
  0. 100
* W.S. Elev (ft)
                           169.00
                                  * Reach Len. (ft)
* Cri t W. S. (ft)
                           161. 22
                                   * Flow Area (sq ft)
                                                           * 6577.77
                                                                      * 1550.04
5807. 59
* E.G. Slope (ft/ft)
                        *0.000153
                                   * Area (sq ft)
                                                           * 6577.77
                                                                      * 1550.04
5807. 59
* Q Total (cfs)
                        *10495.00
                                   * Flow (cfs)
                                                           * 3902.63
                                                                      * 3837.78
2754. 59
                                   * Top Width (ft)
* Top Width (ft)
                        * 2632.32
                                                           * 1131.87
                                                                      * 101.31
                                    Page 120
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1399. 14 *
                            0.75 * Avg. Vel. (ft/s)
 Vel Total (ft/s)
                                                                 0.59 * 2.48 *
  0.47
 Max Chl Dpth (ft)
                            16.30 * Hydr. Depth (ft)
                                                                 5.81
                                                                           15.30 *
4.15 * *
* Conv. Total (cfs)
                                                            *315671.3
                         *848906.6 * Conv. (cfs)
                                                                       *310425.2
*222810.1
* Length Wtd. (ft)
                                   * Wetted Per. (ft)
                                                            * 1133.28
                                                                          103.78
1399. 85 *
 Min Ch El (ft)
                           152.70 * Shear (lb/sq ft)
                                                                 0.06
                                                                            0. 14
  0.04
* Al pha
                             4.29 * Stream Power (Ib/ft s) *
                                                                 0.03 *
                                                                            0.35 *
  0. 02
                                   * Cum Volume (acre-ft)
* Frctn Loss (ft)
* C & E Loss (ft)
                                   * Cum SA (acres)
******************
CROSS SECTION OUTPUT Profile #2%
* E.G. Elev (ft)
                         * 172.87 * Element
                                                               Left OB *
                                                                          Channel *
Right OB *
 Vel Head (ft)
                            0.02
                                    * Wt. n-Val.
                                                                0.100 *
                                                                           0.045
 0.100 *
* W.S. Elev (ft)
                         * 172.85
                                   * Reach Len. (ft)
* Crit W.S. (ft)
*11859.25 *
                                   * Flow Area (sq ft)
                         * 163.61
                                                            *11122. 16 * 1940. 08
* E.G. Slope (ft/ft)
*11859.25 *
                         *0.000090
                                   * Area (sq ft)
                                                            *11122.16
                                                                       * 1940.08
* Q Total (cfs)
                         *17155.00
                                   * Flow (cfs)
                                                             * 6843.31
                                                                       * 4274.11
6037.58
* Top Width (ft)
                         * 3039.49
                                   * Top Width (ft)
                                                            * 1215.17
                                                                       * 101.31
1723. 01
                                                                            2.20 *
 Vel Total (ft/s)
                            0. 69
                                   * Avg. Vel. (ft/s)
                                                                 0.62
  0. 51
* Max Chl Dpth (ft)
                                   * Hydr. Depth (ft)
                            20. 15
                                                                 9. 15
                                                                           19. 15
6.88 *
* Conv. Total (cfs)
                         *1811196.0 * Conv. (cfs)
                                                             *722505.1 *451252.8
*637438.0 *
* Length Wtd. (ft)
                                   * Wetted Per. (ft)
                                                            * 1216.76
                                                                          103. 78
1723. 77
 Min Ch El (ft)
                         * 152.70 * Shear (lb/sq ft)
                                                                 0.05
                                                                            0.10
  0.04
* Al pha
                             3.06 * Stream Power (lb/ft s) *
                                                                 0.03 *
                                                                            0.23
  0. 02
                                   * Cum Volume (acre-ft)
* Frctn Loss (ft)
                                   * Cum SA (acres)
* C & E Loss (ft)
CROSS SECTION OUTPUT Profile #0.2%
* E.G. Elev (ft)
                       * 178.42 * Element
                                                             * Left OB *
                                                                          Channel *
Right OB *
                       * 0.01 * Wt. n-Val.
 Vel Head (ft)
                                                                0. 100 *
                                                                           0.045 *
 0.100
```

* W.S. Elev (ft)		oposed - No-Rise * Reach Len. (ft)	*	*		*
* Crit W.S. (ft) *22080.14 *	* 164. 95	* Flow Area (sq ft)	*18024.31	*	2503. 36	
* E. G. Slope (ft/ft) *22080.14 *	*0.000049	* Area (sq ft)	*18024.31	*	2503. 36	
* Q Total (cfs) *11669.83 *	*27500.00	* Flow (cfs)	*10988.85	*	4841. 32	
* Top Width (ft) 1933.15 *	* 3306.87	* Top Width (ft)	* 1272.41	*	101. 31	*
* Vel Total (ft/s) 0.53 *	* 0.65	* Avg. Vel. (ft/s)	* 0.61	*	1. 93	*
* Max Chl Dpth (ft) 11.42 *	* 25.71	* Hydr. Depth (ft)	* 14.17	*	24. 71	*
* Conv. Total (cfs) *1663519.0 *	*3920088.0	* Conv. (cfs)	*1566446.	0	*690123.	3
* Length Wtd. (ft) 1934.00 *	*	* Wetted Per. (ft)	* 1274. 29	*	103. 78	*
* Min Ch El (ft) 0.04 *	* 152.70	* Shear (Ib/sq ft)	* 0.04	*	0. 07	*
* Al pha 0.02 *	* 2. 22	* Stream Power (lb/ft s)	* 0.03	*	0. 14	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*		*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*		*
******	*****	******	*****	**:	*****	***

# CROSS SECTION

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RI VER: RI VER-2 REACH: Reach-1 RS: 250. 12

INPUT Description: SIDE CHANNE Station Elevation Data Sta Elev Sta	num= 285 Elev Sta	El ev Sta ******	El ev Sta *******	El ev *****
************************************	**************************************	**************************************	167. 7912. 22627 167. 83 27. 5091 167. 8342. 79193 167. 8358. 07477 167. 83 73. 3576 167. 8388. 64043 167. 83103. 9233 167. 83119. 2061 167. 38134. 4889 166. 66149. 7718 165. 63165. 0546 164. 98180. 3374 165. 75195. 6203 165. 39210. 9031 165. 39210. 9031 165. 39210. 9031 165. 39210. 9031 165. 83241. 4688 164. 83256. 7516 164. 83272. 0344 164. 83287. 3173 164. 91302. 6001 165. 28317. 8829	*******  167. 82  167. 83  167. 83  167. 83  167. 83  167. 83  167. 82  167. 24  166. 49  165. 32  165. 68  165. 68  164. 83  164. 83  164. 83  164. 83  164. 83  164. 98  165. 35
320. 9395 165. 42323. 9961 336. 2223 165. 8339. 2789	166. 24342. 3355	165. 57330. 1092 166. 83 345. 392 je 122	165. 65333. 1658 166. 93348. 4486	165. 72 167

```
Proposed - No-Rise
                                        167. 13357. 6183
167. 36372. 9011
167. 4375. 9577
167. 59 388. 184
167. 81403. 4668
167. 83406. 5234
168. 25418. 7496
168. 38421. 8062
                                                                                          167. 22363. 7314
167. 45379. 0143
351. 5052
               167. 08354. 5617
                                                                                                                     167. 26
                                                                                                                     167.49
 366.788
                167. 31369. 8446
               167. 54385. 1274
167. 77400. 4102
168. 11415. 6931
168. 78430. 9759
382. 0708
397. 3537
                                                                                           167. 68394. 2971
167. 85409. 5799
                                                                                                                     167. 72
167. 98
                                                                                            168. 51424. 8628
412.6365
                                                                                                                     168.64
427. 9193
                                         169. 02434. 0325
                                                                  169. 45 437. 089
                                                                                            169. 91440. 1456
                                                                                                                     170.61
443. 2022
                171. 41446. 2587
                                          171. 9449. 3153
                                                                  171. 97452. 3719
                                                                                            171. 83455. 4284
                                                                                                                     171.53
 458.485
                 171. 2461. 5416
                                         170. 84464. 5981
                                                                                            170. 83470. 7113
                                                                  170. 83467. 6547
                                                                                                                     170.83
                                         171.06 479.881
473.7678
                170. 95476. 8244
                                                                  171. 13482. 9375
                                                                                            171. 2485. 9941
                                                                                                                     171.27
                                                                                           171. 2485. 9941
170. 83501. 2769
171. 62516. 5598
171. 19531. 8426
170. 34547. 1254
169. 26562. 4083
167. 62 575. 907
167. 24 590. 049
                                                                  171. 02498. 2204
171. 67513. 5032
171. 33 528. 786
170. 52544. 0688
                                         171. 15495. 1638
171. 74510. 4466
                171. 27492. 1072
171. 62507. 3901
489.0507
                                                                                                                      171
504. 3335
519. 6163
534. 8992
                                                                                                                     171.58
               171. 57522. 6729
170. 88537. 9557
169. 98553. 2386
167. 96 567. 411
                                         171. 47525. 7295
170. 7541. 0123
169. 8556. 2951
167. 86 570. 243
                                                                                                                     171.04
                                                                                                                     170.16
 550. 182
564. 588
                                                                  169. 53559. 3517
167. 75 573. 075
                                                                                                                     168.97
                                                                                                                     167. 52
               167. 47 581. 562
167. 03 595. 713
                                         167. 42 584. 394
167. 03 598. 536
                                                                                                                     167.11
   578.73
                                                                  167. 36 587. 226
 592.881
                                                                  167.01 601.368
                                                                                            167.01
                                                                                                          604.2
                                                                                                                     167.07
                                        167. 03 598. 536
167. 19 612. 687
167. 77 626. 838
168. 57 640. 98
169. 18 655. 131
169. 92 669. 273
170. 6 683. 424
171. 22 697. 575
                                                                                           167. 43 618. 342
168. 14 632. 493
 607.032
                167. 13 609. 855
                                                                  167. 31 615. 519
                                                                                                                     167.49
 607. 032
621. 174
635. 325
649. 467
663. 618
677. 769
691. 911
               167. 6 624. 006
168. 42 638. 148
                                                                  167. 96 629. 661
                                                                                                                     168.29
                                                                  168. 7 643. 812
169. 35 657. 963
170. 06 672. 105
170. 68 686. 256
171. 34 700. 398
                                                                                           168. 81 646. 644
169. 56 660. 786
170. 22 674. 937
170. 73 689. 079
                                                                                                                     168.96
               169. 08 652. 299
169. 79 666. 45
170. 47 680. 592
171. 04 694. 743
                                                                                                                     169.68
                                                                                                                     170.35
                                                                                                                     170.86
                                                                                           171.46 703.23
                                                                                                                      171.6
                                                                                            172. 11 717. 381
 706.062
                171.72 708.894
                                         171.84 711.717
                                                                  171. 98 714. 549
                                                                                                                     172.25
                                                                                           172. 93 731. 523
173. 82 745. 674
 720. 204
                172.42 723.036
                                         172.59 725.868
                                                                  172.75
                                                                               728.7
                                                                                                                      173.1
                                                                  173. 6 742. 842
 734.355
                173. 25 737. 187
                                         173.42 740.01
                                                                                                                     174.02
                                                                  173.6 742.842
174.74 756.993
175.74 771.135
176.49 785.286
177.05 799.437
177.75 813.579
178.74 827.73
               174. 28 751. 329
175. 34 765. 48
176. 26 779. 631
176. 84 793. 773
                                                                                           174. 96 759. 825
175. 92 773. 967
176. 6 788. 118
177. 16 802. 26
                                         174. 52 754. 161
175. 54 768. 312
 748.506
                                                                                                                     175.13
                                                                                                                     176.08
 762.648
 776. 799
790. 941
                                         176. 4 782. 454
176. 95 796. 605
                                                                                                                     176. 7
177. 28
                                         177. 57 810. 756
178. 5 824. 898
                177.41 807.924
                                                                                           177. 95 816. 411
 805.092
                                                                                                                     178.15
 819.243
                178. 3 822. 066
                                                                                           178. 98 830. 562
                                                                                                                     179. 2
 833.385
               179, 44, 836, 217
                                         179. 79 839. 049
                                                                  180. 35 841. 872 180. 76 844. 704
                                                                                                                      181.1
Manning's n Values
                                         num=
                                 Sta
      Sťa n Val
                                       n Val Sta
                                                                 n Val
**********
                  . 03189. 5071
                                          . 025342. 3355
                                                                 . 07
Bank Sta: Left
                          Ri ght
                                                                              Ri ght
                                        Lengths: Left Channel
                                                                                              Coeff Contr.
                                                                                                                      Expan.
         189. 5071342. 3355
                                                                                  515
                                                       515 515
                                                                                               . 1
                                                                                                                         . 3
Skew Angle = 30
CROSS SECTION OUTPUT Profile #1%
                                                      ***********
* E.G. Elev (ft)
Right OB *
                                  * 175.46
                                                        * Element
                                                                                                     Left OB *
                                                                                                                      Channel *
* Vel Head (ft)
                                                                                                                        0.025
                                               0.32
                                                         * Wt. n-Val.
                                                                                                      0.030 *
   0.070
                             * 175.14
* W.S. Elev (ft)
                                                        * Reach Len. (ft)
                                                                                                     515.00
                                                                                                                      515.00
 515.00 *
* Crit W.S. (ft)
                                                         * Flow Area (sq ft)
                                                                                                * 1496. 22
                                                                                                                 * 1526. 15
2230. 42 *
* E. G. Slope (ft/ft)
2230. 42 *
                                     *0.000413 * Area (sq ft)
                                                                                                * 1496, 22
                                                                                                                  * 1526.15
 Q Total (cfs)
                                     *17300.00
                                                                                                * 5819.56
                                                       * Flow (cfs)
                                                                                                                  * 8544.99
2935. 46
 <sup>*</sup> Top Width (ft)
                                     * 759. 92
                                                         * Top Width (ft)
                                                                                                     189. 51
                                                                                                                      152.83
 417.58 *
* Vel Total (ft/s)
                                     * 3. 29
                                                        * Avg. Vel. (ft/s)
                                                                                                        3.89
                                                                                                                         5.60
    1. 32
```

```
Proposed - No-Rise
                      * 10.31
                                                             7. 90 *
                                                                       9.99 *
* Max Chl Dpth (ft)
                                 * Hydr. Depth (ft)
  5.34
 Conv. Total (cfs)
                       *851217.6 * Conv. (cfs)
                                                        *286341.6
                                                                  *420441.7
*144434.4
                         515.00 * Wetted Per. (ft)
                                                          197.00
                                                                     152. 94
 Length Wtd. (ft)
 418. 61
* Min Ch El (ft)
                          164.83
                                 * Shear (lb/sq ft)
                                                             0. 20
                                                                       0.26
  0.14
                           1. 92
                                 * Stream Power (lb/ft s) *
 Al pha
                                                             0.76
                                                                       1.44
  0. 18
* Frctn Loss (ft)
                                 * Cum Volume (acre-ft)
                           0. 21
                                                           369.55
                                                                     151.66
 614. 28
* C & E Loss (ft)
                           0.00 * Cum SA (acres)
                                                            13.65
                                                                       6. 28
Warning: The cross-section end points had to be extended vertically for the computed
water surface.
CROSS SECTION OUTPUT Profile #Floodway
* E.G. Elev (ft)
                       * 176.20 * Element
                                                           Left OB *
                                                                     Channel *
Right OB *
 Vel Head (ft)
                          0.65
                                 * Wt. n-Val.
                                                            0.030
                                                                      0.025
 0.070
                                 * Reach Len. (ft)
* W.S. Elev (ft)
                       * 175.55
                                                           515.00
                                                                  * 515.00
 515.00
                                 * Flow Area (sq ft)
* Crit W.S. (ft)
                                                           211.39
                                                                  * 1589, 24
2251.68
* E.G. Slope (ft/ft)
                       *0.000710 * Area (sq ft)
                                                           211.39
                                                                  * 1589.24
2251. 68
                       *17300.00
                                 * Flow (cfs)
                                                        * 1000.41
* Q Total (cfs)
                                                                  *11988.62
4310.97
 Top Width (ft)
                       * 530.00
                                 * Top Width (ft)
                                                            20. 51
                                                                  * 152.83
 356.66
                                 * Avg. Vel. (ft/s)
 Vel Total (ft/s)
                          4. 27
                                                             4.73
                                                                       7.54
  1. 91
 Max Chl Dpth (ft)
                          10.72
                                 * Hydr. Depth (ft)
                                                            10.31
                                                                      10.40
  6. 31
* Conv. Total (cfs)
                       *649082.5
                                 * Conv. (cfs)
                                                        * 37534.7
                                                                  *449803.8
*161744.0
* Length Wtd. (ft)
                         515.00
                                 * Wetted Per. (ft)
                                                            31. 15
                                                                     152. 94
 361. 72
                                 * Shear (lb/sq ft)
                         164.83
* Min Ch El (ft)
                                                             0.30
                                                                       0.46
  0. 28
 Al pha
                           2.28
                                 * Stream Power (lb/ft s) *
                                                             1.42
                                                                       3.48
  0.53
* Frctn Loss (ft)
                           0. 26
                                 * Cum Volume (acre-ft)
                                                           307.61 *
                                                                     159.81
 586. 44
* C & E Loss (ft)
                           0. 11
                                 * Cum SA (acres)
                                                                       6. 28
                                                            10.33 *
 11. 87 *
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
CROSS SECTION OUTPUT Profile #10%
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		Pr	opo	osed - No-Rise					
* E.G. Elev (ft)	*	170. 84	*	Element	*	Left OB	*	Channel	*
Right OB *  * Vel Head (ft) 0.070 *	*	0. 39	*	Wt. n-Val.	*	0. 030	*	0. 025	*
* W. S. Elev (ft) 515.00 *	*	170. 45	*	Reach Len. (ft)	*	515. 00	*	515. 00	*
* Crit W.S. (ft) 522.05 *	*		*	Flow Area (sq ft)	*	607. 75	*	809. 64	*
* E.G. Slope (ft/ft) 522.05 *	*0	. 001056	*	Area (sq ft)	*	607. 75	*	809. 64	*
* Q Total (cfs) 623.03 *	*	7480. 00	*	Flow (cfs)	*	2106. 67	*	4750. 30	*
* Top Width (ft) 232.15 *	*	574. 48	*	Top Width (ft)	*	189. 51	*	152. 83	*
* Vel Total (ft/s) 1.19 *	*	3. 86	*	Avg. Vel. (ft/s)	*	3. 47	*	5. 87	*
* Max Chl Dpth (ft) 2.25 *	*	5. 62	*	Hydr. Depth (ft)	*	3. 21	*	5. 30	*
* Conv. Total (cfs) 19171.2 *	*2	30167. 8	*	Conv. (cfs)	*	64824.6	* 1	146172. 0	*
* Length Wtd. (ft) 232.69 *	*	515.00	*	Wetted Per. (ft)	*	192. 32	*	152. 94	*
* Min Ch El (ft) 0.15 *	*	164. 83	*	Shear (Ib/sq ft)	*	0. 21	*	0. 35	*
* Al pha 0. 18 *	*	1. 71	*	Stream Power (lb/ft s)	*	0. 72	*	2. 05	*
* Frctn Loss (ft) 239.73 *	*	0. 47	*	Cum Volume (acre-ft)	*	162. 74	*	89. 02	*
* C & E Loss (ft) 9.61 *	*	0. 03	*	Cum SA (acres)	*	8. 50	*	6. 28	*
7. O I ***********************************									
*****									

Warning: Divided flow computed for this cross-section. Warning: The cross-section end points had to be extended vertically for the computed water surface.

		*******	*****	*****	**
******** * E.G. Elev (ft) Right OB *	* 174.04	* El ement	* Left OB	* Channel	*
* Vel Head (ft) 0.070 *	* 0.35	* Wt. n-Val.	* 0.030	* 0.025	*
* W.S. Elev (ft) 515.00 *	* 173.68	* Reach Len. (ft)	* 515.00	* 515.00	*
* Cri t W. S. (ft) 1638.12 *	*	* Flow Area (sq ft)	* 1221.04	* 1304.23	*
* E.G. Slope (ft/ft) 1638.12 *	*0.000540	* Area (sq ft)	* 1221.04	* 1304.23	*
* Q Total (cfs) 2068.75 *	*14350.00	* Flow (cfs)	* 4764.24	* 7517.01	*
* Top Width (ft) 398.77 *	* 741.10	* Top Width (ft)	* 189.51	* 152.83	*
* Vel Total (ft/s) 1.26 *	* 3.45	* Avg. Vel. (ft/s)	* 3.90	* 5.76	*
* Max Chl Dpth (ft) 4.11 *	* 8.85	* Hydr. Depth (ft)	* 6.44	* 8.53	*
* Conv. Total (cfs) 89048.6 *	*617692.0	* Conv. (cfs)	*205075.5	*323567.8	*
* Length Wtd. (ft) 399.73 *	* 515.00	* Wetted Per. (ft)	* 195.55	* 152.94	*
* Min Ch El (ft)	* 164.83	* Shear (Ib/sq ft) Page 125	* 0. 21	* 0.29	*

0. 14 *			oposou no mas					
* Al pha 0 17 *	*	1. 91	* Stream Power (Ib/ft s)	*	0. 82	*	1. 66	*
* Frctn Loss (ft)	*	0. 27	* Cum Volume (acre-ft)	*	301.35	*	132. 69	*
485.52 * * C & E Loss (ft)	*	0.00	* Cum SA (acres)	*	11. 24	*	6. 28	*
19.59 * ***********************************	*****	*****	*******	***	****	***	*****	**

Warning: The cross-section end points had to be extended vertically for the computed water surface.

	ofile #0.2%	******	**	* * * * * * * * *	* * ;	*****	**
*****							
* E.G. Elev (ft)	* 179.03	* Element	*	Left OB	*	Channel	*
Right OB * * Vel_Head (ft)	* 0.30	* Wt. n-Val.	*	0. 030	*	0. 025	*
0.070 * * W.S. Elev (ft)	* 178.73	* Reach Len. (ft)	*	515. 00	*	515. 00	*
515.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	*	2177. 22	*	2075. 34	*
3849.17 * * E.G. Slope (ft/ft)	*0.000266	* Area (sq ft)	*	2177. 22	*	2075. 34	*
3849.17 * * 0 Total (cfs) 5316.77 *	*25400.00	* Flow (cfs)	*	8628. 69	* *	11454. 53	*
* Top Width (ft)	* 824.79	* Top Width (ft)	*	189. 51	*	152. 83	*
482.45 * * Vel Total (ft/s) 1.38 *	* 3.14	* Avg. Vel. (ft/s)	*	3. 96	*	5. 52	*
* Max Chl Dpth (ft) 7.98 *	* 13.90	* Hydr. Depth (ft)	*	11. 49	*	13. 58	*
* Conv. Total (cfs) *325733.9 *	*1556140.0	* Conv. (cfs)		*528639. 9	,	*701765. 9	
* Length Wtd. (ft) 483.58 *	* 515.00	* Wetted Per. (ft)	*	200. 60	*	152. 94	*
* Min Ch El (ft) 0.13 *	* 164.83	* Shear (Ib/sq ft)	*	0. 18	*	0. 23	*
* Al pha 0. 18 *	* 1.98	* Stream Power (Ib/ft s)	*	0. 72	*	1. 25	*
* Frctn Loss (ft) 991.25 *	* 0.13	* Cum Volume (acre-ft)	*	555. 42	*	198. 32	*
* C & E Loss (ft) 34.64 *	* 0.02	* Cum SA (acres)	*	16. 93	*	6. 28	*
	******	****	**	*****	* * :	*****	* *
****				······································	,, ,		

Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION

I NPUT

RI VER: RI VER-2 REACH: Reach-1 RS: 225

Description: SIDE CHANNEL XS 225
Station Elevation Data num= 132
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

```
Proposed - No-Rise
                                  177. 8312. 95593
177. 2645. 34574
176. 3477. 73556
175. 32110. 1254
174. 46142. 5152
             177. 836. 477963
                                                        177. 819. 43389
                                                                              177. 6725. 91185
                                                                                                   177.53
              177. 438. 86778
32. 38982
                                                                              176. 9958. 30167
                                                        177. 13 51. 8237
                                                                                                    176.86
64. 77963
97. 16944
129. 5593
161. 9491
             176. 6271. 25759
                                                        176.0684.21352
                                                                               175. 890. 69148
175123. 0813
                                                                                                    175.64
                                                        175. 16116. 6033
174. 27148. 9931
173. 29 181. 383
             175. 48103. 6474
                                                                                                    174.84
                                                                              174. 08155. 4711
173. 08187. 8609
             174. 65136. 0372
                                                                                                    173.89
             173. 69 168. 427
172. 67200. 8168
171. 59233. 2067
                                   173. 49 174. 905
                                                                                                    172.88
                                                        172. 26213. 7728
171. 09246. 1626
                                   172. 47207. 2948
                                                                                                    171.84
194.3389
                                                                              172.05220.2507
                                   171. 34239. 6846
                                                                              170. 84252. 6405
226.7287
                                                                                                    169.57
259.1185
             168. 23265. 5965
                                   166. 89272. 0744
                                                         165. 54278. 5524
                                                                              164. 83285. 0304
                                                                                                     164. 9
                                                                              165. 65317. 4202
165. 83 349. 81
165. 83382. 1998
165. 83414. 5896
291. 5083
323. 8982
             165. 09297. 9863
165. 83330. 3761
                                   165. 27304. 4643
165. 83336. 8541
                                                         165. 46310. 9422
                                                                                                    165.83
                                                        165. 83 343. 332
165. 83375. 7219
165. 83408. 1117
                                                                                                    165.83
356. 288
388. 6778
             165. 83362. 7659
165. 83395. 1557
                                   165. 83369. 2439
                                                                                                    165.83
                                   165. 83401. 6337
                                                                                                    165.83
421. 0676
453. 4574
             165. 83427. 5456
165. 83459. 9354
                                   165. 83434. 0235
                                                                              165. 83446. 9794
165. 05479. 3693
                                                         165. 83440. 5015
                                                                                                    165.83
                                   165. 83466. 4133
                                                         165. 48472. 8913
                                                                                                    164.76
             164. 63492. 3252
163. 99 524. 715
485.8472
                                    164. 5498. 8032
                                                         164. 37505. 2811
                                                                              164. 24511. 7591
                                                                                                    164.11
518. 2371
                                   163.86 531.193
                                                                              163.83544.1489
                                                         163. 83537. 6709
                                                                                                    163.92
             164. 05557. 1048
550.6268
                                   164. 18563. 5828
                                                         164. 31570. 0607
                                                                              164. 44576. 5387
                                                                                                    164.57
             164. 05557. 1046
164. 7589. 4946
166. 25621. 8845
167. 03654. 2742
167. 67686. 6641
171. 39719. 0539
                                                                              164. 44576. 5387
165. 86608. 9285
166. 79641. 3184
167. 41673. 7081
169. 77 706. 098
172. 5738. 4878
583.0167
                                   164. 85595. 9726
                                                         165. 38602. 4506
                                                                                                    166.05
615. 4065
647. 7963
680. 1861
                                   166. 44628. 3624
167. 16660. 7522
167. 81 693. 142
171. 85725. 5319
                                                         166. 62634. 8404
                                                                                                    166.92
                                                        167. 28667. 2302
168. 64 699. 62
                                                                                                    167.54
                                                                                                     170.9
                                                        172. 18732. 0098
174. 83764. 3997
712. 5759
                                                                                                    172.83
744.9658
             174.06751.4437
                                   174. 83757. 9217
                                                                              174. 83770. 8776
                                                                                                    174.83
777. 3555
             174. 83783. 8335
                                   174. 83790. 3115
                                                        174. 83796. 7894
                                                                              174. 83803. 2674
                                                                                                    174.83
809.7454
             174. 83816. 2233
                                   174. 83822. 7013
                                                        174.83 825.98
                                                                             175. 22 829. 25
                                                                                                    175.19
     1049
              171. 3 1399. 25
                                       181
n Val
                 . 03459. 9354 . 025602. 4506
                                                         . 07
                                  Lengths: Left Channel
                                                                                Coeff Contr.
Bank Sta: Left
                      Ri ght
                                                                   Ri ght
                                                                                                     Expan.
        459. 9354602. 4506
                                                460
                                                           460
                                                                      460
                                                                                         . 1
                                                                                                       . 3
CROSS SECTION OUTPUT Profile #1%
                                            * E.G. Elev (ft)
                                 * 175.25 * Element
                                                                                  * Left OB *
                                                                                                    Channel *
Right OB *
* Vel Head (ft)
                                 * 0.33
                                                * Wt. n-Val.
                                                                                       0.030
                                                                                                      0.025
  0.070 *
* W.S. Elev (ft)
                                * 174. 91
                                                * Reach Len. (ft)
                                                                                      460.00
                                                                                                     460.00
 460.00 *
* Crit W.S. (ft)
                                                * Flow Area (sq ft)
                                                                                                 * 1484.76
                                                                                  * 2147.85
* E.G. Slope (ft/ft) *0.000413 * Area (sq ft) 1501.72 *
                                                                                  * 2147.85
                                                                                                 * 1484.76
* 0 Total (cfs)
                                                                                  * 7379.90
                                                                                                 * 8549.92
                                 *17300.00
                                                * Flow (cfs)
1370. 18
* Top Width (ft)
                                * 1037.90
                                                * Top Width (ft)
                                                                                      339.83
                                                                                                     142.52
 555.56 *
* Vel Total (ft/s) *
                                        3. 37
                                                * Avg. Vel. (ft/s)
                                                                                         3.44
                                                                                                        5.76
    0. 91
 Max Chl Dpth (ft)
                                                * Hydr. Depth (ft)
                                      11. 08
                                                                                         6.32
                                                                                                      10.42
2.70 *
* Conv. Total (cfs)
67433.5 *
                                *851420.6
                                                                                  *363202.1
                                                * Conv. (cfs)
                                                                                                 *420785.0
  Length Wtd. (ft)
                                * 460.00
                                                * Wetted Per. (ft)
                                                                                      340.48
                                                                                                     142.60
 556. 14 *
* Min Ch El (ft)
                                * 163.83
                                                * Shear (lb/sq ft)
                                                                                         0. 16
                                                                                                       0. 27
    0.07
```

```
Proposed - No-Rise
* Al pha
                                 * Stream Power (lb/ft s) *
                                                              0.56 *
                                                                        1.55
  0.06
                            0.17 * Cum Volume (acre-ft)
 Frctn Loss (ft)
                                                            348.01 *
                                                                      133. 86
 592. 22
 C & E Loss (ft)
                            0.02 * Cum SA (acres)
                                                                        4.53 *
                                                             10. 52
  19. 51
            ******************
******
*****
Warning: Divided flow computed for this cross-section.
CROSS SECTION OUTPUT Profile #Floodway
* E.G. Elev (ft)
                          175.83
                                  * Element
                                                            Left OB *
                                                                      Channel *
Right OB *
 Vel Head (ft)
                            0.29
                                  * Wt. n-Val.
                                                             0.030
                                                                       0.025
  0.070
* W.S. Elev (ft)
                         175. 54
                                 * Reach Len. (ft)
                                                            460.00
                                                                      460.00
 460.00
                                  * Flow Area (sq ft)
* Crit W.S. (ft)
                                                         * 2207.06
                                                                    * 1574.05
 878.06
 E.G. Slope (ft/ft)
                                                                    * 1574.05
                       *0.000305
                                  * Area (sq ft)
                                                         * 2207.06
 878.06
* 0 Total (cfs)
                       *17300.00
                                  * Flow (cfs)
                                                         * 7933.71
                                                                    * 8103.30
1262. 99
 Top Width (ft)
                                  * Top Width (ft)
                                                            256.94
                          510.00
                                                                      142.52
 110. 55
* Vel Total (ft/s)
                            3.71
                                  * Avg. Vel. (ft/s)
                                                              3.59
                                                                        5.15
  1.44
 Max Chl Dpth (ft)
                                  * Hydr. Depth (ft)
                           11.71
                                                              8.59
                                                                       11.04
  7. 94
* Conv. Total (cfs)
                       *990178.8
                                  * Conv. (cfs)
                                                         *454091.8
                                                                    *463798.5
72288. 4
* Length Wtd. (ft)
                                                                      142.60
                          460.00
                                  * Wetted Per. (ft)
                                                            260.69
 Min Ch El (ft)
                                  * Shear (lb/sq ft)
                          163.83
                                                              0.16
                                                                        0.21
  0. 15
                            1.34
                                  * Stream Power (lb/ft s) *
 Al pha
                                                              0.58
                                                                        1.08
  0.21
* Frctn Loss (ft)
                                  * Cum Volume (acre-ft)
                            0.14
                                                            293.31
                                                                      141.11
 567. 94
 C & E Loss (ft)
                            0.00
                                 * Cum SA (acres)
                                                              8.69
                                                                        4.53
  9. 11
                *******************
CROSS SECTION OUTPUT Profile #10%
                                   ***********
* E.G. Elev (ft)
                          170.35
                                  * Element
                                                            Left OB *
                                                                      Channel *
Right OB *
 Vel Head (ft)
                            0.31
                                  * Wt. n-Val.
                                                             0.030
                                                                       0.025
  0.070
* W.S. Elev (ft)
                                                                      460.00
                          170.04
                                 * Reach Len. (ft)
                                                            460.00
 460.00
 Crit W.S. (ft)
                                  * Flow Area (sq ft)
                                                            864.42
                                                                      789.75
 279. 57
 E.G. Slope (ft/ft) 279.57 *
                       *0.000775
                                  * Area (sq ft)
                                                            864.42
                                                                      789.75
* 0 Total (cfs)
                       * 7480.00
                                  * Flow (cfs)
                                                           3059.49
                                                                    * 4090.22
 330. 29
                                  * Top Width (ft)
* Top Width (ft)
                          450.89
                                                            209.68
                                                                      142. 52
                                   Page 128
```

```
98.70 *
                           3.87 * Avg. Vel. (ft/s)
 Vel Total (ft/s)
                                                             3.54 *
                                                                       5. 18 *
  1. 18
 Max Chl Dpth (ft)
                            6. 21
                                 * Hydr. Depth (ft)
                                                             4. 12
                                                                        5.54
  2.83
* Conv. Total (cfs)
11864.9 *
                       *268700.0
                                 * Conv. (cfs)
                                                         *109904.2
                                                                   *146930.9 *
 Length Wtd. (ft)
                          460.00
                                 * Wetted Per. (ft)
                                                           210. 19
                                                                      142.60
 98. 90 *
 Min Ch El (ft)
                          163.83
                                 * Shear (lb/sq ft)
                                                             0.20
                                                                        0.27
  0. 14
* Al pha
                           1.33
                                                             0.70
                                 * Stream Power (lb/ft s) *
                                                                        1.39
  0. 16
* Frctn Loss (ft)
                           0.31
                                 * Cum Volume (acre-ft) *
                                                           154.04 *
                                                                       79.56
 234. 99
 C & E Loss (ft)
                           0.02 * Cum SA (acres)
                                                             6.14 *
                                                                        4.53 *
  7.65 *
*************************
CROSS SECTION OUTPUT Profile #2%
* E.G. Elev (ft)
                       * 173.77 * Element
                                                         * Left OB *
                                                                     Channel *
Right OB *
 Vel Head (ft)
                          0.35
                                 * Wt. n-Val.
                                                            0.030
                                                                       0.025
 0.070
* W.S. Elev (ft)
                       * 173.42
                                 * Reach Len. (ft)
                                                           460.00
                                                                      460.00
460.00
* Crit W.S. (ft)
                                 * Flow Area (sq ft)
                                                                   * 1272.01
                                                         * 1679.04
884. 72
* E.G. Slope (ft/ft)
884.72 *
                       *0.000504
                                 * Area (sq ft)
                                                         * 1679.04
                                                                   * 1272.01
* Q Total (cfs)
                                 * Flow (cfs)
                       *14350.00
                                                         * 6022.11
                                                                   * 7301.10
1026. 79
* Top Width (ft)
                       * 767.30
                                 * Top Width (ft)
                                                           289. 26
                                                                   * 142.52
335. 52
* Vel Total (ft/s)
                           3.74
                                 * Avg. Vel. (ft/s)
                                                             3.59
                                                                        5.74
  1. 16
 Max Chl Dpth (ft)
                                 * Hydr. Depth (ft)
                           9. 59
                                                             5.80
                                                                        8. 93
2.64 *
* Conv. Total (cfs)
                       *639122.4
                                 * Conv. (cfs)
                                                         *268213.6
                                                                   *325177.5
45731.4
* Length Wtd. (ft)
                       * 460.00
                                 * Wetted Per. (ft)
                                                           289.90
                                                                     142.60
335. 96
                                 * Shear (lb/sq ft)
* Min Ch El (ft)
                       * 163.83
                                                             0.18
                                                                        0.28
  0.08
* Al pha
                           1. 59
                                 * Stream Power (lb/ft s) *
                                                             0.65
                                                                        1.61
  0. 10
* Frctn Loss (ft)
                           0. 21
                                 * Cum Volume (acre-ft) *
                                                           284. 20 *
                                                                      117.47 *
470. 61
* C & E Loss (ft)
                           0.01
                                 * Cum SA (acres)
                                                                        4.53 *
                                                             8.41 *
 15. 25 *
Warning: Divided flow computed for this cross-section.
CROSS SECTION OUTPUT Profile #0.2%
                      *****
* Left OB * Channel *
Right OB *
```

* Vel Head (ft)	* 0. 24	oposed - No-Rise * Wt. n-Val.	*	0. 030	*	0. 025	*
0.070 * * W.S. Elev (ft) 460.00 *	* 178.65	* Reach Len. (ft)	*	460.00	*	460. 00	*
* Crit W.S. (ft) 3903.96 *	*	* Flow Area (sq ft)	*	3664. 79	*	2016. 79	*
* E. G. Slope (ft/ft) 3903.96 *	*0.000228	* Area (sq ft)	*	3664. 79	*	2016. 79	*
* Q Total (cfs)	*25400.00	* Flow (cfs)	*1	0916. 87	* 1	10591. 61	*
* Top Width (ft)	* 1314.27	* Top Width (ft)	*	459. 94	*	142. 52	*
* Vel Total (ft/s)	* 2.65	* Avg. Vel. (ft/s)	*	2. 98	*	5. 25	*
1.00 * * Max Chl Dpth (ft) 5.48 *	* 14.82	* Hydr. Depth (ft)	*	7. 97	*	14. 15	*
* Conv. Total (cfs) *257568.4 *	*1681153.0	* Conv. (cfs)	*	722556. 5	7	*701028. 6	
* Length Wtd. (ft) 712.48 *	* 460.00	* Wetted Per. (ft)	*	461. 45	*	142. 60	*
* Min Ch El (ft)	* 163.83	* Shear (Ib/sq ft)	*	0. 11	*	0. 20	*
* Al pha	* 2. 20	* Stream Power (lb/ft s)	*	0. 34	*	1.06	*
* Frctn Loss (ft)	* 0.10	* Cum Volume (acre-ft)	*	520. 88	*	174. 13	*
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	*	13. 09	*	4. 53	*
27. 58	*****	******	***	******	* * *	******	**

CROSS SECTION

RI VER: RI VER-2 REACH: Reach-1 RS: 200

I NPUT

Descripti	on: SIDE CHANNEL	XS 200						
Station E	levation Data		388					
Sta	El ev Sta	El ev		El ev			Sta	El ev
*****	*****							
0	177. 833. 569947	177. 837. 1		177. 8310.		177. 8314. 2		177. 83
17. 84973	177. 8321. 41968	177. 8324.		177. 8328. !		177. 8332.		177. 83
35. 69947	177. 8339. 26941	177. 8342.		177. 7646.		177. 6649.	— -	177. 55
53. 5492	177. 4457. 11914	177. 3360.		177. 2264. 2		177. 1267.		177. 01
71. 39893	176. 974. 96888	176. 7878.		176. 6582.		176. 5185.		176. 37
89. 24866	176. 2492. 81861	176. 196.		175. 96 99.		175. 82103.		175. 71
107. 0984	175. 6110. 6683	175. 49114		175. 38117.		175. 27121.		175. 16
124. 9481	175. 05128. 5181	174. 94 13:		174. 83 13		174. 71139.		174.6
142. 7979	174. 49146. 3678	174. 37149		174. 26153.		174. 15157.		174. 03
160. 6476	173. 92164. 2175	173. 81167		173. 72171.		173. 63174.	—	173. 54
178. 4973	173. 45182. 0673	173. 36185		173. 27189.		173. 18192.		173. 09
196. 3471	172. 99 199. 917	172. 9 20		172. 81207.		172. 68210.		172. 56
214. 1968	172. 43217. 7667	172. 3221		172. 18224.		172. 05228.		171. 93
232. 0465	171. 8235. 6165	171. 64239		171. 49242.		171. 33246.		171. 18
249. 8963	171. 02253. 4662	170. 87257		170. 54260.		170. 17264.		169. 74
267. 746	168. 81271. 3159	167. 87274		166. 94278.		166. 01282.		165. 09
285. 5957	164. 17289. 1657	163. 83292		163. 83296.		163. 9299.		163. 99
303. 4455	164. 08307. 0154	164. 18310		164. 27314.	. 1553	164. 35317.	. 7253	164. 41
			Page	130				

Proposed - No-Rise 321. 2952 164. 48324. 8651 164. 56328. 4351 164. 72 332. 005 164.83 335.575 164.83 339. 1449 164. 87353. 4247 164.89 164. 83346. 2848 164. 83342. 7149 164. 85349. 8548 164. 91360. 5646 165. 01378. 4143 164. 96396. 2641 164. 91414. 1138 164. 93364. 1346 165381. 9843 164. 95 399. 834 164. 9417. 6837 164. 95367. 7045 164. 99385. 5542 164. 94 403. 404 164. 89421. 2537 164. 97371. 2744 164. 98389. 1242 164. 93406. 9739 356. 9947 165 374.8444 164.97 164.92 392. 6941 410.5439 164. 88424. 8236 164.87 428.3936 164.86431.9635 164. 85435. 5335 164. 83439. 1034 164. 83442. 6734 164.83 164. 83449. 8133 164. 83460. 5231 446. 2433 164. 83453. 3832 164. 83456. 9532 164.83 164. 83478. 3728 164.76 464.093 164.83 467.663 164. 83471. 2329 164. 83474. 8029 481. 9428 499. 7925 164. 54489. 0827 164. 43492. 6526 164. 32496. 2226 163. 83514. 0723 164. 65485. 5127 164.21 164. 05483. 5127 164. 09503. 3625 163. 83521. 2122 163. 83 539. 062 163. 83556. 9117 163. 83574. 7614 163. 98506. 9324 163. 83524. 7822 163. 83542. 6319 163. 83560. 4816 163.83 163.87510.5023 163. 83528. 3521 163. 83546. 2018 163. 83564. 0516 163. 83531. 9221 163. 83549. 7718 163. 83567. 6215 163. 92585. 4713 163. 83 163. 83 163. 83 164. 03 517. 6423 535. 492 553. 3417 571. 1915 163. 83578. 3314 163. 83581. 9013 589.0412 164. 14592. 6111 164. 25596. 1811 164. 36 599. 751 164.47 603.321 164.58 606.8909 164.69610.4609 164. 79614. 0308 165. 36617. 6008 165.87621.1707 165.97 166. 39639. 0204 166.08628.3106 166. 18631. 8806 166. 29635. 4505 624.7407 166.46 642.5904 166. 6649. 7303 166.66653.3002 166. 73656. 8702 166.8 166. 53646. 1603 660. 4401 678. 2899 696. 1396 713. 9893 166. 83 671. 15 166. 83688. 9997 166. 83674. 7199 166. 83692. 5696 167. 15710. 4194 167. 59728. 2691 166. 83664. 0101 166.83 166.83 667.58 166. 83685. 4297 166. 98703. 2795 167. 41721. 1292 167. 9738. 9789 166. 83681. 8598 166. 89699. 7095 167. 32717. 5593 167. 77 735. 409 166. 83 167. 24 167. 68 167. 06706. 8494 167. 5724. 6992 168. 1742. 5489 731.8391 168. 3746. 1188 168.49 749.6888 168. 68753. 2587 168. 95756. 8287 169. 49760. 3986 170.01763.9686 170.46 171. 48778. 2484 171. 83796. 0981 171. 79781. 8183 171. 88 799. 668 171. 17774. 6784 767.5385 170.88771.1085 171.83 785.3882 171.83788.9582 171.83792.5281 171.94 171. 83788. 9582 171. 99806. 8079 172. 27824. 6577 172. 55842. 5074 172. 07 857. 21 172. 15 873. 58 172. 55 889. 95 171. 68 749. 668 172. 15817. 5178 172. 44835. 3675 172. 72 850. 67 172. 14 867. 03 172. 45 883. 4 172. 69 899. 77 172. 1813. 9478 172. 39831. 7975 172. 67849. 6473 172. 1 863. 76 803. 238 821. 0877 838. 9374 853. 94 172. 04810. 3779 172. 33828. 2276 172.21 172.5 172. 13 172. 14 172. 53 172. 73 172. 61846. 0773 172. 06 860. 49 172. 22 876. 86 172. 58 893. 22 172. 36 172. 65 870.31 880.13 886.68 896.5 172.74 912.87 172.86 916.14 172.89 903.04 906.32 172.83 909.59 172.88 919. 41 935. 78 172. 93 173. 18 922. 69 939. 05 172. 97 173. 21 925. 96 942. 33 173. 19 173. 33 929. 23 173.05 173.15 932.51 948. 88 173. 28 945.6 173. 32 952. 15 968. 52 984. 89 1001. 25 173. 16 173. 37 173. 57 173. 79 174 955. 42 971. 79 988. 16 1004. 53 961. 97 978. 34 994. 71 1011. 07 173.4 958.7 173.45 173.52 965.24 173.54 173. 52 963. 24 173. 62 981. 61 173. 82 997. 98 174. 1 1014. 35 174. 39 1030. 72 174. 74 1047. 08 975.06 991.43 1007.8 173.62 173.63 173.67 173. 84 174. 08 174. 23 173. 82 174. 08 174. 32 173.91 174. 13 1017. 62 174. 12 1020. 9 1024. 17 1027.44 174.46 1033.99 174. 51 1037. 26 174. 56 1040.54 174.66 1043.81 174.84 174.97 1050.36 1053.63 175.07 1056.91 175. 14 1060. 18 175. 23 1063. 45 175.29 1066. 73 1083. 09 175. 28 1073. 27 175.47 1079.82 175.29 175.35 1076.55 175.56 1070 175. 28 1073. 27 175. 61 1089. 64 175. 72 1106. 01 175. 78 1122. 38 175. 95 1138. 75 176. 21 1155. 11 176. 35 1171. 48 175. 35 1076. 55 175. 6 1092. 92 175. 71 1109. 28 175. 84 1125. 65 176. 04 1142. 02 176. 27 1158. 39 176. 35 1174. 76 175.61 1086.37 175.65 1096.19 175.69 175. 68 1102. 74 175. 77 1119. 1 175. 94 1135. 47 176. 17 1151. 84 175. 69 1112. 56 175. 85 1128. 93 176. 08 1145. 29 176. 29 1161. 66 175. 74 175. 87 176. 12 176. 33 1099. 46 1115. 83 1132. 2 1148. 57 1164.94 176. 35 1168. 21 176. 35 1178. 03 176.39 1181.3 176.44 1184.58 176.48 1187.85 176. 52 1191. 12 176.57 1194. 4 176.61 176. 72 1204. 22 176.74 1207.49 176.77 1210.77 1197.67 176.66 1200.95 176.8 176. 74 1207. 49 176. 91 1223. 86 177. 05 1240. 23 177. 17 1256. 6 177. 32 1272. 97 177. 58 1289. 33 177. 96 1305. 7 178. 5 1322. 07 176. 86 1200. 95 176. 84 1217. 31 177. 03 1233. 68 177. 13 1250. 05 177. 21 1266. 42 177. 45 1282. 79 177. 75 1299. 15 176. 72 1204. 22 176. 88 1220. 59 177. 04 1236. 96 177. 14 1253. 32 177. 27 1269. 69 177. 51 1286. 06 177. 86 1302. 43 176. 96 1227. 13 177. 09 1243. 5 1214. 04 1230. 41 177.01 177. 13 1246. 78 1263. 14 1279. 51 177. 18 1259. 87 177. 34 1276. 24 177. 21 177. 39 177.68 177.64 1292.61 1295.88 178.05 1308.98 178.14 1312.25 178. 24 1315. 52 178.38 1318.8 178.62 1325.34 178.75 178.85 1331.89 178. 91 1335. 16 178.94 1328.62

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
Page 131

**************************************	*****			
Bank Sta: Left Right 478. 3728617. 6008	Lengths:	Left Channel Right 800 800 890	Coeff Contr. .1	Expan. . 3
CROSS SECTION OUTPUT PI		********	*****	*****
* E.G. Elev (ft)	* 175.06	* El ement	* Left OB *	Channel *
* Vel Head (ft)	* 0. 28	* Wt. n-Val.	* 0.030 *	0. 025 *
* W.S. Elev (ft)	* 174. 78	* Reach Len. (ft)	* 800.00 *	800.00 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 2368.65 *	1484.13 *
1624.43 * * E.G. Slope (ft/ft)	*0.000343	* Area (sq ft)	* 2368.65 *	1484.13 *
1624.43 * * Q Total (cfs)	*17300.00	* Flow (cfs)	* 7838.60 *	7907.45 *
1553.96 * * Top Width (ft)	* 911. 39	* Top Width (ft)	* 344.72 *	139. 23 *
427.44 * * Vel Total (ft/s)	* 3. 16	* Avg. Vel. (ft/s)	* 3.31 *	5. 33 *
0.96 * * Max Chl Dpth (ft)	* 10. 95	* Hydr. Depth (ft)	* 6.87 *	10. 66 *
3.80 * * Conv. Total (cfs)	*934269. 6	* Conv. (cfs)	*423315.7 *4	427033.8 *
83920.1 * * Length Wtd. (ft)	* 810. 91	* Wetted Per. (ft)	* 345.59 *	139. 34 *
* Min Ch El (ft)	* 163.83	* Shear (Ib/sq ft)	* 0.15 *	0. 23 *
0.08 *  * Al pha  0.08 *	* 1.81	* Stream Power (lb/ft s)	* 0.49 *	1. 21 *
* Frctn Loss (ft)	* 0. 22	* Cum Volume (acre-ft)	* 324.16 *	118. 18 *
575.71 * * C & E Loss (ft) 14.32 *	* 0.03	* Cum SA (acres)	* 6.90 *	3. 05 *
**************************************	*****	********	******	*****
		dway ********	*****	****
********* * E.G. Elev (ft)	* 175.69	* Element	* Left OB *	Channel *
Right OB * * Vel_Head (ft)	* 0. 28	* Wt. n-Val.	* 0.030 *	0. 025 *
0.070 * * W.S. Elev (ft)	* 175.41	* Reach Len. (ft)	* 800.00 *	800.00 *
890.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	* 2490.37 *	1571.73 *
381.21 * * E.G. Slope (ft/ft)	*0.000286	* Area (sq ft)	* 2490.37 *	1571. 73 *
381. 21 * * 0 Total (cfs)	*17300.00	* Flow (cfs)	* 8823.89 *	7952. 47 *
523.64 * * Top Width (ft)	* 465.00	* Top Width (ft)	* 283.37 *	139. 23 *
42.40 * * Vel Total (ft/s)	* 3.89	* Avg. Vel. (ft/s)	* 3.54 *	5.06 *
1.37 * * Max Chl Dpth (ft)	* 11.58	* Hydr. Depth (ft)	* 8.79 *	11. 29 *
8. 99 *		Page 132		

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* Conv. Total (cfs)
                       *1022158.0 * Conv. (cfs)
                                                           *521353.5 *469865.9
 30939.1
  Length Wtd. (ft)
                           808.90 * Wetted Per. (ft)
                                                           * 286.60
                                                                       139. 34
  50. 99
 Min Ch El (ft)
                           163.83 * Shear (lb/sq ft)
                                                               0. 16
                                                                          0. 20
  0.13
 Al pha
                             1. 20
                                  * Stream Power (lb/ft s) *
                                                               0.55
                                                                          1.02
  0.18
* Frctn Loss (ft)
                                  * Cum Volume (acre-ft)
                            0. 17
                                                             268.51
                                                                        124.50
 561. 29
                            0.05 * Cum SA (acres)
 C & E Loss (ft)
                                                               5.84
                                                                          3.05
            *******************
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than 0.7 or greater than
        1.4. This may indicate the need for additional cross sections.
CROSS SECTION OUTPUT Profile #10%
* E.G. Elev (ft)
                          170.01 * Element
                                                             Left OB *
                                                                        Channel *
Right OB *
 Vel Head (ft)
                            0.24
                                  * Wt. n-Val.
                                                              0.030
                                                                         0.025
 0.070
* W.S. Elev (ft)
                        * 169.77
                                  * Reach Len. (ft)
                                                             800.00
                                                                        800.00
 890.00 *
* Crit W.S. (ft)
                                   * Flow Area (sq ft)
                                                           * 1031.65
                                                                        786. 90
 369. 18
* E.G. Slope (ft/ft)
                                  * Area (sq ft)
                                                           * 1031.65
                        *0.000588
                                                                        786.90
 369. 18
* 0 Total (cfs)
                        * 7480.00
                                  * Flow (cfs)
                                                           * 3522.89
                                                                     * 3596.58
 360.54
* Top Width (ft)
                        * 494.82
                                  * Top Width (ft)
                                                             214.44
                                                                        139.23
 141. 15
* Vel Total (ft/s)
                                  * Avg. Vel. (ft/s)
                            3.42
                                                               3.41
                                                                          4.57
  0. 98
 Max Chl Dpth (ft)
                            5.94
                                  * Hydr. Depth (ft)
                                                               4.81
                                                                          5.65
2. 62 *
* Conv. Total (cfs)
14868.6 *
                                  * Conv. (cfs)
                        *308475.3
                                                           *145283.9
                                                                     *148322.9
* Length Wtd. (ft)
                           803.86
                                  * Wetted Per. (ft)
                                                             215.19
                                                                        139.34
 141. Ž7 *
* Min Ch El (ft)
                           163.83
                                  * Shear (lb/sq ft)
                                                               0. 18
                                                                          0. 21
  0. 10
                            1.33
                                  * Stream Power (Ib/ft s) *
 Al pha
                                                               0.60
                                                                          0.95
  0.09
* Frctn Loss (ft)
                            0.39
                                  * Cum Volume (acre-ft)
                                                             144.03
                                                                         71. 24
 231.57
 C & E Loss (ft)
                            0.02 * Cum SA (acres)
                                                               3.91 *
                                                                          3.05
   6. 39 *
CROSS SECTION OUTPUT Profile #2%
* E.G. Elev (ft)
                        * 173.54 * Element
                                                             Left OB *
                                                                        Channel *
Right OB *
 Vel Head (ft)
                            0.30
                                  * Wt. n-Val.
                                                              0.030
                                                                         0.025
  0.070
* W.S. Elev (ft)
                        * 173. 24
                                  * Reach Len. (ft)
                                                             800.00 *
                                                                        800.00 *
                                    Page 133
```

890.00

```
* Crit W.S. (ft)
                                   * Flow Area (sq ft)
                                                            * 1877. 80 * 1270. 34
1036. 66
* E.G. Slope (ft/ft)
                        *0.000422
                                  * Area (sq ft)
                                                            * 1877.80
                                                                       * 1270.34
1036. 66
 Q Total (cfs)
                        *14350.00
                                   * Flow (cfs)
                                                            * 6599.19
                                                                       * 6768.09
982. 72
* Top Width (ft)
                           753.80
                                   * Top Width (ft)
                                                              291.62
                                                                         139. 23
322. 95
* Vel Total (ft/s)
                             3.43
                                   * Avg. Vel. (ft/s)
                                                                3.51
                                                                           5.33
  0.95
                                   * Hydr. Depth (ft)
* Max Chl Dpth (ft)
                             9.41
                                                                6.44
                                                                           9.12
  3. 21
* Conv. Total (cfs) 47845.0 *
                                   * Conv. (cfs)
                                                                      *329514.4
                        *698650.8
                                                            *321291.4
 Length Wtd. (ft)
                           808.47
                                   * Wetted Per. (ft)
                                                              292.47
                                                                         139.34
 323. <u>3</u>5
                                   * Shear (lb/sq ft)
* Min Ch El (ft)
                           163.83
                                                                0.17
                                                                           0.24
  0.08
                             1.63
                                   * Stream Power (lb/ft s) *
 Al pha
                                                                0.59
                                                                           1.28
  0.08
 Frctn Loss (ft)
                             0.26
                                   * Cum Volume (acre-ft)
                                                              265.42
                                                                         104.04
 460.47
 C & E Loss (ft)
                             0.04
                                   * Cum SA (acres)
                                                                5.34
                                                                           3.05
 11.77 *
           *****************
CROSS SECTION OUTPUT Profile #0.2%
                                   ***********
* E.G. Elev (ft)
Right OB *
                                  * Element
                           178. 78
                                                              Left OB *
                                                                         Channel *
 Vel Head (ft)
                                   * Wt. n-Val.
                             0.23
                                                               0.030
                                                                          0.025
 0.070
* W.S. Elev (ft)
                           178. 55
                                   * Reach Len. (ft)
                                                              800.00
                                                                         800.00
890.00
* Crit W.S. (ft)
                                   * Flow Area (sq ft)
                                                            * 3908.00
                                                                      * 2009.79
3798.31 *
* E.G. Slope (ft/ft)
                        *0.000213
                                   * Area (sq ft)
                                                            * 3908.00
                                                                      * 2009.79
3798. 31
* Q Total (cfs)
                        *25400.00
                                   * Flow (cfs)
                                                            *11439.06
                                                                       *10336.06
3624. 88
* Top Width (ft)
                        * 1320. 25
                                   * Top Width (ft)
                                                              478.37
                                                                         139. 23
702.65
                                                                2.93
* Vel Total (ft/s)
                             2.61
                                   * Avg. Vel. (ft/s)
                                                                           5. 14
  0.95
 Max Chl Dpth (ft)
                            14.72
                                   * Hydr. Depth (ft)
                                                                8. 17
                                                                          14.44
  5. 41
* Conv. Total (cfs) *248236.3 *
                        *1739423.0
                                   * Conv. (cfs)
                                                             *783360.3
                                                                       *707826.0
* Length Wtd. (ft)
                                                                         139.34
                           815.34
                                   * Wetted Per. (ft)
                                                              480.02
703. 11
 Min Ch El (ft)
                           163.83
                                   * Shear (lb/sq ft)
                                                                0.11
                                                                           0.19
  0.07
 Al pha
                                   * Stream Power (lb/ft s) *
                             2. 16
                                                                0.32
                                                                           0.99
  0.07
                                   * Cum Volume (acre-ft)
* Frctn Loss (ft)
                             0.13
                                                               480. 90
                                                                         152.86
904. 75
                                                                           3.05 *
 C & E Loss (ft)
                             0.03
                                  * Cum SA (acres)
                                                                8.13 *
  20. 12
```

CROSS SECTION

RI VER: RI VER-2

REACH: Reach-1 RS: 190

I NPUT

Description: SIDE CHANNEL XS 190 ( LETTERED CROSS SECTION T) THE CHANNEL ROUGHNESS IS ESSENTIALLY THE SAME AS OB SINCE IT IS NOT NATURAL

Station F	levation Data	num= 487	SAME AS UB STINC	E II IS NOI NAIU	KAL
Sta	El ev Sta	El ev Sta	El ev Sta	El ev Sta	El ev
		*******			
0	174. 574. 474503	174. 568. 949005	174. 5713. 42351	174. 5617. 89801	174.57
22. 37251 44. 74503	174. 5326. 84702 174. 4849. 21953	174. 5131. 32152 174. 453. 69403	174. 5335. 79602 174. 2958. 16853	174. 5340. 27052 174. 271. 59204	174. 52 173. 96
80. 54105	174. 4649. 21955	174. 453. 69465	173. 5298. 43906	173. 44125. 2861	173. 90
129. 7606	172. 79134. 2351	172. 6138. 7096	172. 39143. 1841	172, 19147, 6586	171. 98
152. 1331	171. 78161. 0821	171. 34170. 0311	170. 88178. 9801	170. 38183. 4546	170. 14
205. 8271	168. 89210. 3016	168. 6214. 7761	168. 29219. 2506	167. 99223. 7251	167. 47
228. 1996	166. 78232. 6741	165. 97237. 1486	164. 82241. 6231	163. 43246. 0976	161.83
250. 5721 277. 4192	161. 91255. 0466 164. 8281. 8937	163. 3259. 5211 164. 83299. 7917	163. 9263. 9957 164. 83304. 2662	164. 12272. 9447 164. 81308. 7407	164. 58 164. 74
313. 2152	164. 63317. 6897	164. 52322. 1642	164. 42326. 6387	164. 31331. 1132	164. 74
335. 5877	164. 09340. 0622	163. 98344. 5367	163. 87349. 0112	163. 83353. 4857	163.83
357. 9602	163. 83362. 4347	163. 83366. 9092	163. 83371. 3837	163. 83375. 8582	163.83
380. 3327	163. 83384. 8072	163. 83389. 2817	163. 83393. 7562	163. 83398. 2307	163.83
402. 7052	163. 83407. 1797	163. 83411. 6542	163. 78416. 1288	163. 7420. 6032	163.62
425. 0778 447. 4503	163. 55429. 5522 163. 16451. 9248	163. 47434. 0268 163. 09456. 3993	163. 39438. 5013 163. 01460. 8738	163. 31442. 9758 162. 94465. 3483	163. 24 162. 86
469. 8228	162. 83474. 2973	162. 83478. 7718	162. 83483. 2463	162. 83487. 7208	162.83
492. 1953	162. 83496. 6698	162. 83501. 1443	162. 83505. 6188	162. 83510. 0933	162.83
514. 5678	162. 83519. 0423	162. 83523. 5168	162. 83527. 9913	162. 83532. 4658	162.83
536. 9403	162. 83541. 4148	162. 93545. 8893	163. 07550. 3638	163. 2554. 8383	163.34
559. 3128 581. 6854	163. 47563. 7874 164. 2586. 1599	163. 61568. 2618 164. 34590. 6343	163. 74572. 7363 164. 46595. 1088	163. 88577. 2108 164. 6599. 5834	164. 04 164. 73
604. 0579	164. 85608. 5323	164. 91613. 0068	164. 98617. 4814	165. 05621. 9559	165. 11
626. 4304	165. 18630. 9048	165. 24635. 3794	165. 31639. 8539	165. 38644. 3284	165. 44
648. 8029	165. 5653. 2774	165. 57657. 7519	165. 63662. 2264	165. 7666. 7009	165.77
671. 1754	165. 91675. 6499	167. 06680. 1244	167. 87684. 5989	168. 72689. 0734	169. 59
693. 5479 783. 038	169. 83702. 4969 167. 98787. 5125	167. 83769. 6144 168. 12791. 9869	167. 83774. 0889 168. 34796. 4615	167. 84778. 5635 168. 55 800. 936	167. 88 168. 77
804. 2	168. 43 809. 2	168. 57 814. 19	168. 54 819. 19	168. 6 832. 79	168. 71
842.62	168. 75 845. 9	168. 7 849. 18	168. 68 855. 74	168. 68 859. 02	168. 72
865. 58	168. 87 878. 69	168. 96 881. 97	169. 03 888. 53	169. 03 891. 8	169.06
895. 08	169. 08 901. 64	169. 15 904. 92	169. 16 911. 48	169. 12 914. 76	169. 14
918. 03	169. 18 921. 31	169. 11 924. 59	169. 13 931. 15	169. 21 937. 71	169. 24
940. 98 963. 94	169. 19 947. 54 169. 14 967. 21	169. 13 950. 82 169. 06 970. 49	169. 07 954. 1 169. 08 973. 77	169. 1 960. 66 169. 14 977. 05	169. 12 169. 13
983. 61	169. 13 986. 89	169. 1 990. 17	169. 1 996. 72	169. 15 1006. 56	169. 26
1009.84	169. 34 1013. 12	169. 36 1016. 39	169. 41 1022. 95	169. 45 1026. 23	169. 43
1029. 51	169. 37 1032. 79	169. 33 1036. 07	169. 32 1039. 35	169. 28 1042. 62	169. 23
1045. 9	169. 22 1049. 18	169. 26 1055. 74	169. 29 1059. 02	169. 33 1062. 3	169. 33
1065. 58 1085. 25	169. 35 1068. 85 169. 36 1088. 53	169. 4 1072. 13 169. 42 1091. 81	169. 39 1078. 69 169. 39 1095. 08	169. 34 1081. 97 169. 38 1098. 36	169. 34 169. 41
1101. 64	169. 46 1104. 92	169. 55 1108. 2	169. 6 1114. 76	169. 68 1118. 03	169. 67
1121. 31	169. 67 1124. 59	169. 61 1127. 87	169. 59 1134. 43	169. 46 1137. 71	169.44
1140. 99	169. 49 1144. 26	169. 6 1147. 54	169. 68 1154. 1	169. 76 1157. 38	169. 79
1160. 66	169. 79 1163. 94	169. 85 1167. 22	169. 85 1177. 05	169. 88 1180. 33	169.88
1193. 45	169. 92 1200	169. 93 1203. 28	169. 97 1206. 56 e 135	170. 03 1209. 84	170. 03
		Paye	5 133		

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Proposed - No-Rise
                                                                        169. 97 1226. 23
                                                                                                                             170 1229.51
  1213. 12
                           170. 01 1216. 4
                                                                                                                                                                   170. 04 1236. 07
                                                                                                                                                                                                                   170. 1
                                                                                                                                                                   170. 04 1236. 07
170. 3 1259. 02
170. 7 1278. 69
170. 8 1295. 09
171. 25 1318. 04
171. 49 1334. 43
                                                                         170. 19 1252. 46
                                                                                                                      170. 27 1255. 74
                                                                                                                                                                                                                 170. 36
  1242.63
                            170. 13 1249. 18
                                                                                                                      170. 27 1255. 74
170. 6 1275. 41
170. 78 1291. 81
171. 14 1314. 76
171. 39 1331. 15
171. 79 1357. 38
172. 06 1377. 05
  1262. 3
1281. 97
1298. 36
1321. 32
                           170. 43 1268. 86
170. 79 1285. 25
171. 04 1301. 64
171. 35 1324. 59
                                                                         170. 54 1272. 13
170. 83 1288. 53
                                                                                                                                                                                                                  170.77
                                                                                                                                                                                                                  170.91
                                                                         171. 06 1308. 2
171. 38 1327. 87
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                                                                         171. 69 1350. 82
172. 05 1373. 78
  1337.71
                            171.62 1344.27
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                                                                                                                                                                   171. 85 1363. 94
172. 13 1383. 61
172. 5 1400. 01
172. 87 1419. 68
173. 15 1436. 07
173. 58 1455. 74
174. 08 1498. 37
                                                1370. 5
  1367.22
                            172.08
                                                                                                                                                                                                                  172.35
                                                                       172. 48 1393. 45
172. 67 1409. 84
173. 02 1429. 51
173. 52 1445. 91
173. 81 1465. 58
173. 98 1485. 25
174. 2 1514. 76
174. 24 1534. 43
174. 26 1550. 83
174. 51 1573. 78
174. 79 1593. 45
174. 89 1613. 12
175. 04 1629. 52
175. 42 1645. 91
175. 91 1668. 86
175. 98 1685. 25
176. 16 1704. 93
                                                                         172. 48 1393. 45
                                                                                                                       172. 45 1396. 73
  1386.89
                            172.44 1390.17
                                                                                                                                                                                                                  172.58
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172. 76 1413. 12

173. 07 1432. 79

173. 54 1449. 19

173. 82 1468. 86

174. 03 1491. 81

174. 21 1518. 04

174. 25 1537. 71

174. 3 1557. 38

174. 64 1577. 06

174. 83 1596. 73

174. 9 1616. 4
                           172. 44 1390. 17
172. 64 1406. 56
173. 03 1426. 23
173. 38 1442. 63
173. 81 1462. 3
173. 99 1481. 97
174. 19 1511. 48
  1403. 28
1422. 96
1439. 35
1459. 02
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  1478. 69
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174. 28 1540. 99
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  1504.92
                           174. 25 1531. 15
174. 26 1547. 55
  1527.88
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                                                                                                                                                                  174. 28 1540. 99
174. 4 1563. 94
174. 74 1580. 33
174. 92 1600. 01
174. 9 1619. 68
175. 08 1636. 07
175. 48 1652. 47
175. 96 1675. 42
176. 06 1691. 81
  1544.27
                           174. 26 1547. 55
174. 43 1570. 5
174. 79 1590. 17
174. 95 1609. 84
174. 97 1626. 24
175. 3 1642. 63
175. 75 1665. 58
175. 95 1681. 98
  1567.22
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  1583. 61
1603. 29
                                                                                                                                                                                                                  174.96
                                                                                                                       174. 9 1616. 4
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  1622. 96
1639. 35
1659. 02
                                                                                                                      175. 08 1632. 79
175. 46 1649. 19
175. 96 1672. 14
176. 03 1688. 53
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     1678.7
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                          175. 95 1681. 98
176. 1 1698. 37
176. 29 1721. 32
176. 64 1737. 71
177 1754. 11
177. 13 1770. 5
177. 32 1790. 17
177. 64 1809. 84
177. 85 1832. 8
178. 21 1849. 19
178. 38 1868. 86
179. 1 1885. 26
                                                                                                                                                                     176. 18 1714. 76
  1695.09
                                                                         176. 16 1704. 93
                                                                                                                       176. 14 1708. 2
                                                                                                                     176. 14 1708. 2
176. 41 1727. 88
176. 78 1744. 27
177. 08 1760. 66
177. 2 1777. 06
177. 45 1796. 73
177. 78 1816. 4
177. 98 1839. 35
178. 24 1855. 75
178. 69 1875. 42
179. 26 1891. 81
179. 48 1911. 49
                                                                                                                                                                                                                  176.28
                                                                       176. 16 1704. 93
176. 32 1724. 6
176. 74 1740. 99
177. 01 1757. 39
177. 12 1773. 78
177. 39 1793. 45
177. 72 1813. 12
177. 93 1836. 07
178. 25 1852. 47
                                                                                                                                                                    176. 46 1731. 16
176. 87 1747. 55
  1718.04
                                                                                                                                                                                                                  176.53
  1734.43
                                                                                                                                                                                                                  176.97
                                                                                                                                                                  176.87 1747.55
177.11 1763.94
177.26 1780.34
177.49 1800.01
177.8 1819.68
178.05 1842.63
178.26 1859.03
  1750. 83
1767. 22
1783. 62
1806. 57
                                                                                                                                                                                                                   177. 1
                                                                                                                                                                                                                  177.27
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177. 81
  1822. 96
1845. 91
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                                                                        178. 58 1872. 14
                                                                                                                                                                  178.82
     1862.3
                                                                                                                                                                                        1878. 7
                                                                                                                                                                                                                  178.93
                                                                                                                                                                  178. 82 1878. 7
179. 25 1895. 09
179. 55 1914. 76
179. 93 1937. 72
180. 31 1957. 39
180. 84 1973. 78
181. 5 2000. 01
181. 92 2029. 52
                           178. 38 1868. 86
179. 1 1885. 26
179. 39 1904. 93
179. 7 1924. 6
180. 09 1947. 55
180. 48 1963. 95
181. 06 1983. 62
181. 58 2006. 57
                                                                        178. 58 1872. 14
179. 23 1888. 53
179. 43 1908. 21
179. 76 1927. 88
180. 16 1950. 83
180. 61 1967. 22
181. 16 1990. 17
  1881. 98
1898. 37
                                                                                                                                                                                                                 179.34
                                                                                                                                                                                                                  179.63
                                                                                                                      179. 48 1911. 49
179. 85 1931. 16
180. 25 1954. 11
180. 75 1970. 5
181. 32 1996. 73
181. 85 2019. 68
  1918.04
                                                                                                                                                                                                                  180.06
  1944.27
                                                                                                                                                                                                                  180.38
  1960. 67
1980. 34
2003. 29
                                                                                                                                                                                                                  180.89
                                                                        181. 16 1990. 17
181. 66 2013. 13
182. 31 2039. 36
182. 99 2062. 31
183. 68 2085. 26
184. 4 2104. 93
185. 22 2121. 32
186. 27 2144. 27
187. 5 2173. 78
188. 49 2200. 01
                                                                                                                                                                                                                  181.56
                                                                                                                                                                                                                  182.13
                                                                                                                       182. 48 2042. 63
183. 09 2068. 86
     2032.8
                            182. 21 2036. 08
                                                                                                                                                                    182.61 2045.91
                                                                                                                                                                                                                  182.71
                            182.77 2055.75
  2049.19
                                                                                                                                                                    183. 34 2072. 14
                                                                                                                                                                                                                  183.43
                                                                                                                     183. 09 2068. 86
183. 75 2088. 54
184. 69 2108. 21
185. 39 2127. 88
186. 4 2147. 55
187. 62 2180. 34
188. 79 2203. 29
                           183. 5 2081. 98
184. 18 2098. 37
                                                                                                                                                                    183. 84 2091. 81
184. 81 2111. 49
  2075. 42
2095. 09
                                                                                                                                                                                                                  183.99
                                                                                                                                                                                                                   184. 9
                           185. 04 2118. 04
185. 98 2140. 99
187. 11 2170. 5
188. 36 2193. 45
189. 23 2213. 12

      185. 39
      2127. 88
      185. 63
      2131. 16

      186. 4
      2147. 55
      186. 52
      2150. 83

      187. 62
      2180. 34
      187. 94
      2183. 62

      188. 79
      2203. 29
      188. 92
      2206. 57

      189. 41
      2219. 68
      189. 51
      2222. 96

  2114. 77
2134. 44
                                                                                                                                                                                                                  185.79
                                                                                                                                                                                                                  186.66
   2160.67
                                                                                                                                                                                                                  188.07
  2190.17
                                                                                                                                                                                                                  189.06
  2209.85
                                                                         189. 34
                                                                                                2216.4
                                                                                                                                                                                                                 189.63
                                                                         190.06
  2229.52
                            189. 91 2232. 8
Manning's n Values
                                                                         num=
 Sta n Val Sta n Val Sta n Val
                                                                                                                    n Val
                                   . 03407. 1797
                                                                           . 025599. 5834
                                                                                                                          . 1
                                                                        Lengths: Left Channel Right Coeff Contr. 1760 1760 1760 .1
Bank Sta: Left Right
                                                                                                                                                                                                                     Expan.
                 407. 1797599. 5834
CROSS SECTION OUTPUT Profile #1%
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Proposed - No-Rise
                        * 174.81
                                   * Element
                                                            * Left OB * Channel *
* E.G. Elev (ft)
Right OB *
 Vel Head (ft)
                             0.17 * Wt. n-Val.
                                                               0.030 *
                                                                          0.025
 0.100
* W.S. Elev (ft)
                           174.63 * Reach Len. (ft)
                                                            * 1760.00
                                                                      * 1760.00
1760.00
* Crit W.S. (ft)
                                   * Flow Area (sq ft)
                                                            * 2393.40
                                                                      * 2181.83
4525. 18
* E.G. Slope (ft/ft)
                        *0.000199
                                   * Area (sq ft)
                                                            * 2393.40
                                                                       * 2181.83
4525. 18
* Q Total (cfs)
                        *17300.00
                                   * Flow (cfs)
                                                            * 5432.94
                                                                      * 9228.49
2638. 58
* Top Width (ft)
                        * 1573.58
                                   * Top Width (ft)
                                                              407. 18
                                                                         192.40
973. 99
* Vel Total (ft/s)
                                  * Avg. Vel. (ft/s)
                                                                2.27
                            1. 90
                                                                           4.23
  0.58
 Max Chl Dpth (ft)
                            12.80 * Hydr. Depth (ft)
                                                                5.88
                                                                          11.34
  4.65
* Conv. Total (cfs)
                        *1226894.0 * Conv. (cfs)
                                                             *385296.8
                                                                       *654472.4
*187124.6
Length Wtd. (ft) 974.73 *
                        * 1760.00 * Wetted Per. (ft)
                                                              408.47
                                                                         192. 44
* Min Ch El (ft)
                           162.83 * Shear (lb/sq ft)
                                                                0.07
                                                                           0. 14
  0.06
                             3. 10
 Al pha
                                  * Stream Power (lb/ft s) *
                                                                0.17
                                                                           0.60
  0.03
* Frctn Loss (ft)
                             0. 22
                                   * Cum Volume (acre-ft)
                                                              280. 43
                                                                          84. 52
512.89
                             0.05 * Cum SA (acres)
* C & E Loss (ft)
***************************
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

#### 

^^^^^	^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^		^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	^ ^ .		^ ^
*****							
* E.G. Elev (ft) Right OB *	* 175.47	* Element	*	Left OB	*	Channel	*
* Vel Head (ft)	* 0.13	* Wt. n-Val.	*	0. 030	*	0. 025	*
0.100 * * W.S. Elev (ft)	* 175.34	* Reach Len. (ft)	*	1760. 00	*	1760. 00	*
1760.00 * * Crit W.S. (ft)	*	* Flow Area (sq ft)	*	2636. 53	*	2318. 32	*
4863.35 * * E.G. Slope (ft/ft)	*0. 000139	* Area (sq ft)	*	2636. 53	*	2318. 32	*
4863.35 * * Q Total (cfs)		* Flow (cfs)	*	5865. 16	*	8535. 37	*
2899.47 *` * Top Width (ft)		* Top Width (ft)	*	352. 18	*	192. 40	*
770.42 * * Vel Total (ft/s)	* 1.76	* Avg. Vel. (ft/s)	*	2. 22			*
0.60 *		_	*			12. 05	*
* Max Chl Dpth (ft) 6.31 *	13. 31	* Hydr. Depth (ft)					
* Conv. Total (cfs) *245983.9 *	*1467692.0	* Conv. (cfs)	;	*497586. 6	;	<sup>4</sup> 724121. 2	
* Length Wtd. (ft) 774.41 *	* 1760.00	* Wetted Per. (ft)	*	354. 48	*	192. 44	*
* Min Ch El (ft) 0.05 *	* 162.83	* Shear (Ib/sq ft)	*	0.06	*	0. 10	*

```
Proposed - No-Rise
                                                                           0.38 *
* Al pha
                                  * Stream Power (lb/ft s) * 0.14 *
  0.03
* Frctn Loss (ft)
                             0.17 * Cum Volume (acre-ft)
                                                              221.43 *
                                                                          88. 78
507.71
                             0.04 * Cum SA (acres)
* C & E Loss (ft)
******************
CROSS SECTION OUTPUT Profile #10%
                                  * E.G. Elev (ft)
                          169, 60
                                   * Element
                                                              Left OB *
                                                                         Channel *
Right OB *
* Vel Head (ft)
                                   * Wt. n-Val.
                                                               0.030
                                                                         0.025
                            0.18
 0.100
* W.S. Elev (ft)
                           169. 42
                                   * Reach Len. (ft)
                                                           * 1760.00
                                                                      * 1760.00
1760.00 *
 Crit W.S. (ft)
                                   * Flow Area (sq ft)
                                                              977.89
                                                                      * 1179.42
575. 57
* E.G. Slope (ft/ft)
                                   * Area (sq ft)
                        *0.000381
                                                              977.89
                                                                      * 1179.42
575.57
 Q Total (cfs)
                                                           * 2618.66
                        * 7480.00
                                   * Flow (cfs)
                                                                      * 4580.48
280.85
                                   * Top Width (ft)
* Top Width (ft)
                           887.38
                                                              210.87
                                                                        192.40
484. 10 *
* Vel Total (ft/s)
                             2.74
                                   * Avg. Vel. (ft/s)
                                                                2.68
                                                                           3.88
  0.49
* Max Chl Dpth (ft)
                             7.59
                                   * Hydr. Depth (ft)
                                                                4.64
                                                                           6.13
1. 19 *
* Conv. Total (cfs)
14394. 9 *
                                   * Conv. (cfs)
                        *383379.6
                                                           *134216.8
                                                                      *234767.8
 Length Wtd. (ft)
                        * 1760.00
                                   * Wetted Per. (ft)
                                                                         192.44
                                                              212.00
484. 71
* Min Ch El (ft)
                           162.83
                                   * Shear (lb/sq ft)
                                                                0.11
                                                                           0.15
  0.03
                             1.57
                                   * Stream Power (lb/ft s) *
 Al pha
                                                                0.29
                                                                           0.57
  0.01
* Frctn Loss (ft)
                             0.43
                                   * Cum Volume (acre-ft)
                                                              125. 58
                                                                          53. 18
221.92
* C & E Loss (ft)
                             0.05
                                  * Cum SA (acres)
*****
Warning: Divided flow computed for this cross-section.
CROSS SECTION OUTPUT Profile #2%
                                  ***********
* E.G. Elev (ft)
                           173. 24
                                   * Element
                                                              Left OB *
                                                                        Channel *
Right OB *
 Vel Head (ft)
                            0.18
                                   * Wt. n-Val.
                                                               0.030
                                                                          0.025
 0. 100
* W.S. Elev (ft)
                          173. 06
                                  * Reach Len. (ft)
                                                           * 1760.00
                                                                      * 1760.00
1760.00
* Crit W.S. (ft)
                                   * Flow Area (sq ft)
                                                           * 1871.27
                                                                      * 1879.44
3133. 97
* E.G. Slope (ft/ft)
                        *0.000231
                                   * Area (sq ft)
                                                           * 1871.27
                                                                      * 1879.44
3133. 97
* Q Total (cfs)
                        *14350.00
                                   * Flow (cfs)
                                                           * 4872.53
                                                                      * 7760.55
1716. 93
                                   * Top Width (ft)
* Top Width (ft)
                        * 1311.56
                                                              289.86
                                                                      * 192.40
                                     Page 138
```

```
2.08 * Avg. Vel. (ft/s)
 Vel Total (ft/s)
                                                               2.60 *
                                                                          4. 13 *
  0.55
 Max Chl Dpth (ft)
                           11. 23
                                  * Hydr. Depth (ft)
                                                               6.46
                                                                          9.77 *
  3.78
* Conv. Total (cfs)
                                                                     *510393.4
                        *943766.7
                                  * Conv. (cfs)
                                                           *320455.1
*112918. 2
* Length Wtd. (ft)
                        * 1760.00
                                  * Wetted Per. (ft)
                                                             291.07
                                                                        192.44
830. 01
* Min Ch El (ft)
                          162.83
                                  * Shear (lb/sq ft)
                                                               0.09
                                                                          0.14
  0.05
* Al pha
                            2.66
                                  * Stream Power (lb/ft s) *
                                                               0.24
                                                                          0.58
  0.03
* Frctn Loss (ft)
                            0. 26
                                  * Cum Volume (acre-ft)
                                                             231.00 *
                                                                         75.12 *
417.86
* C & E Loss (ft)
                            0.05 * Cum SA (acres)
************************
CROSS SECTION OUTPUT Profile #0.2%
* E.G. Elev (ft)
                        * 178.62 * Element
                                                           * Left OB * Channel *
Right OB *
 Vel Head (ft)
                           0. 13
                                  * Wt. n-Val.
                                                              0.030
                                                                         0.025
 0. 100
                        * 178.49 * Reach Len. (ft)
* W.S. Elev (ft)
                                                           * 1760.00
                                                                     * 1760.00
1760.00
                                   * Flow Area (sq ft)
* Crit W.S. (ft)
                                                           * 3964.85
                                                                     * 2924.38
8877.46
* E.G. Slope (ft/ft)
                        *0.000109 * Area (sq ft)
                                                           * 3964.85
                                                                     * 2924.38
8877.46
* Q Total (cfs)
                        *25400.00 * Flow (cfs)
                                                           * 9254.12
                                                                     *11112.79 *
5033.09
* Top Width (ft)
                        * 1865.95
                                  * Top Width (ft)
                                                             407. 18
                                                                     * 192.40
1266. 37
                                  * Avg. Vel. (ft/s)
 Vel Total (ft/s)
                        * 1.61
                                                               2.33
                                                                          3.80 *
  0. 57
* Max Chl Dpth (ft)
                                  * Hydr. Depth (ft)
                        * 16.66
                                                               9. 74
                                                                         15. 20
  7. 01
* Conv. Total (cfs)
                        *2437383.0 * Conv. (cfs)
                                                            *888024.7 *1066383.0
*482975.1
* Length Wtd. (ft)
                        * 1760.00
                                  * Wetted Per. (ft)
                                                           * 412.32
                                                                        192.44
1267. 15
                                  * Shear (lb/sq ft)
 Min Ch El (ft)
                        * 162.83
                                                               0.07
                                                                          0.10
  0.05
```

\* Cum SA (acres)

\* Stream Power (lb/ft s) \*

\* Cum Volume (acre-ft)

0.15 \*

408.61 \*

0.39

107.56 \*

3. 22

0.13

0.04

Warning: The cross-section end points had to be extended vertically for the computed water surface.

\*

SUMMARY OF MANNING'S N VALUES

\* Al pha

0.03

775.26 \*
\* C & E Loss (ft)

\* Frctn Loss (ft)

829. 29 \*

* Reach	*	Ri ver Sta.	* n1	*	n2 *	n3 *	n4 *	n5
***************	*****	*****	*****	****	*****	*****	*****	*****
*Reach-1	*	350	*	. 1*	. 045*	. 1*	*	
*Reach-1	*	344. 95	*	. 1*	. 045*	. 1*	*	
*Reach-1	*	331. 6	*	. 1*	. 045*	. 1*	*	
*Reach-1	*	320	*	. 1*	. 045*	. 1*	*	
*Reach-1	*	314. 4	*	. 1*	. 045*	. 1*	*	
*Reach-1	*	300	*	. 1*	. 045*	. 1*	*	
*Reach-1	*	285	*	. 1*	. 045*	. 1*	*	
*Reach-1	*	280. 55	*	. 1*	. 045*	. 1*	*	
^ *Reach-1 *	*	270	*	. 1*	. 045*	. 1*	*	
^ *Reach-1	*	264	*	. 1*	. 045*	. 1*	*	
*Reach-1	*	250. 12	*	. 07*	. 045*	. 07*	*	
*Reach-1 *Reach-1	*	250. 06 250	*Bri dge *	. 07*	. 045*	. 07*	*	*
*Reach-1	*	246	*	. 07*	. 045*	. 07*	*	
*Reach-1	*	245	*	. 07*	. 045*	. 07*	*	
*Reach-1 *Reach-1	*	244. 19 243. 38	*Bri dge *	. 07*	. 045*	. 07*	*	*
*Reach-1	*	243. 2	*	. 07*	. 045*	. 07*	*	
^ *Reach-1	*	243	*	. 07*	. 045*	. 07*	*	
* *Reach-1	*	190	*	. 1*	. 045*	. 1*	*	
*Reach-1	*	182	*	. 1*	. 045*	. 03*	. 025*	
. 1* *Reach-2	*	180	*	. 1*	. 045*	. 1*	*	
* *Reach-2 *	*	170	*	. 1*	. 045*	. 1*	*	

Ri ver: RI VER-2

*****	*****	*****	****	*****	*****	*****
* Reach	*	Ri ver Sta.		• • •	n2 *	n3 *
*****	****	******	*****	*****	*****	*****
*Reach-1	*	250. 12	*	. 03*	. 025*	. 07*
*Reach-1	*	225	*	. 03*	. 025*	. 07*
*Reach-1	*	200	*	. 03*	. 025*	. 07*
*Reach-1	*	190	*	. 03*	. 025*	. 1*
++++++++++++	+++++	++++++++++		++++++++		. + + + + + + + +

# SUMMARY OF REACH LENGTHS

Ri ver:	R۱۱	VER-	1
---------	-----	------	---

- *
* * * *
505*
100*
*080
550*
500*
340*
320*
140*
515*
000*
520*
*
35*
35*
230*
*
85*
200*
180*
735*
35*
700*
***

River: RIVER-2	_	*****	****	*****	****	*****
* Reach	*	River Sta.				
*Reach-1	*	250. 12	*	515*	515*	515*
*Reach-1	*	225	*	460*	460*	460*
*Reach-1	*	200	*	800*	800*	890*
*Reach-1	*	190	*	1760*	1760*	1760*
******	*****	*****	****	*****	*****	*****

# SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS River: RIVER-1

******	****	*****	****	*****	*****
* Reach	* :****	River St	a. ****	* Contr.	* Expan. * *****
*Reach-1	*	350	*	. 1*	. 3*
*Reach-1	*	344. 95	*	. 1*	. 3*
*Reach-1	*	331. 6	*	. 1*	. 3*
*Reach-1	*	320	*	. 1*	. 3*
*Reach-1	*	314. 4	*	. 1*	. 3*
*Reach-1	*	300	*	. 1*	. 3*
*Reach-1	*	285	*	. 1*	. 3*
*Reach-1	*	280. 55	*	. 1*	. 3*
*Reach-1	*	270	*	. 1*	. 3*
*Reach-1	*	264	*	. 1*	. 3*
*Reach-1	*	250. 12	*	. 3*	. 5*
				Page 1	141

```
Proposed - No-Rise
                         *Bri dge *
*Reach-1
                  250.06
                                        . 5*
                  250
*Reach-1
                                . 3*
                                        . 5*
*Reach-1
                  246
                                . 3*
*Reach-1
                  245
                                         . 5*
                  244.19
*Reach-1
                               . 3*
*Reach-1
                  243.38
                                . 1*
                                        . 3*
*Reach-1
                  243. 2
                                . 1*
*Reach-1
                  243
                                . 1*
                  190
*Reach-1
                                . 1*
                                        . 3*
*Reach-1
                  182
                                . 1*
*Reach-2
                  180
                                . 1*
                                         3*
*Reach-2
                  170
River: RIVER-2
*************
     Reach *
                 River Sta. * Contr. * Expan.
                 250. 12 *
                               . 1*
                                      . 3*
*Reach-1
                  225
                               . 1*
                                        . 3*
                  200
*Reach-1
*Reach-1
                  190
Profile Output Table - Standard Table 1
* River * Reach * River Sta * Profile * Q Total * Min Ch El * W.S. Elev * Crit W.S. * E.G. Elev * E.G. Slope * Vel Chnl * Flow Area * Top Width *
Froude # Chl *
                                                 (cfs) *
                                                             (ft) *
(ft) *
          (ft) *
                   (ft) *
                            (ft/ft) * (ft/s) *
                                                (sq ft) *
           * RI VER-2
175. 14 *
  0.31 *
* RI VER-2
            * Reach-1
                 175. 55 *
   0.41 *
            * 7480.00 * 164.83 * 574.48
* RIVER-2
                    170. 84 * 0. 001056 *
170. 45 *
   0.45 *
                    * 14350.00 * 164.83 * 5.76 * 4163.39 * 741.10
* RI VER-2
            * Reach-1
173.68 *
   0.35 *
                                          * 25400.00 * 164.83 * 5.52 * 8101.73 * 824.79 *
* RI VER-2
            Reach-1 * 250. 12 * 0. 2%
178.73 *
                   179. 03 * 0. 000266 *
  0. 26 *
                                  * 1%
413 *
                                          * 17300.00 * 163.83 * 5.76 * 5134.33 * 1037.90 *
            * RI VER-2
                             0.000413 *
174. 91 *
   0.31 *
                             * FI oodway * 17300.00 * 163.83 * 0.000305 * 5.15 * 4659.16 * 510.00 *
* RI VER-2
            * Reach-1
                     * 225
175. 54 *
                   175.83 *
  0.27 *
                             * Reach-1 * 225
* RI VER-2
                    170. 35 *
170.04 *
```

0 00 +		Р	roposea -	NO-RI Se		
0. 39 * * RI VER-2 173. 42 *	* Reach-1	* 225 173. 77 *	* 0. 000504	2% * * 5. 74	14350. 00 * * 3835. 78 *	163. 83 * 767. 30 *
0. 34 * * RI VER-2 178. 65 *	* Reach-1	* 225 178. 89 *	* 0. 000228	0. 2% * * 5. 25	25400.00 * * 9585.54 *	163. 83 * 1314. 27 *
0. 25 *	*	*	*	*	*	*
*						
* RI VER-2 174. 78 * 0. 29 *	* Reach-1	* 200 175. 06 *	0. 000343	1% * 5. 33	17300. 00 * * 5477. 21 *	163. 83 * 911. 39 *
* RI VER-2 175. 41 * 0. 27 *		* 200 175. 69 *	* 0. 000286	FI oodway * * 5.06	17300.00 * * 4443.31 *	163. 83 * 465. 00 *
* RI VER-2 169. 77 *		* 200 170. 01 *		10% * 4. 57	7480. 00 * * 2187. 73 *	163. 83 * 494. 82 *
0. 34 * * RI VER-2 173. 24 *		* 200 173. 54 *	* 0. 000422	2% * 5. 33	14350. 00 * * 4184. 79 *	163. 83 * 753. 80 *
0. 31 * * RI VER-2 178. 55 *	* Reach-1	* 200 178. 78 *	* 0. 000213	0. 2% * * 5. 14	25400. 00 * * 9716. 10 *	163. 83 * 1320. 25 *
0. 24 *	*	*	*	*	*	* *
*						
* RI VER-2 174. 63 * 0. 22 *	* Reach-1	* 190 174. 81 *	0. 000199	1% * * 4. 23	17300. 00 * * 9100. 40 *	162. 83 * 1573. 58 *
* RI VER-2 175. 34 * 0. 19 *		* 190 175. 47 *	0. 000139	FI oodway * * 3.68	17300.00 * * 9818.19 *	162. 83 * 1315. 00 *
* RI VER-2 169. 42 *	* Reach-1	* 190 169. 60 *	* 0. 000381	10% * * 3.88	7480. 00 * * 2732. 88 *	162. 83 * 887. 38 *
0. 28 * * RI VER-2 173. 06 *		* 190 173. 24 *	* 0. 000231	2% * * 4. 13	14350. 00 * * 6884. 68 *	162. 83 * 1311. 56 *
0. 23 * * RI VER-2 178. 49 *	* Reach-1	* 190 178. 62 *	* 0. 000109	0. 2% * * 3. 80	25400. 00 * * 15766. 68 *	162. 83 * 1865. 95 *
0. 17 *						
* *		*			*	
* RI VER-1 181. 45 * 0. 28 *	* Reach-1	* 350 181. 91 *	* 0. 000901	1% * 6. 43	17700. 00 * * 6303. 06 *	160. 00 * 1094. 31 *
* RI VER-1 181. 80 *	* Reach-1	* 350 182. 35 *	* 0. 000982	FI oodway * * 6.80	17700. 00 * * 4410. 14 *	160. 00 * 440. 00 *
0. 29 * * RI VER-1 177. 58 *	* Reach-1	* 350 177. 96 *	* 0. 000846	10% * * 5. 23	8780. 00 * * 2765. 07 *	160. 00 * 652. 04 *
0. 26 * * RI VER-1 180. 42 *		* 350 180. 88 *	* 0. 000925	2% * * 6. 25	15000. 00 * * 5204. 60 *	160. 00 * 1034. 40 *
0. 28  * *   RI VER-1 184. 25  *	* Reach-1	* 350 184. 67 *	* 0. 000794	0. 2% * 6. 69	25700. 00 * * 9586. 40 *	160. 00 * 1256. 46 *
0. 27 *	*	*	*	*	*	*
*	*	*	*	*	*	*

* * DLVED 1					
* RI VER-1 181. 28 *	* Reach-1	* 344. 95 181. 50 * 0. 00	* 1% * * 0441 * 4. 96	17700. 00 * * 9102. 26 *	159. 00 * 1195. 89 *
0. 20 * * RI VER-1 181. 70 *	* Reach-1	* 344. 95 181. 90 * 0. 00	* FI oodway * 0392 * 4.75	17700.00 * * 8560.24 *	159. 00 * 850. 00 *
0. 19 * * RI VER-1 177. 42 *	* Reach-1	* 344. 95 177. 59 * 0. 00	* 10%	8780.00 * * 4937.46 *	159. 00 * 900. 58 *
0. 18 * * RI VER-1 180. 25 *	* Reach-1	* 344. 95 180. 46 * 0. 00	* 2% * * 0435 * 4.75	15000.00 * * 7886.24 *	159. 00 * 1167. 07 *
0. 20 * * RI VER-1 184. 07 *	* Reach-1	* 344. 95 184. 30 * 0. 00	* 0. 2% * 5. 38	25700. 00 * * 12551. 08 *	159. 00 * 1274. 08 *
0. 20 * *	*	*	* * *	*	*
* * RI VER-1 180. 10 *	* Reach-1	* 331. 6 180. 66 * 0. 00	* 1% * 1105 * 7. 44	17700. 00 * * 5746. 56 *	159. 60 * 906. 63 *
0. 31  * *   RI VER-1 180. 74  *	* Reach-1	* 331. 6 181. 19 * 0. 00	* FI oodway * 0876 * 6.79	17700. 00 * * 6253. 64 *	159. 60 * 840. 00 *
0. 28  * *  RI VER-1 176. 42  *	* Reach-1	* 331. 6 176. 85 * 0. 00	* 10% * 5.87	8780. 00 * * 2911. 38 *	159. 60 * 629. 09 *
0. 28  * *  RI VER-1 179. 07  *		* 331. 6 179. 62 * 0. 00			
0. 31 * * RI VER-1 183. 04 *	* Reach-1	* 331. 6 183. 54 * 0. 00	* 0.2% *	25700.00 *	159. 60 *
0. 30 * *		*			*
*					
* RI VER-1 179. 54 *	* Reach-1	* 320 179. 76 * 0. 00			159. 40 * 1919. 31 *
179. 54 * 0. 21 * * RI VER-1 180. 11 *	* Reach-1	* 320 179. 76 * 0. 000	* 1% * * 0522 * 4.90 * * Floodway *	17700.00 * * 9992.36 * 17700.00 *	159. 40 *
179. 54 *	* Reach-1	* 320	* 1% * * 0522 * 4.90 * * FI oodway * 0617 * 5.44	17700.00 * * 9992.36 * 17700.00 * * 6268.09 *	159. 40 * 600. 00 *
179. 54 *	* Reach-1  * Reach-1	* 320 180. 42 * 0. 00	* 1% * * 0522 * 4.90 * * FI oodway * 5.44 * 4.25	17700.00 * * 9992.36 *  17700.00 * * 6268.09 *  8780.00 * * 4052.28 *	159. 40 * 600. 00 * 159. 40 * 1100. 65 *
179. 54 *	* Reach-1  * Reach-1  * Reach-1	* 320 180. 42 * 0. 000	* 1% * 4.90  * FI oodway * 5.44  * 10% * 5.44  * 25  * 2% * 4.92  * 0.2% *	17700.00 * 9992.36 * 17700.00 * 6268.09 * 8780.00 * 4052.28 * 15000.00 * 8013.89 * 25700.00 *	159. 40 * 600. 00 *  159. 40 * 1100. 65 *  159. 40 * 1757. 54 *
179. 54 * 0. 21 * * RI VER-1 180. 11 * 0. 23 * * RI VER-1 175. 84 * 0. 20 * * RI VER-1 178. 47 * 0. 22 * * RI VER-1 182. 63 * 0. 18 * *	* Reach-1  * Reach-1  * Reach-1  * Reach-1	* 320 180. 42 * 0. 000 * 320 176. 06 * 0. 000 * 320 178. 71 * 0. 000 * 320	* 1% * 4.90  * FI oodway * 5.44  * 10% * 5.44  * 25  * 2% * 4.92  * 0.2% *	17700.00 * 9992.36 * 17700.00 * 6268.09 * 8780.00 * 4052.28 * 15000.00 * 8013.89 * 25700.00 *	159. 40 * 600. 00 *  159. 40 * 1100. 65 *  159. 40 * 1757. 54 *
179. 54 * 0. 21 * * RI VER-1 180. 11 * 0. 23 * * RI VER-1 175. 84 * 0. 20 * * RI VER-1 178. 47 * 0. 22 * * RI VER-1 182. 63 * 0. 18 * *	* Reach-1  * Reach-1  * Reach-1  * Reach-1  * Reach-1	180. 42 * 0. 000  176. 06 * 0. 000  178. 71 * 0. 000  182. 79 * 0. 000  *	* 1%	17700.00 * 9992.36 * 17700.00 * 6268.09 * 8780.00 * 4052.28 * 15000.00 * 8013.89 * 25700.00 * 16880.54 * *	159. 40 * 600. 00 * 159. 40 * 1100. 65 * 159. 40 * 1757. 54 * 159. 40 * 2448. 32 * * *
179. 54 *	* Reach-1  * Reach-1  * Reach-1  * Reach-1  * Reach-1  * Reach-1 173. 46 *	180. 42 * 0.000  176. 06 * 0.000  178. 71 * 0.000  182. 79 * 0.000  *  *  *  *  *  *  *  *  *  *  *  *	* 1%	17700.00 * 9992.36 * 17700.00 * 6268.09 * 8780.00 * 4052.28 * 15000.00 * 8013.89 * 25700.00 * 16880.54 * * * * * * * * * * * * * * * * * * *	159. 40 *
179. 54 *	* Reach-1  * Reach-1  * Reach-1  * Reach-1  * Reach-1  173. 46 *  * Reach-1	180. 42 * 0. 000  176. 06 * 0. 000  178. 71 * 0. 000  182. 79 * 0. 000  *	* 1%	17700.00 * 9992.36 * 17700.00 * 6268.09 * 8780.00 * 4052.28 * 15000.00 * 8013.89 * 25700.00 * 16880.54 * * * * * * * * * * * * * * * * * * *	159. 40 *   600. 00 *    159. 40 *   1100. 65 *    159. 40 *   1757. 54 *    159. 40 *   2448. 32 *   *    **  159. 10 *   159. 10 *   159. 10 *

0 1/ +			Proposed -	No-Ri se		
0. 16 * * RI VER-1 178. 28 *	* Reach-1 172.88 *	* 314 178. 35 *	. 4 * 0. 000271	2% * * 3. 47	15000.00 * * 13099.26 *	159. 10 * 1891. 97 *
182. 50 *	* Reach-1 174. 27 *	* 314 182. 56 *	. 4 * 0. 000208	0. 2% * * 3. 54	25700.00 * * 21022.35 *	159. 10 * 2964. 32 *
0.14 *	*	*	*	*	*	*
	* Reach-1 172. 30 *	* 300 179. 22 *	* 0. 000321	1% * 3. 90	17700. 00 * * 11940. 29 *	158. 70 * 2129. 30 *
* RI VER-1 179. 70 * 0. 17 *	* Reach-1 172. 28 *	* 300 179. 80 *	° 0. 000329	FI oodway * * 4.03	17700.00 * * 10855.62 *	158. 70 * 1080. 00 *
	* Reach-1 168.44 *	* 300 175. 44 *	° 0. 000317	10% * * 3. 30	8780. 00 * * 7106. 97 *	158. 70 * 1324. 93 *
* RI VER-1 178. 02 * 0. 17 *	* Reach-1 171.87 *	* 300 178. 12 *	o. 000334	2% * * 3. 81	15000. 00 * * 10410. 01 *	158. 70 * 2008. 45 *
	* Reach-1 173.33 *	* 300 182. 38 *	° 0. 000276	0. 2% * * 4. 04	25700.00 * * 16559.88 *	158. 70 * 3960. 28 *
* * *	*	*	*	*	*	*
	* Reach-1 171. 92 *	* 285 178. 44 *	o. 000733	1% * 5. 98	17700. 00 * * 7101. 43 *	158. 20 * 1365. 53 *
* RI VER-1 178. 60 * 0. 26 *	* Reach-1 171. 93 *	* 285 178. 98 *	° 0. 000782	FI oodway * * 6. 29	17700. 00 * * 5961. 98 *	158. 20 * 605. 00 *
* RI VER-1 174. 38 * 0. 23 *	* Reach-1 166. 72 *	* 285 174. 66 *	° 0. 000673	10% * * 4. 91	8780. 00 * * 3886. 06 *	158. 20 * 824. 26 *
* RI VER-1 176. 96 * 0. 25 *	* Reach-1 171.13 *			2% * * 5. 86	15000. 00 * * 6070. 28 *	158. 20 * 1240. 17 *
* RI VER-1 181. 38 * 0. 24 *	* Reach-1 173. 49 *	* 285 181. 70 *	° 0. 000668	0. 2% * * 6. 38	25700.00 * * 10306.69 *	158. 20 * 3345. 95 *
* *	*	*	*	*	*	*
	* Reach-1 171.80 *	* 280 178. 23 *	. 55 * 0. 000693	1% * * 5.88	17700. 00 * * 7063. 57 *	158. 00 * 1290. 37 *
* RI VER-1 178. 41 * 0. 25 *					17700. 00 * * 6197. 06 *	
* RI VER-1 174. 23 * 0. 22 *	* Reach-1 166.65 *	* 280 174. 46 *	. 55 * 0. 000588	10% * * 4.66	8780.00 * * 4238.73 *	158. 00 * 774. 71 *
* RI VER-1 176. 78 * 0. 24 *	* Reach-1 171.02 *	* 280 177. 07 *	. 55 * 0. 000704	2% * * 5. 67	15000. 00 * * 6170. 14 *	158. 00 * 1157. 46 *
* RI VER-1 181. 20 * 0. 24 *	* Reach-1 173. 52 *	* 280 181. 52 *	. 55 * 0. 000662	0. 2% * * 6. 41	25700.00 * * 9830.33 *	158. 00 * 3396. 53 *
* *	*	*	*	*	*	*

Proposed - No-Ri se

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* RI VER-1 176. 52 *	* Reach-1 171.46 *	* 270 177. 12 *	* 0. 001500	1% * 7. 45	17700. 00 * * 4228. 59 *	157. 70 * 898. 81 *
0. 34 * * RI VER-1 177. 16 *	* Reach-1 171.45 *	* 270 177. 68 *	* 0. 001254	FI oodway * 7.01	17700.00 * * 4514.99 *	157. 70 * 449. 00 *
0. 31 * * RI VER-1 173. 23 *	* Reach-1 167.38 *	* 270 173. 58 *	* 0. 001095	10% * * 5. 40	8780. 00 * * 2781. 02 *	157. 70 * 451. 48 *
0. 28 * * RI VER-1 175. 39 *	* Reach-1 170. 78 *	* 270 175. 95 *	* 0. 001513	2% * 7. 10	15000. 00 * * 3724. 90 *	157. 70 * 731. 14 *
179. 72 *	173.05 *	* 270 180. 44 *	* 0. 001466	0. 2% * * 8. 38	25700. 00 * * 5702. 49 *	157. 70 * 1916. 75 *
0.35 *	*	*	*	*	* *	* *
* * RI VER-1 175. 98 *	* Reach-1 170. 99 *	* 264 176. 36 *	* 0. 001202	1% * 6. 79	17700. 00 * * 5551. 56 *	157. 50 * 1664. 30 *
0. 30  * *   RI VER-1 176. 73  *					17700. 00 * * 5990. 98 *	
0. 27  * *  RI VER-1 172. 78  *	* Reach-1 168. 90 *	* 264 173. 03 *	* 0. 000920	10% * * 5. 11	8780. 00 * * 3689. 84 *	157. 50 * 839. 81 *
0. 25  * *  RI VER-1 174. 81  *	* Reach-1	* 264	*	2% *	15000. 00 * * 4867. 78 *	157. 50 *
179. 30 *	* Reach-1 172. 29 *	* 264 179. 70 *	* 0. 001042	0. 2% * 7. 19	25700. 00 * * 7491. 52 *	157. 50 * 3321. 91 *
0. 29 *	*	*	*	*	* *	*
* * RI VER-1 175. 41 *	* Reach-1 160.81 *	* 250. 175. 44 *	12 * 0. 000035	1% * * 1. 29	800.00 * * 691.77 *	157. 00 * 2947. 76 *
0. 05  * *   RI VER-1 176. 29  *					800.00 * * 731.01 *	
0. 05   * *   RI VER-1 172. 10   *					1450.00 * * 542.84 *	
0. 14  * *   RI VER-1 174. 17  *		* 250.	12 *	2% *	950. 00 *	
0. 07  * *   RI VER-1 178. 89  *	* Reach-1 160. 59 *	* 250. 178. 89 *	12 * 0. 000000		700. 00 * * 16640. 42 *	
0. 01 * *	*	*	*	*	* *	* *
* RI VER-1	* Reach-1	* 250.	06 *	*	Bri dge *	* *
* * *	*	*	*	*	*	*
* * RI VER-1 174. 71 *	* Reach-1 160.74 *	* 250 174. 72 *	0. 000025 Page	* 1.01		156. 84 * 3891. 49 *

Proposed - No-Rise

Reach	0.04 *			. оросоц			
* RIVER-1	* RI VER-1 175. 58 *	* Reach-1 160.74 *	* 250 175. 59 *	* 0. 000037	FI oodway * * 0.95	800.00 * * 838.60 *	156. 84 * 50. 00 *
TRIVER-1 173. 18	* RI VER-1 169. 81 *	* Reach-1 161.78 *	* 250 169. 92 *	* 0. 000276	10% * * 2. 64	1450. 00 * * 550. 24 *	156. 84 * 128. 52 *
* RI VER-1	* RI VER-1 173. 18 *	* Reach-1 161.00 *	* 250 173. 20 *	* 0. 000049	2% * * 1. 32	950.00 * * 718.60 *	156. 84 * 2722. 11 *
* RI VER-1	* RI VER-1 178. 48 *	* Reach-1 160.54 *	* 250 178. 48 *	* 0. 000000	0. 2% * * 0. 08	700.00 * * 25802.58 *	156. 84 * 4642. 40 *
* RI VER-1	*	*	*	*	*	*	*
* RIVER-1	* RI VER-1 174. 71 *	* Reach-1 161. 57 *	* 246 174. 72 *	* 0. 000015	1% * * 0. 72	800.00 * * 1114.41 *	156. 80 * 3899. 97 *
* RIVER-1 169.83 * 162.57 * 169.89 * 0.000203 * 2.00 * 723.93 * 134.52 * 0.12 * RIVER-1 173.18 * 161.84 * 173.20 * 0.000030 * 2.00 * 723.93 * 156.80 * 134.52 * 0.005 * 156.80 * 156.80 * 173.18 * 0.05 * 161.84 * 173.20 * 0.00030 * 0.96 * 992.20 * 2341.40 * 0.05 * 178.47 * 161.39 * 178.48 * 0.00005 * 0.49 * 1415.49 * 4616.67 * 0.02 * * * * * * * * * * * * * * * * * * *	* RI VER-1 175. 58 *	* Reach-1 161.57 *	* 246 175. 59 *	* 0. 000017	FI oodway * * 0.68	800.00 * * 1183.98 *	156. 80 * 80. 00 *
* RI VER-1	* RI VER-1 169. 83 *	* Reach-1 162.57 *	* 246 169. 89 *	* 0. 000203	10% * * 2. 00	1450.00 * * 723.93 *	156. 80 * 134. 52 *
* RI VER-1	* RI VER-1 173. 18 *	* Reach-1 161.84 *	* 246 173. 20 *	o. 000030	2% * * 0. 96	950.00 * * 992.20 *	156. 80 * 2341. 40 *
* Reach-1	* RI VER-1 178. 47 * 0.02 *		* 246 178. 48 *	° 0. 000005	0. 2% * * 0. 49	700.00 * * 1415.49 *	156. 80 * 4616. 67 *
* RI VER-1	*	*	*	*	*		*
0.06 * * RI VER-1 175.55 * 161.19 * 175.58 * 0.000092 * 1.35 * 591.28 * 35.00 * 0.06 * * RI VER-1 169.62 * 162.42 * 169.84 * 0.000558 * 3.78 * 383.62 * 136.26 * 0.20 * * RI VER-1 173.13 * 161.50 * 173.18 * 0.00095 * 1.88 * 506.51 * 2117.41 * 0.09 * * RI VER-1 178.48 * 0.00 * 156.80		* Danah 1	* 245	+	10/ +	000 00 *	15/ 00 *
** RI VER-1	^ RIVER-I 174. 68 * 0. 06 *						
* RI VER-1 169. 62 * 162. 42 * 169. 84 * 0. 000558 * 3. 78 * 383. 62 * 136. 26 * 0. 20 * 173. 18 * 0. 000558 * 3. 78 * 383. 62 * 136. 26 * 0. 20 * 173. 18 * 0. 00095 * 1. 88 * 506. 51 * 2117. 41 * 0. 09 * 161. 50 * 173. 18 * 0. 000095 * 1. 88 * 506. 51 * 2117. 41 * 0. 00 * 156. 80 * 1. 88 * 506. 51 * 2117. 41 * 0. 00 * 156. 80 * 1. 88 * 506. 51 * 2117. 41 * 0. 00 * 156. 80 * 1. 88 * 506. 51 * 2117. 41 * 0. 00 * 156. 80 * 1. 88 * 506. 51 * 2117. 41 * 0. 00 * 156. 80 * 1. 88 * 506. 51 * 2117. 41 * 0. 00 * 156. 80 * 1. 88 * 506. 51 * 2117. 41 * 0. 00 * 156. 80 * 1. 88 * 506. 51 * 2117. 41 * 0. 00 * 1. 88 * 506. 51 * 2117. 41 * 0. 00 * 1. 88 * 506. 51 * 2117. 41 * 0. 00 * 1. 88 * 1	175. 55 *	* Reach-1 161.19 *	* 245 175. 58 *	0. 000092	FI oodway * * 1.35	800. 00 * * 591. 28 *	156. 80 * 35. 00 *
* RI VER-1	* RI VER-1 169. 62 *	* Reach-1 162.42 *	* 245 169. 84 *	* 0. 000558	10% * * 3. 78	1450.00 * * 383.62 *	156. 80 * 136. 26 *
* RI VER-1	* RI VER-1 173. 13 *	* Reach-1 161.50 *	* 245 173. 18 *	o. 000095	2% * * 1.88	950. 00 * * 506. 51 *	156. 80 * 2117. 41 *
* * * * * * * * * * * * * * * * * * *	* RI VER-1 178. 48 *	* Reach-1 160. 98 *	* 245 178. 48 *	0. 000000	0. 2% * 0. 09	700.00 * * 24443.18 *	
* RI VER-1	*					*	*
* RI VER-1	* RI VER-1	* Reach-1	* 244.	19 *	*	Bri dge *	*
* RI VER-1	*						
* RI VER-1			*				
	* * RI VER-1 174. 57 *	* * Reach-1	* 243.	* *	* 1% *	* 800.00 *	* 156. 70 *

Proposed - No-Rise

0. 04 * * RI VER-1	* Reach-1	* 243.	38 *	10% *	1450.00 *	156. 70 *
169. 38  * 0. 14  * *   RI VER-1	* Reach-1	* 243.	38 *	2% *	* 579.53 * 950.00 *	156. 70 *
172. 98 * 0. 06 *	160. 74 *	173. 01 *	0. 000041	* 1. 22	* 777.85 *	3037. 64 *
* RI VER-1 178. 47 * 0. 00 *	* Reach-1 160. 25 *	* 243. 178. 47 *	38 * 0. 000000	0. 2% * * 0. 07	700.00 * * 29117.13 *	156. 70 * 4533. 10 *
*	*	*	*	*	*	*
* *						455 40 +
^ RIVER-1 174.57 * 0.01 *					800.00 * * 5903.05 *	
* RI VER-1 175. 43 * 0. 02 *	* Reach-1 158. 78 *	* 243. 175. 43 *	2 * 0. 000009	FI oodway * * 0.60	800.00 * * 1345.31 *	155. 10 * 75. 30 *
* RI VER-1 169. 33 *	* Reach-1 159. 77 *	* 243. 169. 34 *	2 * 0. 000049	10% * * 1.17	1450. 00 * * 2240. 86 *	155. 10  * 1726. 67  *
0. 06  * *   RI VER-1 172. 98  *	* Reach-1 159.05 *	* 243. 172. 98 *	2 * 0. 000004	2% * * 0.39	950.00 * * 4790.80 *	155. 10  * 2176. 15  *
0. 02 * * RI VER-1 178. 47 *	* Reach-1	* 243.	2 *	0. 2% *	700.00 * * 8636.32 *	155. 10 * 2779. 42 *
0.01 *	*	*	v. 000000	V. 13 *	*	2777. 4Z *
*	*	*	*	*	*	*
* RI VER-1 174. 57 *	* Reach-1 159. 29 *	* 243 174. 57 *	o. 000003	1% * * 0. 41	2665.00 * * 13390.99 *	153. 20 * 2774. 92 *
0. 02  * *   RI VER-1 175. 38  *	* Reach-1 159.30 *	* 243 175. 42 *	* 0. 000055	FI oodway * * 1.65	2665. 00 * * 1770. 26 *	153. 20 * 100. 00 *
0. 07 * * RI VER-1 169. 31 *	* Reach-1 159.60 *			10% * * 1. 12	3015.00 * * 5871.21 *	153. 20 * 2656. 52 *
0. 05   * *   RI VER-1	* Reach-1	* 243	*	2% *	2805.00 *	153. 20 *
172. 98  * 0. 02  *	159. 42 *	172. 98 *	0. 000007	* 0.53	* 11116.88 *	2741.09 *
* RI VER-1 178. 47 * 0. 01 *	* Reach-1 158. 77 *	* 243 178. 47 *	0. 000001	0. 2% * * 0. 21	2100.00 * * 18976.26 *	153. 20 * 2860. 36 *
* *	*	*	*	*	*	*
* RI VER-1 174. 56 *	* Reach-1	* 190 174. 56 *	* 0. 000006	1% * * 0. 55	2665. 00 * * 12443. 90 *	153. 80 * 1068. 78 *
0. 02  * *   RI VER-1 175. 29  *	* Reach-1	* 190 175. 30 *	* 0. 000012	FI oodway * * 0.84	2665.00 * * 6724.83 *	153. 80 * 488. 00 *
0. 03 * * RI VER-1 169. 18 *	* Reach-1	* 190 169. 19 *		10% *	3015.00 * * 6714.25 *	153. 80 * 1062. 51 *
0. 06 * * RI VER-1 172. 96 *	* Reach-1	* 190 172. 96 *	*	2% *	2805. 00 * * 10735. 03 *	153. 80 *
0. 03 * * RI VER-1	* Reach-1	* 190	*	0. 2% *	2100.00 *	153. 80 *
178. 47 *	*	178. 47 *	0. 000002 Page		* 17166.59 *	1609. 35 *

### Proposed - No-Rise

0.04		P	roposed -	No-Ri se				
0. 01 * * *	*	*	*		*	*	*	
* RI VER-1 174. 54 *		* 182 174. 55 *	o. 000018	1% * O.	* . 96	19965. 00 * * 32769. 91	154. 83 * * 3419. 79 *	
0. 04 * * RI VER-1 175. 28 * 0. 04 *	* Reach-1	* 182 175. 28 *	* 0. 000015	FI oodway	y * . 93	19965. 00 * * 29361. 91	154. 83 * * 2380. 00 *	
* RI VER-1 169. 15 * 0. 05 *	* Reach-1	* 182 169. 16 *	o. 000033	10% * 1.	. 05	10495. 00 * * 15832. 40	154. 83 * * 2823. 72 *	
* RI VER-1 172. 94 * 0. 04 *	* Reach-1	* 182 172. 95 *	* 0. 000021	2% * 0.	* . 98	17155. 00 * * 27426. 74	154. 83 * * 3253. 64 *	
* RI VER-1 178. 46 * 0. 03 *	* Reach-1	* 182 178. 47 *	o. 000013	0. 2%	* . 92	27500. 00 * * 46765. 81	154. 83 * * 3694. 00 *	
* * * *	*		*			*	*	
* RI VER-1 174. 52 * 0. 07 *		* 180 174. 53 *	° 0. 000056	1% * 1.	. 77	19965. 00 * * 34352. 70	153. 30 * * 3408. 33 *	
* RI VER-1 175. 26 * 0. 07 *	* Reach-2	* 180 175. 27 *	* 0. 000051	FI oodway	y * . 75	19965. 00 * * 30669. 10	153.30 * * 2384.00 *	
* RI VER-1 169. 11 * 0. 09 *	* Reach-2 *	* 180 169. 13 *	° 0. 000106	10% * 1.	* . 98	10495. 00 * * 17100. 62	153. 30 * * 2877. 45 *	
* RI VER-1 172. 91 * 0. 08 *	* Reach-2	* 180 172. 93 *	o. 000067	2% * 1.	84	17155. 00 * * 28952. 08	153. 30 * * 3300. 79 *	
* RI VER-1 178. 45 * 0. 06 *	* Reach-2	* 180 178. 46 *	* 0. 000039	0. 2% * 1.	. 67	27500. 00 * * 48158. 45	153. 30 * * 3620. 41 *	
* * *		*				*	*	
	* Reach-2 164.09 *	* 170 174. 49 *	° 0. 000072	1% * 2.	. 09	19965. 00 * * 29916. 54	152. 70 * * 3122. 88 *	
* RI VER-1 175. 21 * 0. 08 *	* Reach-2 164.08 *	* 170 175. 23 *	° 0. 000065	FI oodway	y * . 02	19965. 00 * * 27665. 11	152.70 * * 2300.00 *	
* RI VER-1 169. 00 * 0. 11 *	* Reach-2 161. 22 *			10% * 2.	48	10495. 00 * * 13935. 40	152. 70 * * 2632. 32 *	
* RI VER-1 172. 85 * 0. 09 *	* Reach-2 163.61 *	* 170 172. 87 *	0. 000090	2% * 2.	. 20	17155. 00 * * 24921. 49	152. 70 * * 3039. 49 *	
* RI VER-1 178. 41 * 0. 07 *	* Reach-2 164. 95 *	* 170 178. 42 *		0. 2% * 1.	* . 93	27500. 00 * * 42607. 82	152. 70 * * 3306. 87 *	
*****							*******	
Profile Out	put Table - ******	Encroachmer ******	it 1	****	* * * *	*****	*****	* *
*****	*****	*****	*****	****	* * * *	*****	*****	* *

Proposed - No-Rise
\* River Sta \* Profile \* W.S. Elev \* Prof Delta WS \* \* Reach \* River E.G. Elev \* Top Wdth Act \* Q Left \* Q Channel \* Q Right \* Enc Sta L \* Ch Sta L \* Ch Sta R \* Enc Sta R \* (ft) \* (ft) \* (ft) \* (cfs) \* (ft) \* (ft) \* (cfs) \* (cfs) \* (ft) (ft) \* 1% RI VER-2 \* Reach-1 \* 250.12 175. 14 \* 759.92 \* 8544.99 \* 175.46 \* 2935.46 \* 189.51 \* 5819.56 \* 342.34 \* гі oodway \* 175. 55 \* 11988. 62 \* 4310. 97 \* 169 4 RI VER-2 \* Reach-1 \* 250.12 0.41 \* 176.20 \* 530.00 \* 1000.41 \* 169.00 \* 189.51 \* 342.34 \* 699.00 \* RI VER-2 \* Reach-1 \* 250.12 \* 10% 170. 45 \* -4.69 \* 623.03 \* 189. 51 \* 170.84 \* 574.48 \* 2106.67 \* 4750.30 \* 342.34 \* \* 250.12 \* 2% RI VER-2 \* Reach-1 -1.45 \* 173. 68 \* 2068.75 \* 7517.01 \* 189. 51 \* 741.10 \* 4764.24 \* 174.04 342.34 \* \* 250.12 RI VER-2 \* Reach-1 \* 0.2% 178.73 \* 3.59 \* 824.79 \* 11454.53 \* 5316.77 \* 179.03 \* 189.51 \* 8628.69 \* 342.34 \* \* 225 RI VER-2 \* Reach-1 \* 1% 174. 91 \* 1037. 90 \* 175. 25 1370.18 \* 459.94 \* 7379.90 \* 8549.92 \* 602.45 \* \* 225 \* Floodway \* RI VER-2 175. 54 \* 0.63 \* Reach-1 1262. 99 \* 510.00 \* 7933.71 \* 8103.30 \* 203.00 \* 459.94 \* 175.83 \* 602.45 \* 713.00 \* RI VER-2 \* 225 \* 10% \* Reach-1 170.04 \* -4.88 \* 330. 29 \* 4090. 22 \* 170.35 \* 450.89 \* 3059.49 \* 459.94 \* 602.45 \* \* 225 \* 2% -1.49 \* RI VER-2 \* Reach-1 173. 42 \* 1026.79 \* 173.77 \* 7301.10 \* 459.94 \* 767.30 \* 6022.11 \* \* 178.65 \* 3891.52 \* 602.45 \* \* 225 \* 0.2% 3.73 \* RI VER-2 \* Reach-1 1314. 27 \* 10916. 87 \* 10591. 61 \* 459.94 \* 178.89 \* 602.45 \* \* 200 \* 1% RI VER-2 Reach-1 174. 78 \* 911.39 \* 7907.45 \* 1553.96 \* 478.37 \* 175.06 7838.60 \* 617.60 \* vay ^ 175.41 \* 523.64 \* 105 \* 200 RI VER-2 \* Reach-1 \* Floodway \* 0.63 \* 175.69 \* 465.00 \* 8823.89 \* 7952.47 \* 478.37 \* 195.00 \* 617.60 \* 660.00 \* RI VER-2 169.77 \* \* 200 \* 10% -5.01 \* Reach-1 360. 54 \* 170.01 \* 494.82 \* 478.37 \* 3522.89 \* 3596.58 \* 617.60 \* 173. 24 \* 982. 72 \* \* 2% \* 200 -1.54 \* RI VER-2 \* Reach-1 173.54 753.80 \* 6599.19 \* 6768.09 \* 478.37 \* 617.60 \* \* 200 3.78 \* \* 0.2% RI VER-2 \* Reach-1 178. 55 \* 1320. 25 \* 11439. 06 \* 10336.06 \* 3624.88 \* 478.37 \* 178.78 \* 617.60 \*

* RI VER-2 174.81 *		Reach-1 1573.58		* 190	osed - No-Ri * 1% 9228.49 *	*	*174.	63 *	*	* 407. 18  *
599. 58 * * RI VER-2 175. 47 *		* Reach-1 1315.00	*	* 190 5865.16 *	* Floo 8535.37 *	dway * 2899.47	,175. *	34 * 55.00	*	0. 71  * 407. 18  *
599. 58 * * RI VER-2 169. 60 *		Reach-1 887.38		* 190 2618.66 *	* 10% 4580. 48 *	* 280. 85	,169. *	42 *	*	-5. 21 * 407. 18 *
599. 58 * * RI VER-2 173. 24 *		* Reach-1 1311. 56		* 190 4872.53 *	* 2% 7760. 55 *	* 1716. 93	*173.	06 *	*	-1. 57 * 407. 18 *
599. 58 * * RI VER-2 178. 62 *		Reach-1 1865. 95			* 0. 2% 11112. 79 *	* 5033. 09	*178.	49 *	*	3. 86 * 407. 18 *
599. 58 * *	*	*	*	*	*	*	*	*	*	*
* RI VER-1 181. 91 *			*	* 350 2439. 38 *	* 1% 12407. 46 *	* 2853. 16	*181.	45 *	*	758. 00 *
873. 00 * * RI VER-1 182. 35 *		Reach-1 440.00	*	* 350 1866.82 *	* Floo 13398. 57 *	dway * 2434.61	*181.	80 * 658. 00	*	0. 34 * 758. 00 *
873. 00 *  * RI VER-1  177. 96 *	*	Reach-1 652.04		* 350 627.46 *	* 10% 7764. 20 *	* 388. 34	*177.	58 *	*	-3. 87 * 758. 00 *
873. 00 * * RI VER-1 180. 88 *		Reach-1 1034. 40	*	* 350 1822. 19 *	* 2% 11312. 19 *	* 1865. 62	* 180.	42 *	*	-1. 03 * 758. 00 *
873. 00 * * RI VER-1 184. 67 *		Reach-1 1256. 46		* 350 4584. 22 *	* 0. 2% 15059. 76 *	* 6056. 02	*184.	25 *	*	2. 79 * 758. 00 *
873.00 *	*	^	*	*	*	*	*	*	*	*
*		*								
* RI VER-1 181. 50 * 868. 00 *		Reach-1 1195.89	*	* 344.95 2652.52 *	* 1% 9569. 66 *	* 5477. 82	*181.	28 *	*	768. 00 *
* RI VER-1 181. 90 * 868. 00 *		850.00		* 344.95 2571.79 *	* Floo 9348.31 *	dway * 5779.90		70 * 418. 00	*	0. 42 * 768. 00 *
* RI VER-1 177. 59 * 868. 00 *	*	Reach-1 900. 58		* 344.95 484.82 *	* 10% 6018. 31 *	* 2276. 87		42 *	*	-3.86 * 768.00 *
* RI VER-1 180. 46 * 868. 00 *		Reach-1 1167.07		* 344.95 1811.51 *	* 2% 8673. 74 *	* 4514. 75	* 180.	25 *	*	-1. 03 * 768. 00 *
* RI VER-1 184. 30 * 868. 00 *		Reach-1 1274.08	*	* 344.95 5455.91 *	* 0. 2% 11879. 65 *	* 8364. 44	*184.	07 *	*	2. 79  * 768. 00  *
* *	*		*	*	*	*	*	*	*	*
*	4	*		+ 224 /	+ 40/	4	100	10 +		4
* RI VER-1 180. 66 * 855. 37 *		906. 63	*		11333. 57 *		*	10 *	*	769. 81 *
* RI VER-1 181. 19 * 855. 37 *		Reach-1 840.00 00 *	*	* 331.6 4289.62 *	* Floo 10707.63 *	dway * 2702.75	180. *	74 * 215. 00	*	0. 65 * 769. 81 *
* RI VER-1 176. 85 * 855. 37 *	*		*	* 331.6 842.36 *	* 10% 7090. 08 *	* 847. 55	176. *	42 *	*	-3. 68 * 769. 81 *
000.07					Page 151					

		Pron	osed - No-Rise		
* RI VER-1 179. 62 * 855. 37 *	* Reach-1 833.33 *	* 331.6	* 2% * 10247. 64 * 2077. 31	179. 07 *	-1. 03 * * 769. 81 *
* RI VER-1 183. 54 *	* Reach-1 956.76 *	* 331.6 7840.07 *	* 0. 2% * 13573. 43 * 4286. 50	183. 04 *	2. 94 * * 769. 81 *
855.37 *	* *	*	* *	*	* *
* RI VER-1 179. 76 *	* Reach-1 1919, 31 *	* 320 3163. 87 *	* 1% 9878. 17 * 4657. 97	179. 54 * *	* 1740.65 *
1858. 13 * * RI VER-1 180. 42 *	* Reach-1 600.00 *	* 320 2761.03 *	* Fl oodway * 11335. 38 * 3603. 59	180. 11 * * 1536. 00	0. 56 * * 1740. 65 *
1858. 13 * * RI VER-1 176. 06 *	2136. 00 *     * Reach-1     1100. 65 *	* 320 1028. 74 *	* 10%       * 6730. 89 *    1020. 37		-3. 70 * * 1740. 65 *
1858. 13 * * RI VER-1 178. 71 *	* Reach-1 1757.54 *	* 320 2454.04 *	* 2% * 9305.05 * 3240.91	178. 47 *	-1. 08 * * 1740. 65 *
1858. 13 * * RI VER-1 182. 79 *	* Reach-1 2448. 32 *	* 320 5510. 27 *	* 0.2% * 11092.63 * 9097.11	182.63 *	3. 09 * * 1740. 65 *
1858. 13 * *	* *	*	* *	*	* *
* RI VER-1 179. 44 *	* Reach-1 1804.17 *	* 314.4 180.64 *	* 1% * 4917. 29 * 12602. 06	179.38 *	* 1135.36 *
1215. 54 * * RI VER-1 180. 03 *	* Reach-1 1385.00 *	* 314.4 200.31 *	* FI oodway * 5273.72 * 12225.97	179. 96 * * 1110. 00	0. 58 * * 1135. 36 *
1215. 54 * * RI VER-1 175. 70 *	2495. 00 *     * Reach-1     1734. 11 *	* 314.4 79.77 *	* 10%	175.62 *	-3. 75 * * 1135. 36 *
1215. 54 * * RI VER-1 178. 35 *	* Reach-1 1788. 18 *	* 314.4 149.12 *	* 2% * 4580. 35 * 10270. 54	178. 28 * *	-1. 09 * * 1135. 36 *
1215. 54 * * RI VER-1 182. 56 *	* Reach-1 2014. 32 *	* 314.4 290.03 *	* 0. 2% * 5873. 63 * 19536. 34	*182.50 *	3. 12 * * 1135. 36 *
1215. 54 * *	* *	*	* *	*	* *
* RI VER-1 179. 22 *	* Reach-1 1387.64 *	* 300 384. 22 *	* 1% * 5847. 31 * 11468. 47	179. 13 *	* 2520.00 *
2605. 04 * * RI VER-1 179. 80 *	* Reach-1 1080.00 *	* 300 419.82 *	* Floodway * 6243.48 * 11036.70	179. 70 * * 2363. 00	0. 57 * * 2520. 00 *
2605. 04 * * RI VER-1 175. 44 *	3443.00 *     * Reach-1     1172.73 *	* 300 68.78 *	* 10%	175.36 *	-3. 77 * * 2520. 00 *
2605. 04 * * RI VER-1 178. 12 *	* Reach-1 1380. 81 *	* 300 173.04 *	* 2% * 5349.75 * 9477.21	178. 02 *	-1. 11 * * 2520. 00 *
2605. 04 * * RI VER-1 182. 38 *	* Reach-1 1494.12 *	* 300 1276. 28 *		182. 29 *	3. 16 * * 2520. 00 *
2605. 04 *	* *	*	* *	*	* *

Proposed - No-Rise \* 285 \* 1% \* RI VER-1 \* Reach-1 178. 12 \* 2650.95 \* 178.44 \* 5316.19 \* 9732.85 \* 3076.79 \* 895. 21 \* 3167.03 \* \* Reach-1 \* 285 \* FI oodway \* 178.60 \* 10509.98 \* 1808.24 \* 2664.00 \* 0.49 \* RI VER-1 3076.79 \* 605.00 \* 5381.78 \* 178.98 \* 3167.03 \* 3269.00 \* \* 285 \* 10% RI VER-1 -3.73 \* \* Reach-1 174.38 \* 1078.11 \* 1366.96 \* 6334.93 \* 174.66 \* 806.09 \* 3076.79 \* 3167.03 \* \* 2% \* 285 -1.16 \* RI VER-1 Reach-1 176. 96 \* 177. 29 \* 8927.44 2167.98 \* 886.23 \* 3904.59 \* 3076.79 \* 3167.03 \* RI VER-1 Reach-1 \* 285 \* 0.2% 3. 26 \* 181.38 \* 3076. 79 \* 4146.45 \* 1086.39 \* 9299.07 \* 12254.49 \* 181.70 \* 3167.03 \* \* RIVER-1 \* 280.55 \* 1% 177.94 \* \* Reach-1 178.23 \* 778.42 \* 9021.27 \* 3862.66 \* 3083.19 \* 4816.07 \* 3167. 11 \* \* 280.55 178. 41 \* RI VER-1 \* Reach-1 \* Floodway \* 0.48 \* 9767. 38 \* 2912. 82 \* 2714. 00 \* 600.00 \* 3083.19 \* 178.76 \* 5019.80 \* 3167. 11 \* 3314.00 \* \* 280.55 \* 10% -3.70 \* RI VER-1 \* Reach-1 174. 23 \* 1653.36 \* 174.46 \* 5703.26 \* 3083. 19 \* 747. 10 \* 1423.38 \* 3167. 11 \* \* 2% -1.15 \* RI VER-1 Reach-1 \* 280.55 176. 78 \* 3176.91 \* 768.74 \* 8157.30 \* 177.07 \* 3665.79 \* 3083. 19 \* 3167.11 \* \* 280.55 \* 0.2% 3.27 \* RI VER-1 \* Reach-1 181. 20 \* 914. 28 \* 181.52 \* 11598. 78 \* 6064.20 \* 3083.19 \* 8037.02 \* 3167. 11 \* \* 1% RI VER-1 \* 270 \* Reach-1 176. 52 \* 5996.77 \* 177.12 \* 446.60 \* 11699.69 \* 3.53 \* 3570.65 \* 3675. 10 \* \* 270 \* Floodway \* / \* 177. 16 \* 4. 62 \* 3229. 00 \* 0.64 \* RI VER-1 \* Reach-1 11468.17 \* 177.68 \* 449.00 \* 6227.21 \* 3570.65 \* 3675. 10 \* 3678.00 \* -3.30 \* RI VER-1 \* Reach-1 \* 270 \* 10% 173. 23 ' 0.08 \* 173.58 \* 431.03 \* 2163.27 \* 6616.65 \* 3570.65 \* 3675.10 \* 175. 39 \* 1. 62 \* \* 2% \* 270 -1.13 \* RI VER-1 Reach-1 10309.74 \* 3570.65 \* 175.95 \* 441.44 \* 4688.64 \* 3675.10 \* \* 0.2% \* 270 3. 20 \* RI VER-1 \* Reach-1 179. 72 \* 500.98 \* 9728.57 \* 15956.24 \* 15. 19 \* 3570.65 \* 180.44 \* 3675.10 \* \* 264 \* 1% 175. 98 \* \* RIVER-1 \* Reach-1 176.36 \* 582.69 \* 8393.59 \* 9.79 \* 9296.63 \* 3676.58 \* 3754.88 \* \* 264 \* Floodway \* y \* 176. 73 \* 11. 56 \* 3106. 10 \* 0.75 \* Reach-1 RI VER-1 582.90 \* 177.05 \* 9569.99 \* 3676.58 \* 8118.45 \* 3754.88 \* 3759.00 \* \* 264 \* Reach-1 \* 10% -3.20 \* RI VER-1 172.78 \* 1.65 \* 173.03 \* 3744.23 \* 5034.12 \* 3676.58 \* 580.85 \* 3754.88 \*

		Pro	oosed - No-Ris	20		
* RI VER-1 175. 18 *	* Reach-1 582.00	* 264 * 7445.65 *	* 2%	* 6. 09	174.81 *	-1.17 * * 3676.58 *
3754. 88 * * RI VER-1 179. 70 *	* Reach-1	* 264 * 14925.76 *	* 0.2% 10748.04 *	* 26. 20	179. 30 *	3. 32 * * 3676. 58 *
3754.88 *	*	* *	*	*	*	* *
* RI VER-1 175. 44 *	* Reach-1 45.00		* 1% 774.60 *	* 12. 17	175. 41 *	* 3660.00 *
3695. 00 * * RI VER-1 176. 31 *	* Reach-1 45.00	* 250.12 * 12.12 *	* Flood 776.43 *	dway * 11.44	176. 29 * * 3655. 00	0. 87 * * 3660. 00 *
3695. 00 * * RI VER-1 172. 23 *	3700.00 *     * Reach-1     44.44	* 250.12 * 17.29 *	* 10% 1417.00 *	* 15. 71	172. 10 *	-3.31 * * 3660.00 *
3695. 00 * * RI VER-1 174. 21 *	* Reach-1 45.00	* 250.12 * 14.12 *	* 2% 923.06 *	* 12. 82	174. 17 * *	-1. 25 * * 3660. 00 *
3695. 00 * * RI VER-1 178. 89 *	* Reach-1 3387.88	* 250.12 * 558.65 *	* 0.2% 109.85 *		178. 89 *	3. 48 * * 3660. 00 *
3695. 00 * *	*	* *	*	*	*	* *
* RI VER-1 175. 42 *	* Reach-1	* 250.0 <sub>6</sub>	BR U * 1% 796.16 *	* 3. 84	175. 33 * *	* 3660.00 *
3695. 00 * * RI VER-1 176. 29 *	* Reach-1	* 250.0 <sub>6</sub>	BR U * FI ood 796. 16 *	dway * 3.84	176. 20 * * 3655. 00	0. 87 * * 3660. 00 *
3695. 00 * * RI VER-1 172. 18 *	3700.00 * * Reach-1	* 250.0 <sub>6</sub>	BR U * 10% 1443.03 *		171. 88 *	-3. 45 * * 3660. 00 *
3695. 00 * * RI VER-1 174. 18 *	* Reach-1	* 250.0 <sub>6</sub>	BR U * 2% 945.43 *	* 4. 57	174 06 *	-1.27 * * 3660.00 *
3695. 00 * * RI VER-1 178. 88 *	* Reach-1 1334.17		BR U * 0.2% 576.01 *	*	178. 85 *	3. 52 * * 3660. 00 *
3695. 00 * *	*	* *	*	*	*	* *
* RI VER-1 174. 82 *	* Reach-1	* 250.0 <sub>6</sub>	BR D * 1% 800.00 *		174.63 *	* 3966.32 *
4057. 61 * * RI VER-1 175. 69 *	* Reach-1	* 250.0 <sub>6</sub>	BR D * Flood 800.00 *	dway *	175. 50 * * 3985. 00	0. 87 * * 3966. 32 *
4057. 61 * * RI VER-1 170. 20 *	4035.00 * * Reach-1	* 250.0 <sub>6</sub>	BR D * 10% 1450.00 *	*	169. 58 * *	-5. 05 * * 3966. 32 *
4057. 61 * * RI VER-1 173. 33 *	* Reach-1	* 250.0 <sub>6</sub>	BR D * 2% 950.00 *	*	173. 07 *	-1.56 * * 3966.32 *
4057. 61 * * RI VER-1 178. 50 *	* Reach-1 1874.73		BR D * 0.2% 500.42 *	* 174. 16	178. 47 *	3.84 * * 3966.32 *
4057. 61 * *	*	* *	*	*	*	* *

+ DIVED 4	* 5	Prop	osed - No-Rise	474 74 +	т.
* RI VER-1 174. 72 *	* Reach-1 50.00 *	* 250 *	* 1% * 800. 00 *	174. 71 * *	* 3966.32 *
4057. 61 *	50.00 *		600.00		3900. 32
* RI VER-1	* Reach-1	* 250	* FLoodway *	175. 58 *	0.87 *
175. 59 *	50.00 *	*	800.00 *	* 3985.00	* 3966.32 *
4057. 61 * * RI VER-1	4035.00 * * Reach-1	* 250	* 10% *	169. 81 *	-4.90 *
169. 92 *	50.00 *	250 *	1450. 00 *	*	* 3966.32 *
4057.61 *	*				
* RI VER-1 173. 20 *	* Reach-1 50.00 *	* 250 *	* 2% * 950. 00 *	173. 18  *	-1. 53 * * 3966. 32 *
4057. 61 *	30.00 *		930.00		3900. 32
* RI VER-1	* Reach-1	* 250	* 0.2%		3.77 *
178. 48 *	4642. 40 *	432.47 *	127. 32 * 140.	22 *	* 3966.32 *
4057. 61 * *	*	*	* *	*	*
*	*	*	*	*	* *
*	*				
* RIVER-1	* Reach-1	* 246	* 1% *	<sub>+</sub> 174. 71 *	* 3061 18 *
174. 72 * 4055. 27 *	80. 00 *	^	800.00 *	^	* 3964.48 *
* RI VER-1	* Reach-1	* 246	* Floodway *	175. 58 *	0.87 *
175. 59 *	80.00 *	*	800.00 *		* 3964.48 *
4055. 27 *	4052.00 *	+ 04/	+ 100/	1/0 02 *	4 00 *
* RI VER-1 169. 89 *	* Reach-1 80.00 *	* 246	* 10% * 1450. 00 *	169. 83 * *	-4. 88 * * 3964. 48 *
4055. 27 *	*		1430.00		3704. 40
* RIVER-1	* Reach-1	* 246	* 2% *	173. 18 *	-1.53 *
173. 20 *	80. 00 *	*	950.00 *	*	* 3964.48 *
4055. 27 * * RI VER-1	* Reach-1	* 246	* 0.2% *	178. 47 *	3. 76 *
178. 48 *	80.00 *	*	700. 00 *	*	* 3964.48 *
4055. 27 *	*				
*	*	*	* *	*	* *
*	*				
* RI VER-1	* Reach-1	* 245	* 1%	174. 68 *	*
174.71 *	35. 00 *	*	800.00 *	*	* 3970.91 *
4052. 15 * * RI VER-1	* Reach-1	* 245	* Floodway *	175. 55 *	0.87 *
175. 58 *	35.00 *	*	800. 00 *		* 3970. 91 *
4052. 15 *	4031.00 *				
* RI VER-1 169. 84 *	* Reach-1	* 245	* 10% * 1450. 00 *	169. 62 * *	-5. 06 * * 3970. 91 *
4052. 15 *	35 <sub>.</sub> 00 *		1450.00		3970. 91
* RI VER-1	* Reach-1	* 245	* 2% *	173. 13 *	-1.55 *
173. 18 *	35. 00 *	*	950.00 *	*	* 3970. 91 *
4052. 15 * * RI VER-1	* Reach-1	* 245	* 0.2% *	178. 48 *	3.80 *
178. 48 *	4650.76 *	488. 63 *	127. 44 * 83.	93 *	* 3970. 91 *
4052.15 *	*				
*	*	*	* *	*	* *
*	*				
* RI VER-1	* Reach-1	* 244.19	BR U * 1% *	174.62 *	*
174.69 *	*	*	800.00 *	*	* 3970.91 *
4052. 15   * *   RI VER-1	* Reach-1	* 244. 19	BR U * Floodway *	175. 49 *	0.86 *
INT A PLY - 1	Keacii-i	244. I7 *	800.00 *	* 3996.00	
175. 56 *	~				
4052. 15 *	4031.00 *				
4052. 15 * * RI VER-1	4031.00 * * Reach-1	* 244.19 *	BR U * 10% *	169. 47 *	-5. 15 * * 2070 01 *
4052. 15 *	4031.00 *	* 244. 19 *			-5. 15 * * 3970. 91 *

		Dece	acad Na Dia	_			
* RI VER-1 173. 16 *	* Reach-1 *	* 244. 19 *	osed - No-Rise BR U * 2% 950.00 *	*	173.06 *	*	-1.56 * 3970.91 *
4052. 15 * * RI VER-1 178. 48 *	* Reach-1 4650. 74 *	* 244. 19 422. 15 *	BR U * 0.2% 116.43 *	* 161. 43	178. 48 *	*	3. 85 * 3970. 91 *
4052. 15 *	* * *	*	*	*	*	*	*
* RI VER-1 174. 62 *	* Reach-1 *	* 244. 19 *	BR D * 1% 800.00 *	*	174.56 *	*	3930. 35 *
4009. 75 * * RI VER-1 175. 48 *	* Reach-1	* 244. 19 *	BR D * Floody 800.00 *	way *	175. 42 * * 3954. 00	*	0. 86 * 3930. 35 *
4009. 75 * * RI VER-1 169. 60 *	4009.00 *     * Reach-1     30.00 *	* 244. 19 *	BR D * 10% 1450.00 *	*	169. 32 *	*	-5. 23 * 3930. 35 *
4009. 75 * * RI VER-1 173. 06 *	* Reach-1 *	* 244. 19 *	BR D * 2% 950.00 *	*	172. 97 * *	*	-1. 59 * 3930. 35 *
4009. 75 * * RI VER-1 178. 47 *	* Reach-1 4513.96 *	* 244. 19 416. 28 *	BR D * 0.2% 127.80 *	* 155. 92	178. 47 *	*	3. 92 * 3930. 35 *
4009. 75 *	* * *	*	*	*	*	*	*
* RI VER-1 174. 58 *	* Reach-1 55.00 *	* 243.38	* 1% 800. 00 *	*	174. 57 * *	*	3930. 35 *
4009. 75 * * RI VER-1 175. 45 *	* Reach-1 55.00 *	* 243.38	* FI oodv 800. 00 *	way *	175. 43 * * 3954. 00	*	0. 87 * 3930. 35 *
4009. 75 * * RI VER-1 169. 47 *	4009.00 *     * Reach-1     55.00 *	* 243.38	* 10% 1450.00 *	*	169. 38 * *	*	-5. 19 * 3930. 35 *
4009. 75 * * RI VER-1 173. 01 *	* Reach-1 55.00 *	* 243.38	* 2% 950. 00 *	*	172. 98 * *	*	-1. 59 * 3930. 35 *
4009. 75 * * RI VER-1 178. 47 *	* Reach-1 4533.10 *	* 243.38 414.40 *	* 0.2% 105.66 *	* 179. 93	178. 47 *	*	3. 90 * 3930. 35 *
4009.75 *	* * *	*	*	*	*	*	*
* RI VER-1 174. 57 *	* Reach-1 700.00 *	* 243.2 54.76 *	* 1% 349.80 *	* 395. 43	174.57 *	*	3496. 00 *
3575. 79 * * RI VER-1 175. 43 *	* Reach-1 75.30 *	* 243.2 0.07 *	* FI oods 799. 93 *	way *	175. 43 * * 3495. 80	*	0. 86 * 3496. 00 *
3575. 79 * * RI VER-1 169. 34 *	3571. 10 *     * Reach-1     646. 09 *	* 243. 2 105. 28 *	* 10% 1077. 43 *	* 267. 29	169. 33 * *	*	-5. 24 * 3496. 00 *
3575. 79 * * RI VER-1 172. 98 *	* Reach-1 700.00 *	* 243. 2 66. 88 *	* 2% 470. 86 *	* 412. 27	172. 98 * *	*	-1.59 * 3496.00 *
3575. 79 * * RI VER-1 178. 47 *	* Reach-1 700.00 *	* 243. 2 45. 43 *	* 0.2% 246.63 *	* 407. 94	178. 47 *	*	3. 90 * 3496. 00 *
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* RI VER-1 174. 57 *	* Reach-1 1430.00 *	Prop * 243 570. 20 *	osed - No-Ri se * 1%
1334. 49 * * RI VER-1 175. 42 *	* Reach-1 100.00 *	* 243 150. 19 *	* FI oodway * 175. 38 * 0. 81 * 2514. 29 * 0. 52 * 1235. 00 * 1254. 82 *
1334. 49 * * RI VER-1 169. 32 *	1335.00 *     * Reach-1     1387.92 *	* 243 874.34 *	* 10%
1334. 49 * * RI VER-1 172. 98 *	* Reach-1 1430.00 *	* 243 645.61 *	* 2%
1334. 49 * * RI VER-1 178. 47 * 1334. 49 *	* Reach-1 1430.00 *	* 243 397. 25 *	* 0. 2%
1334.49	* *	*	* * * * * *
* RI VER-1 174. 56 * 217. 68 *	* Reach-1 1068.78 *	* 190 11.55 *	* 1%
* RI VER-1 175. 30 * 217. 68 *	* Reach-1 488.00 * 632.00 *	* 190 4. 29 *	* Floodway * 175.29 * 0.73 * 1182.80 * 1477.91 * 144.00 * 147.22 *
* RI VER-1 169. 19 * 217. 68 *	* Reach-1 1062.51 *	* 190 8.77 *	* 10%
* RI VER-1 172. 96 * 217. 68 *	* Reach-1 1066.83 *	* 190 10. 98 *	* 2%
* RI VER-1 178. 47 * 217. 68 *	* Reach-1 1609.35 *	* 190 13.39 *	* 0. 2%
* *	*	*	*
* RI VER-1 174. 55 * 754. 21 *	* Reach-1 3419.79 *	* 182 962.12 *	* 1%
* RI VER-1 175. 28 *	* Reach-1 2380.00 * 2926.00 *	* 182 338.54 *	* FI oodway * 175. 28 * 0. 73 * 2047. 59 * 17578. 87 * 546. 00 * 639. 94 *
* RI VER-1 169. 16 * 754. 21 *	* Reach-1 2823. 72 *	* 182 342. 94 *	* 10%
* RI VER-1 172. 95 * 754. 21 *	* Reach-1 3253.64 *	* 182 747. 98 *	* 2%
* RI VER-1 178. 47 * 754. 21 *	* Reach-1 3694.00 *	* 182 1562. 89 *	* 0. 2%
*	*	*	* * * * * *
* RI VER-1 174. 53 *	* Reach-2 3408.33 *	* 180 5726. 09 *	* 1%
1465. 19 * * RI VER-1 175. 27 *	* Reach-2 2384.00 *	* 180 4714. 23 *	* FI oodway * 175. 26 * 0. 73 * 3624. 49 * 11626. 28 * 696. 00 * 1363. 83 *
1465. 19 * * RI VER-1 169. 13 *	3080.00 *     * Reach-2     2877.45 *	* 180 2338. 71 *	* 10%
1465. 19 *	*		Page 157

		Propo	osed - No-Rise		
* RIVER-1	* Reach-2	* 180	* 2% *	172. 91 *	-1.61 *
172. 93 *	3300.79 *	4694.70 *	3391. 42 * 9068. 88	* *	1363.83 *
1465. 19 *	*				
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1729. 19 *	*				
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1729. 19 *	*				
			******		
		*****	******	******	*****
++++++++++	<b>+++++++++</b>				

### APPENDIX F AGENCY COORDINATION

### Maron, Lindsey

From: Bobby Kiani <mkiani@leonardjackson.net>
Sent: Monday, August 28, 2017 10:43 AM

**To:** Maron, Lindsey

Cc: Bidari, Raj; jrivera@ci.manassas.va.us; Hannan, Cheryl; Pitney, Eleanore J.

**Subject:** Revision Request Received- Unincorporated Areas of Prince William County, VA (Case

Number 17-03-2321P) - Response Required

Follow Up Flag: Follow up Flag Status: Completed

Dear Ms. Maron:

We have received your request that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a revision to the flood hazard information on the applicable National Flood Insurance Program (NFIP) map for Unincorporated Areas of Prince William County, Virginia. This e-mail is being sent to officially acknowledge the receipt of your request and replaces the paper copy acknowledgement letters previously issued by FEMA. We ask that you please respond directly to this e-mail to verify that it has been received.

The case number assigned to your request is <u>17-03-2321P</u>, and the project identifier is <u>Manassas Regional Airport-Runway 34R Extension Program</u>.

We are reviewing your submitted data and will contact you if additional information is required to process your request. If additional information is not required, we will issue a final letter of determination within 90 days of receiving your request.

If you have general questions about your request, FEMA policy, or the NFIP, please contact the FEMA Map Information eXchange (FMIX), toll free, at 1-877-FEMA MAP (1-877-336-2627). If you have specific questions concerning your request, the case reviewer's contact information is listed below, or please contacts the Revisions Coordinator for your State, Ms. Ellie Pitney, at <a href="mailto:pitneyei@cdmsmith.com">pitneyei@cdmsmith.com</a> or at (303) 383-2318.

Please be assured we will do our best to respond to all inquiries in a timely manner.

Thanks,

### **Bobby Kiani**

Revisions Analyst LJA, a member of Compass PTS JV Telephone (347) 670-4616 <u>mkiani@leonardjackson.net</u>



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<u>APPENDIX I</u>

### DRAFT EA PUBLIC INVOLVEMENT AND RESPONSES TO COMMENTS

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### I.1 NOTICE OF AVAILABILITY

The notice of availability was published in the local newspaper on January 31, 2018. A notice for the availability of the Draft EA was also provided on the Airport's main website, as well as a third party website specific to projects occurring at the Airport.



### Fauquier Times | Prince William Times | Gainesville Times

39 CULPEPER ST. WARRENTON, VA 20186 | 540.347.4222 F: 540.349.8676

MANASSAS REGIONAL AIRPORT Account: 330319 10600 HARRY J. PARRISH BLVD Ad Number: 4763590 2ND FLOOR Source: **EMAIL** MANASSAS VA 20110 Size: 3 X 9.29 (703)257-8271 Sales Rep: **JCLG** Words: 476 Lines: 270 Cost of Ad Total Due Payments 233.00 0.00 233.00 Class: LGS LEGALS SubClass: 492 **PUBLIC NOTICES** Description: environmental assess **GVTC and PWTC Class** Jan 31 Web Ads Class Jan 31

AD MAKEUP NOTES



### NOTICE OF AVAILABILITY OF DRAFT ENVIRONMENTAL ASSESSMENT (EA)

Pursuant to Title 49, United States Code, § 47106(c)(1)(A), notice is hereby given that the City of Manassas (City), in coordination with the Federal Aviation Administration (FAA), intends to redevelop the west corporate side area and develop a parcel on the east side of the Manassas Regional Airport (Proposed Action). The Proposed Action includes, but is not limited to, development of corporate hangars, t-hangars, apron expansion, maintenance and storage building, wash rack, and extension of utilities and security fence. A Draft Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) has been prepared to disclose the potential economic, social, and environmental impacts of the Proposed Action.

Pursuant to FAA Order 1050.1F and Executive Order 11990, notice is given that the Proposed Action would affect wetlands. Potential impacts and mitigation measures to wetlands are described in the Draft EA. A portion of the Proposed Action is within a 100-year floodplain. Pursuant to FAA Order 1050.1F, Environmental Impacts: Policies and Procedures, and Executive Order 11988, Floodplain Management, notice is given that the Proposed Action constitutes an encroachment into the 100-year floodplain. The potential impacts are described in the Draft EA. While no impacts to historic or cultural resources have been identified, the FAA initiated consultation with the Virginia Department of Historic Resources in compliance with Section 106 of the National Historic Preservation Act. This notice also fulfills any consultation requirements under Section 106.

Copies of the Draft EA will be available for public examination for a 30-day period beginning January 31, 2018 at the following locations: the Manassas Regional Airport Administrative Office, 10600 Harry J. Parish Boulevard, Manassas, VA 20110; the Manassas Regional Airport website http://www.manassasregionalairportprojects.com/; the Central Community Library, 8601 Mathis Avenue, Manassas, VA 20110; and City Hall, 9027 Center Street, Manassas, VA 20110.

Written comments on the information in the Draft EA may be sent to David.Alberts@rsandh.com or addressed to: Mr. David Alberts, RS&H, 10748 Deerwood Park Boulevard South, Jacksonville, FL 32256 or Mr. Juan Rivera, Airport Director, Manassas Regional Airport, 10600 Harry J. Parish Boulevard, Manassas, VA 20110. Electronic and hand-delivered comments must be received no later than 5:00 pm Eastern Time on March 3, 2018. Mailed comments must be postmarked no later than March 3, 2018. Be advised that all comments received including personal identifying information may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

A public workshop to review the project and summary of potential effects and the opportunity to provide comments will be held on Tuesday, February 20, 2018 from 5:00PM to 7:00 PM Eastern Time, in the Manassas Regional Airport Administrative Office Lobby and Conference Room 1 (10600 Harry J. Parish Boulevard, Manassas, VA 20110).

### AFFIDAVIT OF PUBLISHER PURSUANT TO SECTION 8.01-415 OF THE 1950 CODE OF VIRGINIA AD AMENDED

I <u>Evelyn Cobert</u> , being duly sworn deposes and says that the attached order of publication was published in the Gainesville / Prince William Times, a newspaper published in the County of Prince William, State of Virginia, on
1-31-18,
and that deponent is duly authorized agent of the Publisher of said newspaper
Evelyn Cobert Advertising Representative
State of Virginia
County of Prince William
COMMONWEALTH of VIRGINIA IN THE COUNTY OF PRINCE WILLIAM, to-wit:
on

### Evelyn Cobert

who is known to me and whose name as <u>Advertising Representative in the County Prince William, State of Virginia</u>, is signed to the foregoing affidavit, personally appeared before me, a Notary Public in and for the jurisdiction aforesaid, to affirm that the foregoing affidavit was sworn & subscribed to in front of me and executed the same by proper authority.

Notary Public

Notary Registration No. 7274066

My commission expires: October 31, 2021

OF E

Jean E. Cobert NOTARY PUBLIC Commonwealth of Virginia Reg. #7274066 My Commission Expires October 31, 2021

20

### **Public Notices**



### NOTICE OF AVAILABILITY OF DRAFT ENVIRONMENTAL ASSESSMENT (EA)

Pursuant to Title 49, United States Code, § 47106(c)(1)(A),

notice is hereby given that the City of Manassas (City), in coordination with the Federal Aviation Administration (FAA), intends to redevelop the west corporate side area and develop a parcel on the east side of the Manassas Regional Airport (Proposed Action). The Proposed Action includes, but is not limited to, development of corporate hangars, thangars, apron expansion, maintenance and storage building, wash rack, and extension of utilities and security fence. A Draft Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) has been prepared to disclose the potential economic, social, and environmental impacts of the Proposed Action.

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Copies of the Draft EA will be available for public examination for a 30-day period beginning January 31, 2018 at the following locations: the Manassas Regional Airport Administrative Office, 10600 Harry J. Parish Boulevard, Manassas, VA 20110; the Manassas Regional Airport website http://www.manassasregionalairportprojects.com/; the Central Community Library, 8601 Mathis Avenue, Manassas, VA 20110; and City Hall, 9027 Center Street, Manassas, VA 20110.

Written comments on the information in the Draft EA may be sent to David.Alberts@rsandh.com or addressed to: Mr. David Alberts, RS&H, 10748 Deerwood Park Boulevard







**BU\$INESS** 



This ad could be working for you.

### West Corporate Redevelopment & Eastside Parcel Environmental Assessment

### ABOUT THE PROJECT

This Environmental Assessment will analyze impacts associated with the proposed development layout of the Airport's recent West Corporate Redevelopment Study and a 12 acre parcel on the east side of the Airport. The proposed developments include both aviation and non-aviation related elements. Upon completion of this Environmental Assessment and approval from FAA, the Airport will be able to move forward with implementing the proposed improvements.

An electronic version of the <u>Draft EA for the West Corporate Development and East Parcel Development</u> at Manassas Regional Airport is now available. Written comments on the information in the Draft EA may be sent to <u>David.Alberts@rsandh.com</u> or addressed to:

10748 Deerwood Park Boulevard South Jacksonville, FL 32256

or

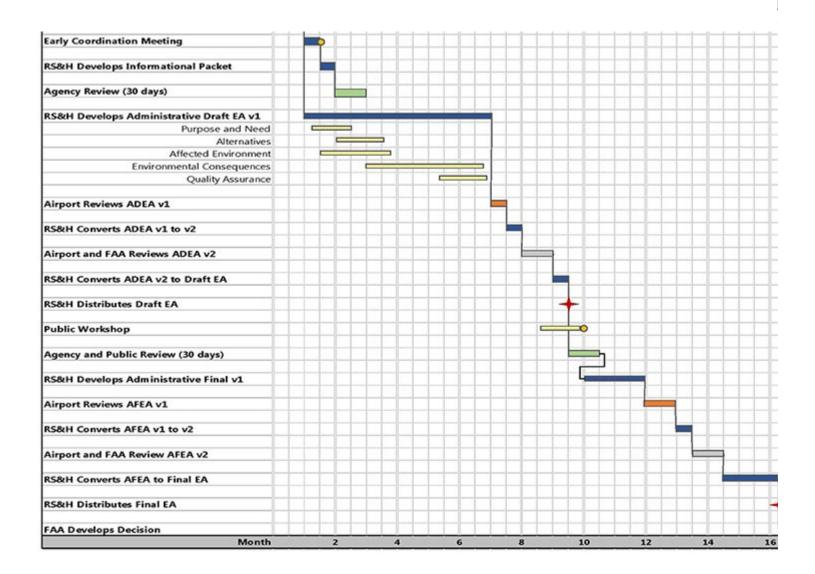
Mr. Juan Rivera Airport Director Manassas Regional Airport 10600 Harry J. Parish Boulevard Manassas, VA 20110

Electronic and hand-delivered comments must be received no later than 5:00 pm Eastern Time on March 3, 2018. Mailed comments must be postmarked no later than March 3, 2018. Be advised that all comments received, including personally identifying information, may be made publicly available at any time. While you can ask Manassas Regional Airport Projects us in your comment to withhold your personally identifying information from public review, we cannot guarantee that we will be able to do so.

A public workshop will be held on Tuesday, February 20, 2018 from 5:00pm to 7:00pm (EST) to review the project and summary of potential effects, as well as provide the opportunity for the public to submit comments. It will be held in the Manassas Regional Airport Administrative Office Lobby and Conference Room 1 (10600 Harry J. Parish Boulevard, Manassas, VA 20110).



### PROJECT SCHEDULE





### I.2 DRAFT EA DISTRIBUTION

The distribution list for the Draft EA is provided below. A copy of the letter provided with each package is also provided in this section.

### **FEDERAL AGENCIES**

304-252-6216 x 130

FAA (1 CD)

Ms. Susan B. Stafford Environmental Protection Specialist Beckley Airports Field Office 176 Airport Circle, Rm 101 Beaver, WV 25813

FAA (1 Hardcopy)
Mr. Matthew Thys
Manager
Washington Airports District Office
23723 Air Freight Ln., Suite 210
Dulles, VA 20166
(703) 661-1355

<u>USEPA</u> (1 hardcopy + 1 CD) Ms. Barbara Okorn NEPA Reviewer USEPA Region 3 (3EA30) 1650 Arch Street Philadelphia, PA 19103 (215) 814-3330

FEMA (1 hardcopy + 1 CD)
Ms. Amanda Ciampolillo
Environment & Historic Preservation Contact
FEMA Region III
615 Chestnut Street
One Independence Mall, Sixth Floor
Philadelphia, PA 19106
(215) 931-5500

<u>USACE</u> (1 hardcopy + 1 CD) Mr. Tucker Smith Chief, Northern Section United States Army Corps of Engineers 803 Front Street Norfolk, VA 23510 (757) 201-7727

### **STATE AGENCIES**

VDEQ (1 hardcopy + electronic submittal)
Ms. Valerie Fulcher
Office of Environmental Impact Review
Virginia Department of Environmental Quality
629 East Main Street, 6<sup>th</sup> Floor
Richmond, VA 23219
(804) 698-4330

Virginia Department of Aviation (1 hardcopy + 1 CD)

Ms. Susan Simmers
Airport Services Division
Virginia Department of Aviation
5702 Gulfstream Road
Richmond, VA 23250
804-236-3627

### **LOCAL AGENCIES**

Manassas Regional Airport (2 hardcopies + 10 comment forms + 1 CD)
Mr. Juan Rivera
Airport Director
10600 Harry J. Parish Blvd.
Manassas, VA 20110
(703) 361-1882

<u>City of Manassas City Hall</u> (1 hardcopy + 10

comment forms) Andrea P. Madden 9027 Center Street Manassas, VA 20110 703-257-8200

Central Community Library (1 hardcopy + 10

comment forms)
Ms. Donna Horning
8601 Mathis Avenue
Manassas, VA 20110
(703) 792-8360

Prince William County (1 hardcopy + 1 CD)

Mr. David J. McGettigan, AICP Long Range Planning Manager Planning Division Prince William County 5 County Complex Court, Suite 210 Prince William, VA 22192 (703) 792-7615 <u>Prince William County (1 hardcopy + 1 CD)</u>

Mr. Raj Bidari

Department of Public Works

Prince William County

5 County Complex Court

Prince William, Virginia 22192

(703) 792-7078

Prince William County (1 hardcopy + 1 CD)

Jacob Renaud, P.E.

Stormwater Program Manager

City of Manassas

8500 Public Works Drive

Manassas, Virginia 20110

(703) 257-8228



**O** 904-256-2500 **F** 904-256-2501 *rsandh.com* 



[DATE]

[NAME] [ADDRESS] [ADDRESS LINE 2]

RE: Manassas Regional Airport

Draft Environmental Assessment for West Corporate Development and East Parcel Development

Dear [Mr./Ms.],

In compliance with Federal Aviation Administration (FAA) policy and procedures (FAA Orders 1050.1F and 5050.4B) for implementing the National Environmental Policy Act, as amended (42 United States Code 4321 et seq.), the City of Manassas (City), is announcing the availability of, and requesting comments on, the *Draft Environmental Assessment (EA) for West Corporate Development and East Parcel Development at Manassas Regional Airport*. The Draft EA was prepared to analyze the potential environmental impacts of the City's proposal to redevelop the west corporate side area and develop a parcel on the east side of the Manassas Regional Airport (Proposed Action). The Proposed Action includes, but is not limited to, development of corporate hangars, t-hangars, apron expansion, maintenance and storage building, wash rack, and extension of utilities and security fence.

Pursuant to FAA Order 1050.1F and Executive Order 11990, notice is given that the Proposed Action would affect wetlands. Potential impacts and mitigation measures to wetlands are described in the Draft EA. A portion of the Proposed Action is within a 100-year floodplain. Pursuant to FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, and Executive Order 11988, Floodplain Management, notice is given that the Proposed Action constitutes an encroachment into the 100-year floodplain. The potential impacts are described in the Draft EA. While no impacts to historic or cultural resources have been identified, the FAA initiated consultation with the Virginia Department of Historic Resources in compliance with Section 106 of the National Historic Preservation Act. This notice also fulfills any consultation requirements under Section 106.

All interested parties are invited to provide comments concerning the content of the Draft EA by March 3, 2018. Comments should be as specific as possible and should address the analysis of potential environmental impacts and the adequacy of the Proposed Action or merits of alternatives being considered. Reviewers should organize their comments to be meaningful and inform the City of their interest and concerns by quoting or providing specific references to the text of the Draft EA. Matters that could have been raised with specificity during the comment period on the Draft EA may not be considered if they are raised for the first time later in the decision process. This commenting procedure is intended to ensure that substantive comments and concerns are made available to the City in a timely manner so that the City has an opportunity to address them.



Written comments may be submitted to the Airport, Attn. Mr. Juan Rivera, Airport Director, Manassas Regional Airport, 10600 Harry J. Parish Boulevard, Manassas, VA 20110 or mailed to RS&H, Inc. Attn. Mr. David Alberts, 10748 Deerwood Park Boulevard South, Jacksonville, FL 32256. Comments may also be submitted by email to david.alberts@rsandh.com.

A public workshop to review the project and summary of potential effects and the opportunity to provide comments will be held on Tuesday, February 20, 2018 from 5:00PM to 7:00 PM Eastern Time, in the Manassas Regional Airport Administrative Office Lobby and Conference Room 1 (10600 Harry J. Parish Boulevard, Manassas, VA 20110).

Sincerely,

David Alberts, Project Manager

## I.3 PUBLIC WORKSHOP MATERIALS The following pages show the sign-in sheet for the public workshop, as well as the poster boards and comment form.

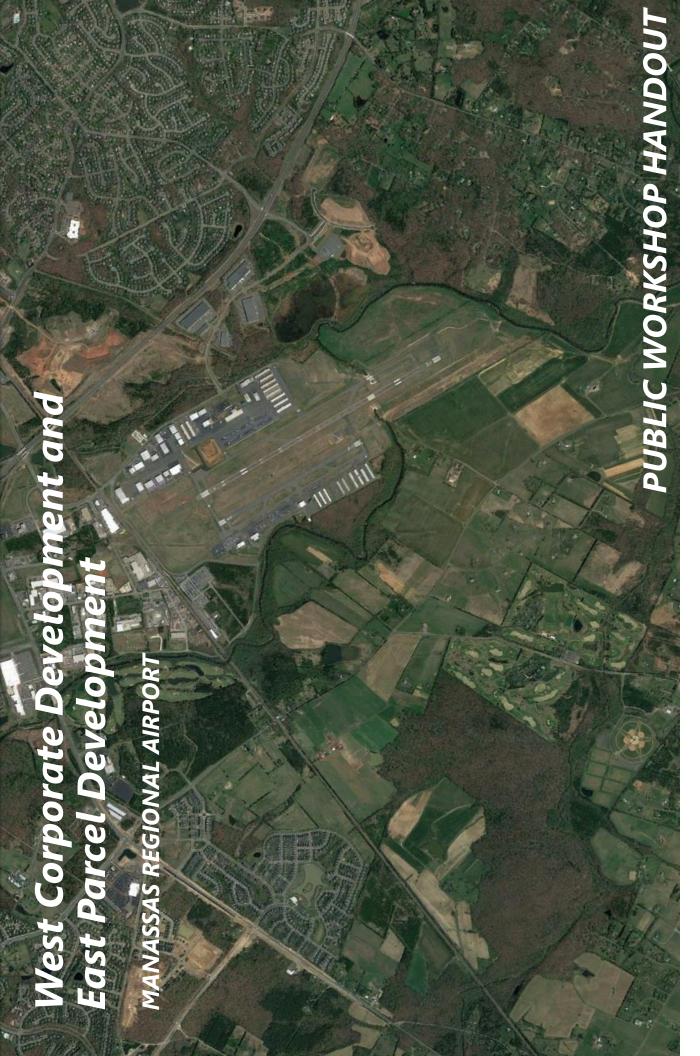
### Draft Environmental Assessment Manassas Regional Airport West Corporate Development

## Public Workshop

Date: February 20, 2018

Location: Manassas Regional Airport

Name (Please Print)	Organization	Address	EMAIL
Natalle Heath	RSRH		natalie-heathersandh.com
Lindsey Maron	RS+H		lindsey.mara Orsandhion
DAVING AcsenTS	755+7		DAVIO, ASSUTTO REAMBIAGE
Jin Porter	FREEDON NO SEN		(res) and the man of the control of
Donuy Miller	EAA	West Side	Drosident Opan 18.000
Joe Gardner	Dilles Aviation	10501 Observation RL Madaust	Jac Ozulles Aviarión, com
Johne Berry	Hirport		Woo grossomom o what
Amanda Surridan	RS+H		Amounta. In motor of 150 will brown
		V	





# Purpose and Need

## » Purpose

- Develop and maintain safe and modern facilities
- Improve financial self-sustainability

## » Need

- On-Airport roadway and airfield pavement deficiencies
- Insufficient building/hangar space
- Underutilization of Airport property







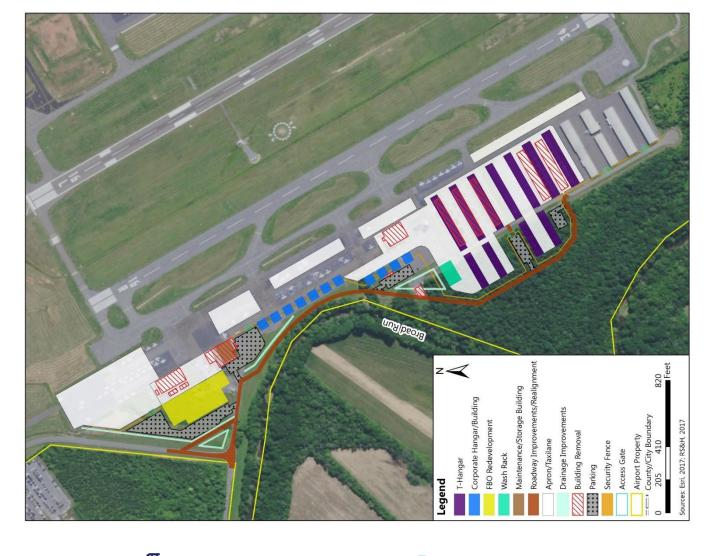


# **Proposed Action**

# » West Corporate Development Area

- On-Airport roadway improvements
- · FBO building and parking lot reconstruction
- Corporate hangar/building and parking lot construction
- T-hangar demolition/replacement and construction and T-hangar parking lot
- · Aircraft apron expansion
- Maintenance and storage building expansion
- Wash rack construction
- Utilities extension and stormwater drainage improvements
- Security fence extension





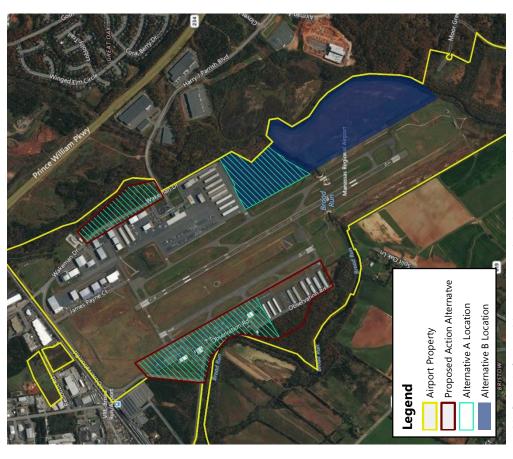
# **Proposed Action**

- » East Parcel Development Area:
- On-Airport roadway improvements
- Corporate hangar/building and parking lot construction
- **Taxilane Extension**
- Utilities extension and stormwater drainage improvements
- Security fence extension





## Alternatives Analysis



This figure is for graphic purposes only and is not to scale.



- » Alternative Location Considerations
- Developable on-Airport land
- Avoidance of Part 77 surfaces and runway protection zone
- Avoidance / minimization of 100-year floodplain
- Avoid, to the greatest extent possible, the long- and short-term adverse effects associated with use and/or modification of the 100-year floodplain
- » Alternatives retained for analysis
- Proposed Action
- No Action Alternative
- » Alternatives dismissed
- Alternative A (greater floodplain impact than the Proposed Action Alternative)
- Alternative B (greater floodplain impact than the Proposed Action Alternative)

## NEPA Environmental Resource Categories and Summary of Environmental Findings

- » Air Quality
- Implementation of best management practices during construction
- Emissions would remain below de minimis thresholds
- » Biological Resources (including Fish, Wildlife, and Plants)
- No impacts to any protected species
- » Climate
- Implementation of best management practices
- » Coastal Resources
- Wakeman Drive realignment potentially intersects "Resource Protection Area
- » Department of Transportation Act, Section 4(f)
- No impact to Section 4(f) resources

- » Farmlands
- No impact to farmland
- » Hazardous Materials, Solid Waste, and Pollution Prevention
- Short-term, temporary increase in the storage and use of hazardous materials (e.g., diesel fuel)
- Implementation of best management practices during construction and operation
- » Historical, Architectural, Archaeological, and Cultural Resources
- No impact to historical, architectural, archaeological, or cultural resources
- Land Use
- No impact to land use
- Natural Resources and Energy Supply
- Short-term increase in consumable material use during construction
- Long-term increase in energy requirements
- Sustainable design considerations



## Summary of Environmental Findings (Continued) NEPA Environmental Resource Categories and

- » Noise and Noise-Compatible Land Use
- No impact to noise or noise-compatible land use
- » Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks
- Short-term, temporary increase in traffic from construction-related vehicles
- No disproportionate effects to any population
- No impact to children's environmental health and safety risks
- » Visual Effects (including Light Emissions)
- No visual effects
- » Water Resources
- Wetlands:
- 1.62 acres affected (Obtain appropriate permits from federal and state agencies)
- Purchase mitigation credits (anticipated 3.2 credits)

- » Water Resources (continued)
- Floodplains:
- 2.7 acres of the 100-year floodplain affected
- 19.9 acres of the regulatory floodway affected
- Establishment of a floodplain mitigation area
- Ongoing coordination with the Federal Emergency
  Management Agency to obtain a Conditional Letter of
  Map Revision
- Surface Water & Groundwater
- Obtain a Virginia Pollutant Discharge Elimination
   System permit for construction and operation activities
   to reduce surface water and groundwater impacts
- Wild & Scenic Rivers
- No impact to wild and scenic rivers
- Implementation of best management practices during construction to reduce effects to water resources
- » Cumulative
- No increase in effects when considered with other past, present, and reasonably foreseeable future projects



# How to Provide Comments on the Draft EA

» Fill out comment form this evening

» Send written comments via U.S. mail (must be postmarked March 3, 2018) to:

Mr. David Alberts

RS&H, Inc.

10748 Deerwood Park Blvd South

Jacksonville, FL 32256

OL

Mr. Juan Rivera

Airport Director 10600 Harry J. Parish Blvd

Manassas, VA 20110

» Send written comments via email to:

Mr. David Alberts david.alberts@rsandh.com





## City of Manassas / Manassas Regional Airport **West Corporate Development and East Parcel Development Environmental Assessment**



**Public Workshop - Comment Form** 

The City of Manassas (City) has prepared the Draft Environmental Assessment (EA) for West Corporate Development and East Parcel Development at Manassas Regional Airport. The Draft EA analyzes the potential environmental impacts of the City's proposal to redevelop the west corporate side area and develop a parcel on the east side of the Manassas Regional Airport (Proposed Action). The Proposed Action includes, but is not limited to, development of corporate hangars, t-hangars, apron expansion, maintenance and storage building, wash rack, and extension of utilities and security fence.

Comments:				
Comments are not limite	d to this form. Please a	ttach any additiona	sheets as necessary.	
Name:				
Address:				<del></del>
City, State, Zip:				<u></u>
Email:				

## Comments on the Draft EA will be accepted through March 3, 2018.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, be advised that your entire comment - including your personal identifying information - may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so. Written comments may be mailed to the Airport, Attn. Mr. Juan Rivera, Airport Director, Manassas Regional Airport, 10600 Harry J. Parish Boulevard, Manassas, VA 20110 or mailed to RS&H, Inc. Attn. Mr. David Alberts, 10748 Deerwood Park Boulevard South, Jacksonville, FL 32256. Comments may also be submitted by email to david.alberts@rsandh.com. A public workshop to review the project and summary of potential effects and the opportunity to provide comments will be held on Tuesday, February 20, 2018 from 5:00PM to 7:00 PM Eastern Time, in the Manassas Regional Airport Administrative Office Lobby and Conference Room 1 (10600 Harry J. Parish Boulevard, Manassas, VA 20110).

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## I.4 COMMENTS RECEIVED AND RESPONSES TO COMMENTS

## Letter 1



## COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 1111 East Main Street, Suite 1400, Richmond, VA 23219

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David K. Paylor

(804) 698-4000 1-800-592-5482

February 28, 2018

Mr. Juan Rivera, Director Manassas Regional Airport 10600 Harry J. Parrish Blvd. Manassas, VA 20110

Matthew J. Strickler

Secretary of Natural Resources

RE: Comments on the Draft Environmental Assessment for the Manassas Regional Airport West Corporate Development and East Parcel Development, City of Manassas and Prince William County, DEQ 18-022F

Dear Mr. Rivera:

The Commonwealth of Virginia has completed its review of the above-referenced document. The Department of Environmental Quality (DEQ) is responsible for coordinating Virginia's review of federal environmental documents submitted under the National Environmental Policy Act (NEPA) and responding to appropriate federal officials on behalf of the Commonwealth. This is in response to the January 2018 Draft Environmental Assessment (EA) for the above-referenced project. The following agencies participated in the review of this proposal:

Department of Environmental Quality (DEQ)
Department of Conservation and Recreation (DCR)
Department of Historic Resources (DHR)
Department of Health (VDH)
Department of Aviation (DOAV)

In addition, Department of Game and Inland Fisheries (DGIF), Department of Forestry, Marine Resources Commission, Department of Transportation, the Northern Virginia Regional Commission, the City of Manassas and Prince William County were invited to comment on the proposal.

## PROJECT DESCRIPTION

The City of Manassas is seeking approval from the Federal Aviation Administration (FAA) for the Manassas Regional Airport West Corporate Development and East Parcel Development project. The city owns and operates the airport which intersects the jurisdictional boundaries of the City of Manassas and Prince William County with approximately 20 acres of land on the east side of the airport being located within the limits of the county. The airport has a terminal building, fixed base operator (FBO) hangars/buildings and various corporate and general aviation hangars. The airport has two runways, Runway 16L/34R (6,000 feet long by 100 feet wide) and Runway 16R/34L (3,704 feet long by 100 feet wide). The West Corporate Area development involves onairport roadway improvements, reconstruction of the FBO building and parking lot, construction of eleven new corporate hangars, buildings and associated parking lots, the demolition and replacement of five T-hangars, the expansion of the west aircraft apron and taxilane tie down parking, a taxilane extension, the construction of a maintenance and storage building and a wash rack, extension of utilities and stormwater drainage improvements, and a security fence extension. The East Parcel development includes on-airport roadway improvements (Wakeman Drive realignment), the construction of a corporate hangar, building, and parking lot, extension of a taxilane and utilities connections, stormwater drainage improvements, and a security fence extension. The project study area which encompasses the area that may be affected by the proposed project is 160 acres.

This project was previously reviewed for federal consistency under DEQ project #17-061F. The Federal Consistency Certification and DEQ's response is included in Appendix F of the Draft EA. DEQ concurred that the proposal is consistent with the enforceable policies of the Virginia Coastal Zone Management Program provided the City obtained all required permits and authorizations with respect to erosion and sediment control, coastal lands management, wetlands impacts and air pollution control.

## **ENVIRONMENTAL IMPACTS AND MITIGATION**

- 1. Water Quality and Wetlands. According to the Draft EA (page 5-23), the proposed west side corporate development would affect 0.02-acre of palustrine emergent wetlands and 1.60 acres of palustrine forested wetlands on the west side of the airport. The impact to the 1.60 acres of palustrine forested wetlands is associated with mitigation for potential floodway and floodplain impacts in the City of Manassas. The City will purchase 3.2 wetland bank credits to mitigate the impacts. All required permits would be obtained prior to the start of ground disturbance.
- **1(a) Agency Jurisdiction.** The State Water Control Board promulgates Virginia's water regulations covering a variety of permits to include the <u>Virginia Pollutant Discharge Elimination System Permit</u> (VPDES) regulating point source discharges to surface waters, Virginia Pollution Abatement Permit regulating sewage sludge, storage and land

application of biosolids, industrial wastes (sludge and wastewater), municipal wastewater, and animal wastes, the <u>Surface and Groundwater Withdrawal Permit</u>, and the <u>Virginia Water Protection (VWP) Permit</u> regulating impacts to streams, wetlands, and other surface waters. The VWP permit is a state permit which governs wetlands, surface water, and surface water withdrawals and impoundments. It also serves as §401 certification of the federal Clean Water Act §404 permits for dredge and fill activities in waters of the U.S. The VWP Permit Program is under the Office of Wetlands and Stream Protection, within the DEQ Division of Water Permitting. In addition to central office staff that review and issue VWP permits for transportation and water withdrawal projects, the six DEQ regional offices perform permit application reviews and issue permits for the covered activities:

- · Clean Water Act, §401;
- Section 404(b)(i) Guidelines Mitigation Memorandum of Agreement (2/90);
- State Water Control Law, Virginia Code section 62.1-44.15:20 et seq.; and
- State Water Control Regulations, 9 VAC 25-210-10.

**1(b) Agency Findings.** The DEQ Northern Regional Office (NRO) states that upon receipt of a Joint Permit Application for the proposed surface water impacts, DEQ VWP Permit staff will review the proposed project in accordance with the VWP permit program regulations and current VWP permit program guidance.

The VMRC did not comment on the proposal.

1(c) Agency Recommendation. DEQ VWP Program staff recommends that the project sponsor:

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- Avoid and minimize impacts to surface waters to the maximum extent practicable; and
- · Coordinate with the U.S. Army Corp of Engineers on wetlands impacts.

To minimize unavoidable impacts to wetlands and waterways, DEQ recommends the following practices:

- Operate machinery and construction vehicles outside of stream-beds and wetlands; use synthetic mats when in-stream work is unavoidable.
- Preserve the top 12 inches of trench material removed from wetlands for use as wetland seed and root-stock in the excavated area.

Design erosion and sedimentation controls in accordance with the most current edition of the Virginia Erosion and Sediment Control Handbook. These controls should be in place prior to clearing and grading, and maintained in good working order to minimize impacts to State waters. The controls should remain in place

until the area is stabilized.
Place heavy equipment, located in temporarily impacted wetland areas, on mats, geotextile fabric, or use other suitable measures to minimize soil disturbance, to

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Environmental Assessment for West Corporate Development and East Parcel Development at Manassas Regional Airport

the maximum extent practicable.

- Restore all temporarily disturbed wetland areas to pre-construction conditions and plant or seed with appropriate wetlands vegetation in accordance with the cover type (emergent, scrub-shrub, or forested). The applicant should take all appropriate measures to promote revegetation of these areas. Stabilization and restoration efforts should occur immediately after the temporary disturbance of each wetland area instead of waiting until the entire project has been completed.
- Place all materials which are temporarily stockpiled in wetlands, designated for
  use for the immediate stabilization of wetlands, on mats, geotextile fabric in order
  to prevent entry in State waters. These materials should be managed in a
  manner that prevents leachates from entering state waters and must be entirely
  removed within thirty days following completion of that construction activity. The
  disturbed areas should be returned to their original contours, stabilized within
  thirty days following removal of the stockpile, and restored to the original
  vegetated state.
- Flag or clearly mark all non-impacted surface waters within the project or right-ofway limits that are within 50 feet of any clearing, grading, or filling activities for the life of the construction activity within that area. The project proponent should notify all contractors that these marked areas are surface waters where no activities are to occur.
- Employ measures to prevent spills of fuels or lubricants into state waters.

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(continued)

- **1(d) Requirement.** Submit a Joint Permit Application (JPA) to VMRC (see Item 2(c) below for information on the JPA process) for the proposed impacts to surface waters and wetlands to obtain a VWP permit, as necessary.
- 2. Subaqueous Lands and Tidal Wetlands. Documentation in Appendix F (Federal Consistency Certification) of the Draft EA indicates that subaqueous lands will be impacted.
- **2(a) Agency Jurisdiction.** The <u>Virginia Marine Resources Commission (VMRC)</u> regulates encroachments in, on or over state-owned subaqueous beds as well as tidal wetlands pursuant to Virginia Code §28.2-1200 through 1400. For nontidal waterways, VMRC states that it has been the policy of the Habitat Management Division to exert jurisdiction only over the beds of perennial streams where the upstream drainage area is 5 square miles or greater. The beds of such waterways are considered public below the ordinary high water line.
- 2(b) Agency Findings. VMRC did not comment on the draft EA.

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- **2(c) Requirement**. Submit a JPA to VMRC for the proposed impacts to subaqueous lands. The VMRC serves as the clearinghouse for the JPA used by the:
  - · Corps for issuing permits pursuant to Section 404 of the Clean Water Act and

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(continued)

Manassas Regional Airport West Corporate Development and East Parcel Development DEQ #18-022F

Section 10 of the Rivers and Harbors Act;

- DEQ for issuance of a VWP permit;
- VMRC for encroachments on or over state-owned subaqueous beds as well as tidal wetlands; and
- local wetlands board for impacts to wetlands.

The VMRC will distribute the completed IPA to the a

The VMRC will distribute the completed JPA to the appropriate agencies. Each agency will conduct its review and respond. Upon receipt of the JPA, VMRC will determine whether a permit is necessary.

3. Erosion and Sediment Control and Stormwater Management. The Draft EA (page 5-29) states that the project would increase impervious surfaces on the property by approximately 25 acres. The project will comply with Virginia's Erosion and Sediment Control law and Stormwater Management Law, as locally administered. Best Management Practices (BMPs) including dry swales, bioretention, infiltration and sheet flow to open space would be utilized to minimize impacts to surface waters.

**3(a) Agency Jurisdiction.** The DEQ <u>Office of Stormwater Management</u> administers the following laws and regulations governing construction activities:

- Virginia Erosion and Sediment Control (ECS) Law (§ 62.1-44.15:51 et seq.) and Regulations (9VAC25-840) (VESCL&R);
- Virginia Stormwater Management Act (§ 62.1-44.15:24 et seq.) (VSWML);
- Virginia Stormwater Management Program (VSMP) regulation (9VAC25-870) (VSWMR); and
- 2014 General Virginia Pollutant Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from Construction Activities (9VAC25-880).

In addition, DEQ is responsible for the Virginia Stormwater Management Program (VSMP) General Permit for Stormwater Discharges from Construction Activities related to Municipal Separate Storm Sewer Systems (MS4s) and construction activities for the control of stormwater discharges from MS4s and land disturbing activities under the Virginia Stormwater Management Program (9VAC25-890-40).

## 3(b) Requirements.

**3(b)(i)** Erosion and Sediment Control Plan. The City of Manassas is responsible for submitting a project-specific erosion and sediment control (ESC) plan to the locality in which the project is located for review and approval pursuant to the local ESC requirements, if the project involves a land-disturbing activity equal to or greater than 10,000 square feet (2,500 square feet in a Chesapeake Bay Preservation Area). Depending on local requirements the area of land disturbance requiring an ESC plan may be less. The ESC plan must be approved by the locality prior to any land-disturbing activity at the project site. All regulated land-disturbing activities associated with the project, including on and off site access roads, staging areas, borrow areas, stockpiles,

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## 6 (continued)

and soil intentionally transported from the project, must be covered by the project specific ESC plan. Local ESC program requirements must be requested through the locality.

3(b)(ii) Stormwater Management Plan. Depending on local requirements, a
 Stormwater Management (SWM) plan may be required. Local SWM program requirements must be requested through the locality.

3(b)(iii) General Permit for Stormwater Discharges from Construction Activities (VAR10). The operator or owner of a construction activity involving land disturbance of equal to or greater than 1 acre is required to register for coverage under the General Virginia Pollutant Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from Construction Activities and develop a project specific stormwater pollution prevention plan (SWPPP). The SWPPP must be prepared prior to submission of the registration statement for coverage under the General Permit and the SWPPP must address water quality and quantity in accordance with the Virginia Stormwater Management Program Regulations. General information and registration forms for the General Permit are available on DEQ's website at:

www.deq.virginia.gov/Programs/Water/StormwaterManagement/VSMPPermits/ConstructionGeneralPermit.aspx.

- 3(c) Agency Recommendations. Consider utilizing permeable paving for parking areas and walkways, where appropriate. Denuded areas should be promptly revegetated following construction.
  - **4.** Air Pollution Control. The Draft EA (page 5-2) indicates a temporary increase in emissions from construction equipment, demolition and paving activities is expected to occur. These temporary impacts are not expected to have a significant impact on air quality. Long-term vehicular traffic to the airport is expected to increase as a result of the project due to increased employment at the airport, though the anticipated new employees likely already reside and commute within the region.
  - **4(a) Agency Jurisdiction.** The <u>DEQ Air Division</u>, on behalf of the State Air Pollution Control Board, is responsible for developing regulations that implement Virginia's Air Pollution Control Law (<u>Virginia Code</u> §10.1-1300 *et seq.*). DEQ is charged with carrying out mandates of the state law and related regulations as well as Virginia's federal obligations under the Clean Air Act as amended in 1990. The objective is to protect and enhance public health and quality of life through control and mitigation of air pollution. The division ensures the safety and quality of air in Virginia by monitoring and analyzing air quality data, regulating sources of air pollution, and working with local, state and federal agencies to plan and implement strategies to protect Virginia's air quality. The appropriate DEQ regional office is directly responsible for the issuance of necessary permits to construct and operate all stationary sources in the region as well as monitoring emissions from these sources for compliance. In the case of certain projects,

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additional evaluation and demonstration must be made under the general conformity provisions of state and federal law.

The Air Division regulates emissions of air pollutants from industries and facilities and implements programs designed to ensure that Virginia meets national air quality standards. The most common regulations associated with major projects are:

Open burning:
Fugitive dust control:
Permits for fuel-burning equipment:
9 VAC 5-130 et seq.
9 VAC 5-50-60 et seq.
9 VAC 5-80-1100 et seq.

**4(b) Agency Findings.** According to the DEQ Air Division, the project site is located in a designated ozone nonattainment area and an emission control area for oxides of nitrogen (NO<sub>x</sub>) and volatile organic compounds (VOCs).

4(c) Recommendation. Precautions should be taken to restrict the emissions of VOCs and NOx during construction.

4(d) Requirements.

**4(d)(i)** Fugitive Dust. During construction, fugitive dust must be kept to a minimum by using control methods outlined in 9 VAC 5-50-60 *et seq.* of the *Regulations for the Control and Abatement of Air Pollution*. These precautions include, but are not limited to, the following:

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- Use, where possible, of water or chemicals for dust control;
- Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials;
- · Covering of open equipment for conveying materials; and
- Prompt removal of spilled or tracked dirt or other materials from paved streets and removal of dried sediments resulting from soil erosion.

**4(d)(ii) Open Burning.** If project activities include the open burning of construction material or the use of special incineration devices, this activity must meet the requirements under 9 VAC 5-130 *et seq.* of the *Regulations* for open burning, and may require a permit. The *Regulations* provide for, but do not require, the local adoption of a model ordinance concerning open burning. The applicant should contact locality officials to determine what local requirements, if any, exist.

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**4(d)(iii) Fuel-Burning Equipment.** Installation/ operation/ modification of fuel-burning equipment (boilers, generators, compressors, etc.) or any other air-pollution-emitting equipment may be subject to registration or permitting requirements (9 VAC 5-80-1100 et seq).

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**4(d)(iv) Asphalt Paving.** A precaution, which typically applies to road construction and paving work (9 VAC 5-45-780 *et seq.*), places limitations on the use of "cut-back" (liquefied asphalt cement, blended with petroleum solvents), and may apply to the project. The asphalt must be "emulsified" (predominantly cement and water with a small amount of emulsifying agent) except when specified circumstances apply. Moreover, there are time-of-year restrictions on its use from April through October in VOC emission control areas.

- **5. Solid and Hazardous Wastes and Hazardous Materials**. The Draft EA (page 5-12) states that construction activities would temporarily increase on-site hazardous waste storage, primarily consisting of diesel fuel. The construction would result in a short-term, temporary increase in the quantity of solid waste generated at the airport. The contractor would be responsible for disposing of any waste in accordance with federal state, and local laws and regulations.
- **5(a) Agency Jurisdiction.** On behalf of the Virginia Waste Management Board, the DEQ Division of Land Protection and Revitalization is responsible for carrying out the mandates of the Virginia Waste Management Act (Virginia Code §10.1-1400 *et seq.*), as well as meeting Virginia's federal obligations under the Resource Conservation and Recovery Act and the Comprehensive Environmental Response Compensation Liability Act, commonly known as Superfund. The DEQ Division of Land Protection and Revitalization also administers those laws and regulations on behalf of the State Water Control Board governing Petroleum Storage Tanks (Virginia Code §62.1-44.34:8 *et seq.*), including Aboveground Storage Tanks (9VAC25-91 *et seq.*) and Underground Storage Tanks (9VAC25-580 *et seq.* and 9VAC25-580-370 *et seq.*), also known as 'Virginia Tank Regulations', and § 62.1-44.34:14 et. seq. which covers oil spills.

## Virginia:

- Virginia Waste Management Act, Virginia Code § 10.1-1400 et seq.
- Virginia Solid Waste Management Regulations, 9 VAC 20-81
   (9 VAC 20-81-620 applies to asbestos-containing materials)
- Virginia Hazardous Waste Management Regulations, 9 VAC 20-60
   (9 VAC 20-60-261 applies to lead-based paints)
- Virginia Regulations for the Transportation of Hazardous Materials, 9 VAC 20-110.

## Federal:

- Resource Conservation and Recovery Act (RCRA), 42 U.S. Code sections 6901 et seq.
- U.S. Department of Transportation Rules for Transportation of Hazardous Materials, 49 Code of Federal Regulations, Part 107
- · Applicable rules contained in Title 40, Code of Federal Regulations.

**5(b)** Agency Findings. DEQ's Division of Land Protection and Revitalization (DLPR) conducted a search of its solid and hazardous waste databases (2,000-foot radius), including petroleum release sites, in the project area vicinity to identify waste sites in close proximity to the area. A number of sites of concern were identified in close proximity to the airport or within airport property.

## **Hazardous Waste/RCRA Facilities**

- VAD988212643, Tri-State Tours, 10680 Wakeman Court, Manassas, VA 22110. Small quantity generator (SQG)
- VA0000347922, Wilcox Woodworks, 10687 Wakeman Court, Manassas, VA 22110. SQG
- VAR000506774, Corfu Contractors, 10599 Residence Road, Manassas, VA 20136. SQG

## **Petroleum Releases**

 PC#20013062, Manassas Airport – New Control Tower, 10522 Terminal Road, Manassas, VA 22110. Release Date: 09/25/2000. Status: Closed.

\*PC#19910187, Dulles Aviation Incorporated – Manassas Airport, 10522 Terminal Road, Manassas, VA 22110. Release Date: 08/21/1990. Status: Closed.

\*PC#19993317, Manassas Municipal Airport, 10522 Terminal Road, Manassas, VA 22110. Release Date: 03/22/1999. Status: Closed.

\*PC#19973688, Manassas Airport – Old Control Tower, 10522 Terminal Road, Manassas, VA 22110. Release Date: 09/05/1996. Status: Closed.

\*PC#19870385, Manassas Airport, 10522 Terminal Road, Manassas, VA 22110. Release Date: 12/09/1986. Status: Closed.

 PC#19900438, VDOT – Manassas Area Headquarters Shop, 10228 Residency Road, Manassas, VA 22110, Release Date: 10/16/1989, Status: Closed.

\*denotes the same address

## 5(c) Requirements.

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**5(c)(i)** Contaminated Waste. Any soil that is suspected of contamination or wastes that are generated must be tested and disposed of in accordance with applicable federal, state, and local laws and regulations. All construction and demolition debris must be

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Manassas Regional Airport
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## 17 (continued)

characterized in accordance with the *Virginia Hazardous Waste Management Regulations* prior to disposal at an appropriate facility.

**5(c)(ii) Petroleum Release Sites and Storage.** If evidence of a petroleum release is discovered, it must be reported to DEQ, as authorized by Virginia Code § 62.1-44.34.8 through 9 and 9 VAC 25-580-10 *et seq*.

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The installation and use of an aboveground storage tank (>660 gallons) for temporary fuel storage (>120 days) during the project must follow the requirements in 9 VAC 25-91-10 *et seg*.

5(c)(iii) Asbestos and Lead-Based Paint. All structures being demolished/renovated/removed must be checked for asbestos-containing materials (ACM) and lead-based paint (LBP) prior to demolition. If ACM or LBP materials are identified all federal and state requirements must be followed.

**5(d) Agency Recommendation.** DEQ recommends that the applicant implement pollution prevention principles, including the reduction, reuse, and recycling of all solid wastes generated. All generation of hazardous wastes should be minimized and handled appropriately.

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The DEQ's Pollution Complaint (PC) cases identified above (petroleum releases) should be further evaluated by the project engineer or manager to establish the exact location, nature and extent of the petroleum release and the potential to impact the proposed project. The project engineer or manager may contact the DEQ's Northern Virginia Regional Office at (703) 583-3800 (Tanks Program) for further information about the PC cases.

**6. Natural Heritage Resources**. The Draft EA (page 5-4) states that approximately 17 acres of previously undeveloped habitat will be disturbed. Some of the habitat is previously graded and mowed grassland. No evidence of federal-listed or state-listed species have been observed in the proposed area of disturbance.

## 6(a) Agency Jurisdiction.

(i) The Virginia Department of Conservation and Recreation's (DCR) Division of Natural Heritage (DNH). DNH's mission is conserving Virginia's biodiversity through inventory, protection and stewardship. The Virginia Natural Area Preserves Act (Virginia Code §10.1-209 through 217), authorized DCR to maintain a statewide database for conservation planning and project review, protect land for the conservation of biodiversity, and the protect and ecologically manage the natural heritage resources of Virginia (the habitats of rare, threatened and endangered species, significant natural communities, geologic sites, and other natural features).

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Manassas Regional Airport West Corporate Development and East Parcel Development DEQ #18-022F

(ii) The Virginia Department of Agriculture and Consumer Services (VDACS): The Endangered Plant and Insect Species Act of 1979 (Virginia Code Chapter 39 §3.1-1020 through 1030) authorizes VDACS to conserve, protect and manage endangered and threatened species of plants and insects. Under a Memorandum of Agreement established between VDACS and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species.

**6(b) Agency Findings.** DCR DNH found that the Broad Run Stream Conservation Unit (SCU) is adjacent to the project site. The Broad Run SCU has been given a biodiversity ranking of B3, which represents a site of high significance. Natural heritage resources associated with this site are:

Alasmidonta varicosa Brook floater G3/S1/NL/LE
Elliptio lanceolata Yellow lance G2G3/S2S3/SOC/NL

The Brook floater is currently listed as endangered by DGIF. The Yellow lance is currently classified as a species of concern by the United States Fish and Wildlife Service (USFWS); however, this designation has no official legal status. In addition, Broad Run has been designated by the DGIF as a "Threatened and Endangered Species Water" for the Brook floater. According to DCR's species distribution model, the potential may exist for the Dwarf wedgemussel (Alasmidonta heterodon, G1G2/S1/LE/LE) adjacent to the project area.

Refer to the attached DCR memorandum dated February 15, 2018 for more details about the identified species.

- 6(b)(i) State-listed Plant and Insect Species. The current activity will not affect any documented state-listed plants or insects.
- 23 6(b)(ii) State Natural Area Preserves. There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.
  - **6(c) Recommendations.** To minimize adverse impacts to the aquatic ecosystem as a result of the proposed activities, DCR recommends the implementation of and strict adherence to applicable state and local erosion and sediment control/storm water management laws and regulations.

Contact DCR DNH to secure updated information on natural heritage resources if the scope of the project changes and/or six months has passed before it is utilized. New and updated information is continually added to the Biotics Data System.

 ${f 6(d)}$  Additional Information. The DGIF maintains a database of wildlife locations,

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including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from <a href="http://vafwis.org/fwis/">http://vafwis.org/fwis/</a> or contact Ernie Aschenbach at 804-367-2733 or <a href="mailto:Ernie.Aschenbach@dgif.virginia.gov">Ernie.Aschenbach@dgif.virginia.gov</a>.

- 7. Historic Impacts. The Draft EA (page 5-13) indicates that DHR concurred with the FAA that the proposed action would have no adverse effect on historic properties with the condition that protective measures be employed during construction for Site 44PW0729, located immediately west of the archaeological survey area.
- **7(a) Agency Jurisdiction.** The Department of Historic Resources (DHR) conducts reviews of projects to determine their effect on historic structures or cultural resources under its jurisdiction. DHR, as the designated State's Historic Preservation Office, ensures that federal actions comply with Section 106 of the National Historic Preservation Act of 1962 (NHPA), as amended, and its implementing regulation at 36 CFR Part 800. The NHPA requires federal agencies to consider the effects of federal projects on properties that are listed or eligible for listing on the National Register of Historic Places. Section 106 also applies if there are any federal involvements, such as licenses, permits, approvals or funding. DHR also provides comments to DEQ through the state environmental impact report review process.
- 7(b) Agency Findings. DHR confirmed that the FAA has consulted directly with DHR regarding the project. DHR provided concurrence on June 2, 2017 (Appendix D of the Draft EA) that the project will have no adverse effect, provided that protective measures are employed during construction for adjacent site 44PWO729 (DHR File No. 2017-0348).
- **7(c) Agency Recommendation.** Utilize protective measures during construction for adjacent site 44PWO729 (DHR File No. 2017-0348).
  - **8. Aviation Impacts.** The Draft EA (page 1-7) indicates that the project components are shown on the conditional-approved Airport Layout Plan (ALP) and that the City of Manassas will request the FAA's unconditional approval for the project.
  - **8(a) Agency Jurisdiction.** The Virginia Department of Aviation is a state agency that plans for the development of the state aviation system; promotes aviation; grants aircraft and airports licenses; and provides financial and technical assistance to cities, towns, counties and other governmental subdivisions for the planning, development, construction and operation of airports, and other aviation facilities.
  - **8(b) Agency Finding.** DOAV finds that the proposed project is consistent with the approved ALP for the airport. DOAV has been working with and providing comments on the project directly to the airport sponsor, in coordination with the FAA's Washington Airports District Office.

9. Pollution Prevention. DEQ advocates that principles of pollution prevention and sustainability be used in all construction projects as well as in facility operations. Effective siting, planning, and on-site Best Management Practices (BMPs) will help to ensure that environmental impacts are minimized. However, pollution prevention and sustainability techniques also include decisions related to construction materials, design, and operational procedures that will facilitate the reduction of wastes at the source.

**9(a) Recommendations.** We have several pollution prevention recommendations that may be helpful for this project and future activities on the airport:

- Consider development of an effective Environmental Management System (EMS). An effective EMS will ensure that the proposed facility is committed to complying with environmental regulations, reducing risk, minimizing environmental impacts, setting environmental goals, and achieving improvements in its environmental performance. DEQ offers EMS development assistance and recognizes facilities with effective Environmental Management Systems through its Virginia Environmental Excellence Program (VEEP). VEEP provides recognition, annual permit fee discounts, and the possibility for alternative compliance methods.
- Consider environmental attributes when purchasing materials. For example, the extent of recycled material content, toxicity level, and amount of packaging should be considered and can be specified in purchasing contracts.
- Consider energy efficiency when choosing materials and products, like insulation, fixtures, and HVAC systems.
- Consider contractors' commitment to the environment when choosing contractors. Specifications regarding raw materials and construction practices can be included in contract documents and requests for proposals.
- Choose sustainable materials and practices for building construction and design.
- Integrate pollution prevention techniques into the facility maintenance and operation, to include inventory control for centralized storage of hazardous materials. Maintenance facilities should have sufficient and suitable space to allow for effective inventory control and preventive maintenance.

DEQ's Office of Pollution Prevention provides information and technical assistance relating to pollution prevention techniques and EMS. For more information, contact DEQ's Office of Pollution Prevention, Meghann Quinn at (804) 698-4021.

**10. Pesticides and Herbicides**. Should construction or maintenance activities require the use of pesticides or herbicides for landscape maintenance, these chemicals should be in accordance with the principles of integrated pest management. The least toxic

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## Letter 1 Continued (Page 14/33)

Manassas Regional Airport West Corporate Development and East Parcel Development DEQ #18-022F

## 29 (continued)

pesticides that are effective in controlling the target species should be used. Contact the Department of Agriculture and Consumer Services at (804) 786-3501 for more information.

- 11. Chesapeake Bay Preservation Areas. According to the Draft EA (page 5-9), the west parcel development is located entirely within the City of Manassas which is outside of the coastal zone. The east parcel development area is located within Virginia's coastal zone and an on-site delineation of the Cannon Branch Resource Protection Area (RPA) was reviewed and approved by Prince William County. Aside from the Wakeman Road realignment, the remainder of the east parcel development will not impact the Cannon Branch RPA. The Draft EA notes that road improvements are considered exempt from the requirements of the Chesapeake Bay Preservation Act provided that certain conditions are met.
- 11(a) Agency Jurisdiction. The DEQ Office of Local Government Programs administers the Chesapeake Bay Preservation Act (Virginia Code §62.1-44.15:67 et seq.) and Chesapeake Bay Preservation Area Designation and Management Regulations (9 VAC 25-830-10 et seq.). Each Tidewater locality must adopt a program based on the Chesapeake Bay Preservation Act and the Chesapeake Bay Preservation Area Designation and Management Regulations. The Act and regulations recognize local government responsibility for land use decisions and are designed to establish a framework for compliance without dictating precisely what local programs must look like. Local governments have flexibility to develop water quality preservation programs that reflect unique local characteristics and embody other community goals. Such flexibility also facilitates innovative and creative approaches in achieving program objectives. The regulations address nonpoint source pollution by identifying and protecting certain lands called Chesapeake Bay Preservation Areas. The regulations use a resource-based approach that recognizes differences between various land forms and treats them differently.
- 11(b) Agency Findings. The City of Manassas is not subject to the Chesapeake Bay Preservation Act or the Regulations. OLGP's review of the submitted documentation shows that the proposed West Corporate Development project will occur solely within the confines of the city-owned airport property, and as such, the West Corporate Development portion of the project is not subject to review for Bay Act compliance.

In Prince William County, the areas protected by the Chesapeake Bay Preservation Act, as locally implemented, require conformance with performance criteria. These areas include RPAs and Resource Management Areas (RMAs) as designated by the local government. RPAs include tidal wetlands, certain non-tidal wetlands and tidal shores. RPAs also include a 100-foot vegetated buffer area located adjacent to and landward of these features and along both sides of any water body with perennial flow. RMAs, which require less stringent performance criteria, include all areas of the County not designated as RPA.

3.

## 31 (continued)

The proposed East Parcel Development project will occur on approximately 20 acres of land within Prince William County and calls for the realignment of Wakeman Drive, taxi lane extensions, construction of three surface parking lots and several airplane hangar buildings, stormwater drainage improvements and the installation of additional security fencing. The proposed Wakeman Drive Realignment will result in an encroachment of impervious roadway into the Cannon Branch RPA, at the south end of the project, where the proposed road will intersect with Harry J. Parrish Boulevard.

11(c) Requirement. The Wakeman Drive realignment component of the East Parcel Development project would be considered exempt from the Regulations provided the road improvements are constructed in accordance with (i) regulations promulgated pursuant to the *Virginia Erosion and Sediment Control Law* and the *Virginia Stormwater Management Act*, (ii) an erosion and sediment control plan and a stormwater management plan approved by DEQ, or (iii) local water quality protection criteria at least as stringent as the above state requirements. The exemption of public roads is further conditioned on the following:

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Optimization of the road alignment and design, consistent with other applicable requirement, to prevent or otherwise minimize (i) encroachment into the RPA and (ii) adverse effects on water quality.

9VAC25-830-110 of the Chesapeake Bay Preservation Area Designation and Management Regulations require that a site-specific RPA determination and a Water Quality Impact Assessment (WQIA) be submitted for projects that propose land-disturbing activities on lands containing RPAs.

Per 9VAC25-830-140 of the Regulations, the WQIA is required for any proposed land development in a RPA.

11(d) Conclusion. Results of the site-specific determination for the East Parcel Development have been submitted (see Appendix C: Wetland Data Forms Relevant to the Preservation Area Site Assessment (PASA), Figure 32 - October 16, 2017 located within Appendix F- Federal Consistency Certification of the Draft EA) and Prince William County staff have concurred with the RPA delineation findings referenced in that document. To date, OLGP staff has not received the required WQIA for this project.

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Provided adherence to the above requirements, the proposed activity would be in accordance with the Chesapeake Bay Preservation Act and Regulations.

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**12. Public Water Supply.** The Draft EA does not address anticipated impacts to public water supplies.

**12(a) Agency Jurisdiction.** The Virginia Department of Health (VDH), Office of Drinking Water (ODW) reviews projects for the potential to impact public drinking water

## Letter 1 Continued (Page 16/33)

Manassas Regional Airport
West Corporate Development and East Parcel Development
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sources (groundwater wells and surface water intakes). VDH administers both federal and state laws governing waterworks operation.

**12(b) Agency Findings.** VDH ODW identified two public groundwater wells within a 1-mile radius of the project site.

PWS ID Number	City/County	System Name	Facility Name
6153264	PRINCE WILLIAM	BROAD RUN GOLF	WELL
6153041	PRINCE WILLIAM	BRISTOW MANOR GOLF CLUB	WELL

Additionally, the project is within the watershed of the Fairfax County Water Authority's Occoquan Reservoir public surface water intake (PWS ID 6059501).

## 12(c) Recommendation.

- BMPs should be employed on the project site including erosion and sedimentation controls as well as spill prevention controls and countermeasures.
- Properly manage materials on site and during transport to prevent impacts to nearby surface water.
- 37 12(d) Requirement. Potential impacts to public water distribution systems or sanitary sewage collection systems must be verified by the local utility as applicable.

## **REGULATORY AND COORDINATION NEEDS**

- **1. Wetlands and Subaqueous Lands**. A Joint Permit Application must be submitted to VMRC for the proposed wetlands and subaqueous lands impacts. Contact VMRC (Tony Watkinson, 757-247-2250) with questions.
  - 2. Erosion and Sediment Control and Stormwater Management.

**2(a) Erosion and Sediment Control and Stormwater Management.** This project must comply with *Virginia's Erosion and Sediment Control Law* (Virginia Code § 62.1-44.15:61) and *Regulations* (9 VAC 25-840-30 *et seq.*) and *Stormwater Management Law* (Virginia Code § 62.1-44.15:31) and *Regulations* (9 VAC 25-870-210 *et seq.*) as locally administered. Land-disturbing activities of equal to or greater than 10,000 square feet (2,500 square feet in a Chesapeake Bay Preservation Area) would be regulated by *VESCL&R* and *VSWML&R*. Local erosion and sediment control, and stormwater management plan requirements should be coordinated with the locality.

Specific questions regarding Erosion and Sediment control requirements should be directed to DEQ, Larry Gavan at (804) 698-4040.

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**2(b) General Permit for Stormwater Discharges from Construction Activities (VAR10).** For projects involving land-disturbing activities of equal to or greater than one acre the applicant is required to register for coverage under the Virginia Stormwater Management Program General Permit for Discharges of Stormwater from Construction Activities (9 VAC 25-870-1 *et seq.*). Specific questions regarding the Stormwater Management Program requirements should be directed to DEQ, Holly Sepety at (804) 698-4039.

- **3. Air Quality Regulations**. Activities associated with this project may be subject to air regulations administered by DEQ. The state air pollution regulations that may apply to the project are:
  - fugitive dust and emissions control (9VAC5-50-60 et seg.);
  - asphalt paving operations (9VAC5-45-760 et seq.);
  - permits for fuel-burning equipment (9VAC5-80-1100 et seq.); and
  - open burning restrictions (9VAC5-130 et seq.).

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The installation, operation and/or modification of stationary or portable fuel-burning equipment or other sources of air pollutants may be subject to registration requirements. Guidance on permitting requirements may be obtained by contacting DEQ-NRO (703-583-3800).

Guidance on minimizing the emission of VOCs and  $NO_x$  during construction may be obtained from DEQ NRO (703-583-3800).

**4. Solid and Hazardous Wastes**. All solid waste, hazardous waste, and hazardous materials must be managed in accordance with all applicable federal, state, and local environmental regulations.

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If evidence of a petroleum release is discovered during construction, it must be reported to DEQ-NRO Tanks Program (703-583-3800). Contact DEQ-NRO (703-583-3800), for information on the location and availability of suitable waste management facilities in the project area or if free product, discolored soils, or other evidence of contaminated soils are encountered.

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**4(a) Asbestos Containing Material.** It is the responsibility of the owner or operator to thoroughly inspect affected structures for the presence of asbestos, including Category I and Category II nonfriable asbestos containing material (ACM). Upon classification as friable or non-friable, all waste ACM shall be disposed of in accordance with the Virginia Solid Waste Management Regulations (9 VAC 20-80-640), and transported in accordance with the Virginia regulations governing Transportation of Hazardous Materials (9 VAC 20-110-10 *et seq.*). Contact DEQ-NRO (703-583-3800) and/or the Department of Labor and Industry (804-371-2327) for additional information.

## Letter 1 Continued (Page 18/33)

Manassas Regional Airport West Corporate Development and East Parcel Development DEQ #18-022F

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**4(b) Lead-Based Paint.** If applicable, this project must comply with the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) regulations, and with the Virginia Lead-Based Paint Activities Rules and Regulations. For additional information regarding these requirements, contact the Department of Professional and Occupational Regulation (804-367-8500).

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- **5. Natural Heritage Resources.** Contact DCR DNH, Rene Hypes at (804) 371-2708, to secure updated information on natural heritage resources if the scope of the project changes and/or six months has passed before the project is implemented, since new and updated information is continually added to the Biotics Data System.
- **6. Chesapeake Bay Preservation Act.** The project must be conducted in a manner that is consistent with the coastal lands management enforceable policy of the CZM Program as administered by DEQ pursuant to the Chesapeake Bay Preservation Act (Virginia Code 62.1-44.15 et seq.) and the Chesapeake Bay Preservation Area Designation and Management Regulations (9VAC25-830 et. seq.). Per 9VAC25-830-140 of the Regulations, a WQIA is required for any proposed land development in a RPA (applicable to the Wakeman Road realignment portion of the east parcel development).

For additional information contact Daniel Moore (804-698-4520).

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7. Historic Resources. Coordinate with DHR (Adrienne Birge-Wilson, 804-482-6092) as necessary with questions regarding its findings and the protective measures for adjacent site 44PW0729.

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8. Potable and Sanitary Water Collection Systems. Potential impacts to public water distribution systems or sanitary sewage collection systems must be verified by the local utility. Contact the VDH Office of Drinking Water with questions related to its recommendations (Arlene Fields Warren, 804-864-7781).

Thank you for the opportunity to review and respond to the Draft Environmental Assessment for the Manassas Regional Airport West Corporate Development and East Parcel Development. Detailed comments of reviewing agencies are attached for your review. Please contact me at (804) 698-4204 or Janine Howard at (804) 698-4299 for clarification of these comments.

## Letter 1 Continued (Page 19/33)

Manassas Regional Airport West Corporate Development and East Parcel Development DEQ #18-022F

Sincerely,

Bettina Rayfield, Program Manager Environmental Impact Review

Ec:

Robbie Rhur, DCR Amy Ewing, DGIF Tony Watkinson, VMRC Roger Kirchen, DHR Greg Evans, DOF Arlene Warren, VDH Elizabeth Jordan, VDOT Robert Lazaro, Northern Virginia Regional Commission William Patrick Pate, City of Manassas Christopher E. Martino, Prince William County Clay Morris, Prince William County Susan Simmers, DOAV Susan Stafford, FAA Juan Rivera, Manassas Regional Airport Natalie Heath, RS&H David Alberts, RS&H

## DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION OF AIR PROGRAM COORDINATION ENVIRONMENTAL REVIEW COMMENTS APPLICABLE TO AIR QUALITY TO: Janine L. Howard DEQ - OEIR PROJECT NUMBER: DEQ #18-022F PROJECT TYPE: ☐ STATE EA / EIR X FEDERAL EA / EIS ☐ SCC ☐ CONSISTENCY DETERMINATION PROJECT TITLE: Manassas Regional Airport West Corporate Development and East **Parcel Development** PROJECT SPONSOR: Federal Aviation Administration PROJECT LOCATION: X OZONE NONATTAINMENT AND EMISSION CONTROL AREA FOR NOX & VOC REGULATORY REQUIREMENTSMAY BE APPLICABLE TO: CONSTRUCTION **OPERATION** STATE AIR POLLUTION CONTROL BOARD REGULATIONS THAT MAY APPLY: 9 VAC 5-40-5200 C & 9 VAC 5-40-5220 E - STAGE I 9 VAC 5-45-760 et seq. - Asphalt Paving operations 9 VAC 5-130 et seg. - Open Burning 3. 4. X 9 VAC 5-50-60 et seq. Fugitive Dust Emissions 9 VAC 5-50-130 et seq. - Odorous Emissions; Applicable to\_ 9 VAC 5-60-300 et seq. - Standards of Performance for Toxic Pollutants 6. 9 VAC 5-50-400 Subpart\_\_\_\_\_, Standards of Performance for New Stationary Sources, designates standards of performance for the\_\_\_\_\_ 49 9 VAC 5-80-1100 et seq. of the regulations - Permits for Stationary Sources 9 VAC 5-80-1605 et seq. Of the regulations - Major or Modified Sources located in PSD areas. This rule may be applicable to the 10. 9 VAC 5-80-2000 et seq. of the regulations - New and modified sources located in non-attainment areas 11. 9 VAC 5-80-800 et seq. Of the regulations – State Operating Permits. This rule may be applicable to COMMENTS SPECIFIC TO THE PROJECT: All precautions are necessary to restrict the emissions of volatile organic compounds (VOC) and oxides of nitrogen (NO<sub>x</sub>).

(Kotur S. Narasimhan) Office of Air Data Analysis

DATE: February 5, 2018



## **MEMORANDUM**

TO:

Janine Howard, DEQ/EIR Environmental Program Planner

FROM:

Katy Dacey, Division of Land Protection & Revitalization Review Coordinator

DATE:

May 12, 2017

COPIES:

Sanjay Thirunagari, Division of Land Protection & Revitalization Review Manager; file

SUBJECT:

Environmental Impact Review: EIR Project No 17-061F Manassas Regional Airport

West Corporate Development and East Parcel Development, City of Manassas, Prince

William County, VA

The Division of Land Protection & Revitalization (DLPR) has completed its review of the May 2017 EIR for the Manassas Regional Airport West Corporate Development and East Parcel Development projects located at 10600 Harry J. Parrish Boulevard at the Manassas Regional Airport in Manassas, Virginia 20110

Project Scope: redevelopment and development of the west and east sides of airport to include: roadway improvements, building and parking lot reconstructions, T-hangers demolition, construction of hanger and parking lot, expansion of apron and taxilane tie down parking, wash rack construction, utilities and stormwater drainage improvements, taxilane extension and security fence extension

Solid and hazardous waste issues were not addressed in the submittal. The submittal did not indicate that a search of Federal or State environmental databases was conducted. DLPR staff conducted a search (2000 foot radius) of solid and hazardous waste databases (including petroleum releases) to identify waste sites in close proximity to the project corridor. DLPR search did identify five waste sites within the project area which might impact the project. Additionally, no waste sites of possible concern were located within the zip code of the project area, 22110. DLPR staff has reviewed the submittal and offers the following comments:

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## Hazardous Waste/RCRA Facilities - three in close proximity to project area.

- 1. VAD988212643, Tri-State Tours, 10680 Wakeman Court, Manassas, VA 22110. SQG
- 2. VA0000347922, Wilcox Woodworks, 10687 Wakeman Court, Manassas, VA 22110, SQG
- 3. VAR000506774, Corfu Contractors, 10599 Residence Road, Manassas, VA 20136. SQG

## 50 (continued)

## CERCLA Sites - none in the same zip code of the project area

The above information related to hazardous wastes, RCRA/CERCLA sites can be accessed from EPA's websites at <a href="https://www3.epa.gov/enviro/">https://www3.epa.gov/enviro/</a>,

https://rcrainfopreprod.epa.gov/rcrainfoweb/action/main-menu/view and https://www.epa.gov/superfund

Formerly Used Defense Sites (FUDS) - none in close proximity to project area

Solid Waste - none in close proximity to project area

<u>Virginia Remediation Program (VRP)</u> – none in close proximity to project area

Petroleum Releases - two within the project area (\*denotes the same address)

 PC#20013062, Manassas Airport – New Control Tower, 10522 Terminal Road, Manassas, VA 22110. Release Date: 09/25/2000. Status: Closed.

\*PC#19910187, Dulles Aviation Incorporated – Manassas Airport, 10522 Terminal Road, Manassas, VA 22110. Release Date: 08/21/1990. Status: Closed.

\*PC#19993317, Manassas Municipal Airport, 10522 Terminal Road, Manassas, VA 22110. Release Date: 03/22/1999. Status: Closed.

\*PC#19973688, Manassas Airport – Old Control Tower, 10522 Terminal Road, Manassas, VA 22110. Release Date: 09/05/1996. Status: Closed.

\*PC#19870385, Manassas Airport, 10522 Terminal Road, Manassas, VA 22110. Release Date: 12/09/1986. Status: Closed.

 PC#19900438, VDOT – Manassas Area Headquarters Shop, 10228 Residency Road, Manassas, VA 22110. Release Date: 10/16/1989. Status: Closed.

Please note that the DEQ's Pollution Complaint (PC) cases identified should be further evaluated by the project engineer or manager to establish the exact location, nature and extent of the petroleum release and the potential to impact the proposed project. Also, the project engineer or manager should contact the DEQ's Northern Virginia Regional Office at (703) 583-3800 (Tanks Program) for further information about the PC cases.

## PROJECT SPECIFIC COMMENTS

None

GENERAL COMMENTS

Soil, Sediment, Groundwater, and Waste Management

Any soil, sediment or groundwater that is suspected of contamination or wastes that are generated must be tested and disposed of in accordance with applicable Federal, State, and local laws and regulations. Some

## **Letter 1 Continued (Page 23/33)**

## 50 (continued)

of the applicable state laws and regulations are: Virginia Waste Management Act, Code of Virginia Section 10.1-1400 *et seq.*; Virginia Hazardous Waste Management Regulations (VHWMR) (9VAC 20-60); Virginia Solid Waste Management Regulations (VSWMR) (9VAC 20-81); Virginia Regulations for the Transportation of Hazardous Materials (9VAC 20-110). Some of the applicable Federal laws and regulations are: the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Section 6901 *et seq.*, and the applicable regulations contained in Title 40 of the Code of Federal Regulations; and the U.S. Department of Transportation Rules for Transportation of Hazardous Materials, 49 CFR Part 107.

## Asbestos and/or Lead-based Paint

All structures being demolished/renovated/removed should be checked for asbestos-containing materials (ACM) and lead-based paint (LBP) prior to demolition. If ACM or LBP are found, in addition to the federal waste-related regulations mentioned above, State regulations 9VAC 20-81-620 for ACM and 9VAC 20-60-261 for LBP must be followed. Questions may be directed to Jason Miller at the DEQ's Piedmont Regional Office at (804) 527-5028.

## Pollution Prevention - Reuse - Recycling

Please note that DEQ encourages all construction projects and facilities to implement pollution prevention principles, including the reduction, reuse, and recycling of all solid wastes generated. All generation of hazardous wastes should be minimized and handled appropriately.

If you have any questions or need further information, please contact Katy Dacey at (804) 698-4274.

## **Letter 1 Continued (Page 24/33)**

## Howard, Janine (DEQ)

From: Miller, Mark (DEQ)

Sent: Monday, February 05, 2018 10:57 AM

To: Howard, Janine (DEQ)

Subject: FW: NEW PROJECT FAA Manassas Airport 18-022F

Importance: High

Northern Regional Office comments regarding the Draft EA for the Manassas Regional Airport West Corporate Development and East Parcel Development, 18-022F, Manassas City/Prince William County, are as follows:

<u>Land Protection Division</u> – The project manager is reminded that if any solid or hazardous waste is generated/encountered during construction, the project manager would follow applicable federal, state, and county regulations for their disposal.

<u>Air Compliance/Permitting</u> - The project manager is reminded that during the construction phases that occur with this project; the project is subject to the Fugitive Dust/Fugitive Emissions Rule 9 VAC 5-50-60 through 9 VAC 5-50-120. In addition, should any open burning or use of special incineration devices be employed in the disposal of land clearing debris during demolition and construction, the operation would be subject to the Open Burning Regulation 9 VAC 5-130-10 through 9 VAC 5-130-60 and 9 VAC 5-130-100.

Virginia Water Protection Permit (VWPP) Program – The project manager is reminded that a VWP permit from DEQ may be required should impacts to surface waters be necessary. DEQ VWP staff recommends that the avoidance and minimization of surface water impacts to the maximum extent practicable as well as coordination with the US Army Corps of Engineers. Upon receipt of a Joint Permit Application for the proposed surface water impacts, DEQ VWP Permit staff will review the proposed project in accordance with the VWP permit program regulations and current VWP permit program quidance.

<u>Erosion and Sediment Control and Storm Water Management:</u> DEQ has regulatory authority for the Virginia Pollutant Discharge Elimination System (VPDES) programs related to municipal separate storm sewer systems (MS4s) and construction activities. Erosion and sediment control measures are addressed in local ordinances and State regulations. Additional information is available at

<u>http://www.deq.virginia.gov/Programs/Water/StormwaterManagement.aspx</u>. Non-point source pollution resulting from this project should be minimized by using effective erosion and sediment control practices and structures. Consideration should also be given to using permeable paving for parking areas and walkways where appropriate, and denuded areas should be promptly revegetated following construction work. If the total land disturbance exceeds 10,000 square feet, an erosion and sediment control plan will be required. Some localities also require an E&S plan for disturbances less than 10,000 square feet. A stormwater management plan may also be required. For any land disturbing activities equal to one acre or more, you are required to apply for coverage under the VPDES General Permit for Discharges of Storm Water from Construction Activities. The Virginia Stormwater Management Permit Authority may be DEQ or the locality.

Mark L. Miller
Environmental Manager-Enforcement, Pollution Response, & Environmental Review
Department of Environmental Quality - Northern Regional Office
13901 Crown Court, Woodbridge, Virginia 22193
(O) 703-583-3850
E-mail:Mark.Miller@deq.virginia.gov
http://www.deq.virginia.gov/Programs/PollutionResponsePreparedness.aspx

Matthew J. Strickler Secretary of Natural Resources

Clyde E. Cristman



## COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

Rochelle Altholz
Deputy Director of
Administration and Finance

Russell W. Baxter Deputy Director of Dam Safety & Floodplain Management and Soil & Water Conservation

Thomas L. Smith Deputy Director of Operations

## MEMORANDUM

DATE:

February 15, 2018

TO:

Janine Howard, DEO

FROM:

Roberta Rhur, Environmental Impact Review Coordinator

SUBJECT:

DEQ 18-022F, Manassas Regional Airport West Corporate Development and East Parcel

Development

## Division of Natural Heritage

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in our files, the Broad Run Stream Conservation Unit (SCU) is located adjacent to the project site. SCUs identify stream reaches that contain aquatic natural heritage resources, including 2 miles upstream and 1 mile downstream of documented occurrences, and all tributaries within this reach. SCUs are also given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain. The Broad Run SCU has been given a biodiversity significance ranking of B3, which represents a site of high significance. The natural heritage resources of concern associated with this SCU are:

52 E

Alasmidonta varicosa Elliptio lanceolata Brook floater Yellow lance

G3/S1/NL/LE G2G3/S2S3/SOC/NL

The Brook floater, a small freshwater mussel species, is known from the northeastern United States primarily in the Atlantic Slope drainages (NatureServe, 2009). In Virginia, it is recorded from the Potomac River basin with a possible record from the James River. Of 14 documented records in Virginia, only two are thought to be viable. Population declines have been documented throughout its range (NatureServe, 2009). The Brook floater typically inhabits flowing-water habitats in and near riffles and rapids of smaller creeks with rocky or gravelly substrates (Nedeau et al., 2000 per NatureServe, 2009). Many facets of its life history are unknown including its fish host. Threats for the Brook floater in particular include poor water quality as this species does not tolerate silt or nutrient pollution well (Stevenson and Bruenderman, 1995). Please note that this species is currently listed as endangered by the Virginia Department of Game and Inland Fisheries (VDGIF).

The Yellow lance occurs in mid-sized rivers and second and third order streams. To survive, it needs a silt-free, stable streambed and well-oxygenated water that is free of pollutants. This species has been the subject of taxonomic debate in recent years (NatureServe, 2009). Currently in Virginia, the Yellow lance is

600 East Main Street, 24th Floor Richmond, Virginia 23219 | 804-786-6124

State Parks • Soil and Water Conservation • Outdoor Recreation Planning Natural Heritage • Dam Safety and Floodplain Management • Land Conservation

## 52 (continued)

recognized from populations in the Chowan, James, York, and Rappahannock drainages. Its range also extends into Neuse-Tar river system in North Carolina. In recent years, significant population declines have been noted across its range (NatureServe, 2009). The Yellow lance may be particularly sensitive to chemical pollutants and exposure to fine sediments from erosion (NatureServe, 2009). Please note that this species is currently classified as a species of concern by the United States Fish and Wildlife Service (USFWS); however, this designation has no official legal status.

Considered good indicators of the health of aquatic ecosystems, freshwater mussels are dependent on good water quality, good physical habitat conditions, and an environment that will support populations of host fish species (Williams et al., 1993). Because mussels are sedentary organisms, they are sensitive to water quality degradation related to increased sedimentation and pollution. They are also sensitive to habitat destruction through dam construction, channelization, and dredging, and the invasion of exotic mollusk species.

In addition, Broad Run has been designated by the VDGIF as a "Threatened and Endangered Species Water" for the Brook floater.

Please note according to DCR's species distribution model, potential may exist for the Dwarf wedgemussel (*Alasmidonta heterodon*, G1G2/S1/LE/LE) to occur adjacent to the project site.

To minimize adverse impacts to the aquatic ecosystem as a result of the proposed activities, DCR recommends the implementation of and strict adherence to applicable state and local erosion and sediment control/storm water management laws and regulations. Due to the legal status of the Brook floater, DCR also recommends coordination with Virginia's regulatory authority for the management and protection of this species, the VDGIF, to ensure compliance with the Virginia Endangered Species Act (VA ST §§ 29.1-563 – 570).

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

New and updated information is continually added to Biotics. Please re-submit project information and map for an update on this natural heritage information if the scope of the project changes and/or six months has passed before it is utilized.

The VDGIF maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from <a href="http://vafwis.org/fwis/">http://vafwis.org/fwis/</a> or contact Ernie Aschenbach at 804-367-2733 or <a href="maintains-en-alpha-en-alph

The remaining DCR divisions have no comments regarding the scope of this project. Thank you for the opportunity to comment.

CC: Amy Ewing, VDGIF Troy Andersen, USFWS

## Letter 1 Continued (Page 27/33) Literature Cited NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 16, 2010 and April 5, 2010). Nedeau, E.J., M.A. McCollough, and B.I. Swartz. 2000. The freshwater mussels of Maine. Maine Department of Inland Fisheries and Wildlife, Augusta, Maine. 118 pp. Stevenson, Phillip H. and Sue A. Bruenderman 1995. A Guide to Endangered and Threatened Species of Virginia. K. Terwilliger ed. The McDonald and Woodward Publishing Company, Blacksburg, Virginia. p. 74. Williams, J.D., M.L. Warren, Jr., K.S. Cummings, J.L. Harris, and R.J. Neves. 1993. Conservation status of freshwater mussels of the United States and Canada. Fisheries 18: 6-9.

## Howard, Janine (DEQ)

From:

Birge-wilson, Adrienne (DHR)

Sent:

Wednesday, February 07, 2018 1:19 PM

To:

Howard, Janine (DEQ)

Subject:

RE: NEW PROJECT FAA Manassas Airport 18-022F - DHR File No. 2017-0348

Janine,

Good afternoon.

**53** 

As noted in Appendix D (D-1) of the Draft EA, FAA has consulted directly with DHR regarding this undertaking. DHR provided concurrence on 2 JUN 2017 that the project will have *no adverse effect with the condition* that protective measures be employed during construction for adjacent site 44PWO729 (DHR File No. 2017-0348).

V/R,

Adrienne Birge-Wilson

Review and Compliance Division
Virginia Department of Historic Resources
2801 Kensington Avenue
Richmond, VA 23221
[804] 482-6092
adrienne.birge-wilson@dhr.virginia.gov

From: Fulcher, Valerie (DEQ)

Sent: Tuesday, January 30, 2018 2:38 PM

To: dgif-ESS Projects (DGIF); Rhur, Robbie (DCR); odwreview (VDH); Dacey, Katy (DEQ); Narasimhan, Kotur (DEQ); Moore, Daniel (DEQ); Miller, Mark (DEQ); Kirchen, Roger (DHR); Evans, Gregory (DOF); Watkinson, Tony (MRC); Cromwell, James R. (VDOT); Jordan, Elizabeth (VDOT); <a href="mailto:rlazaro@novaregion.org">rlazaro@novaregion.org</a>; <a href="mailto:citymanager@ci.manassas.va.us">citymanager@ci.manassas.va.us</a>; Patton, Justin S.; Simmers, Susan H. (DOAV)

Cc: Howard, Janine (DEQ)

Subject: NEW PROJECT FAA Manassas Airport 18-022F

Importance: High

Good afternoon - this is a new OEIR review request/project:

**Document Type: Draft EA** 

**Project Sponsor: Federal Aviation Administration** 

Project Title: Manassas Regional Airport West Corporate Development and East Parcel Development

Location: City of Manassas, Prince William County

Project Number: DEQ #18-022F

The document is available at <a href="https://www.deq.virginja.gov/fileshare/oeir">www.deq.virginja.gov/fileshare/oeir</a> in the <a href="https://example.com/fileshare/oeir">FAA</a> folder.

The due date for comments is <u>FEBRUARY 16, 2018</u>. You can send your comments either directly to JANINE HOWARD by email (<u>Janine.Howard@deq.virginia.gov</u>), or you can send your comments by regular interagency/U.S. mail to the Department of Environmental Quality, Office of Environmental Impact Review, 1111 East Main St., Richmond, VA 23219 (please note new address).



## COMMONWEALTH OF VIRGINIA

Mark K. Flynn Director

## Department of Aviation

5702 Gulfstream Road Richmond, Virginia 23250-2422 V/TDD -- (804) 236-3624 FAX -- (804) 236-3635

Transmitted via Email

February 2, 2018

Ms. Janine Howard Department of Environmental Quality Office of Environmental Impact Review 1111 East Main Street Richmond, VA 23219

Re: Manassas Regional Airport

West Corporate Development & East Parcel Development

Project Number: 18-22F

Dear Ms. Howard:

54

Thank you for the opportunity to comment on the West Corporate Development & East Parcel Development project at the Manassas Regional Airport. The project is consistent with the approved airport layout plan for the airport. The Virginia Department of Aviation has been working with and providing comments on the project directly to the airport sponsor, in coordination with the Federal Aviation Administration's Washington Airports District Office.

The Virginia Department of Aviation has no objection to the project as proposed.

Please let me know if you have any questions on our comments.

Sincerely,

Susan H. Simmers Senior Aviation Planner

Susand Simoners

ec: Juan Rivera, Director, Manassas Regional Airport

100 DOAVA\$ 20180202 DEQ 18-022F HEF West Corp-East Parcel Development



## COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 1111 East Main Street, Suite 1400, Richmond, VA 23219

Mailing address: P.O. Box 1105, Richmond, Virginia 23218

www.deq.virginia.gov

David K. Paylor Director

(804) 698-4000 1-800-592-5482

Matthew J. Strickler Secretary of Natural Resources

## **MEMORANDUM**

TO:

Janine Howard, DEQ Environmental Program Planner

FROM:

Daniel Moore, DEQ Principal Environmental Planner

DATE:

February 21, 2018

SUBJECT:

DEQ #18-022F: Manassas Regional Airport Development, City of Manassas and

Prince William County

We have reviewed the Draft EA application for the proposed Manassas Regional Airport West Corporate Development and East Parcel Development project in the City of Manassas and Prince William County and offer the following comments regarding consistency with the provisions of the Chesapeake Bay Preservation Area Designation and Management Regulations (Regulations):

The City of Manassas is not subject to the Chesapeake Bay Preservation Act or the Regulations. Our review of the submitted documentation shows that the proposed West Corporate Development project will occur solely within the confines of the city-owned airport property, and as such, the project is not subject to review for Bay Act compliance.

In Prince William County, the areas protected by the Chesapeake Bay Preservation Act, as locally implemented, require conformance with performance criteria. These areas include Resource Protection Areas (RPAs) and Resource Management Areas (RMAs) as designated by the local government. RPAs include tidal wetlands, certain non-tidal wetlands and tidal shores. RPAs also include a 100-foot vegetated buffer area located adjacent to and landward of these features and along both sides of any water body with perennial flow. RMAs, which require less stringent performance criteria, include all areas of the County not designated as RPA.

The proposed East Parcel Development project will occur on approximately 20 acres of land within Prince William County and calls for the realignment of Wakeman Drive, taxi lane extensions, construction of three surface parking lots and several airplane hangar buildings, stormwater drainage improvements and the installation of additional security fencing. The Wakeman Drive Realignment component of the East Parcel Development project would be considered exempt from the Regulations provided the realignment is constructed in accordance with (i) regulations promulgated pursuant to the *Virginia Erosion and Sediment Control Law* and

### Letter 1 Continued (Page 31/33)

## 55 (continued)

the Virginia Stormwater Management Act, (ii) an erosion and sediment control plan and a stormwater management plan approved by DEQ, or (iii) local water quality protection criteria at least as stringent as the above state requirements. The exemption of public roads is further conditioned on the following:

Optimization of the road alignment and design, consistent with other applicable requirement, to prevent or otherwise minimize (i) encroachment into the RPA and (ii) adverse effects on water quality.

As noted in previous memorandums from the DEQ Office of Local Government Programs (OLGP) staff regarding this project, 9VAC25-830-110 of the Chesapeake Bay Preservation Area Designation and Management Regulations require that a site-specific RPA determination and a Water Quality Impact Assessment (WQIA) be submitted for projects that propose land-disturbing activities on lands containing RPAs. Results of the site-specific determination for the East Parcel Development have been submitted (see Appendix C: Wetland Data Forms Relevant to the PASA, Figure 32 - October 16, 2017) and Prince William County staff have concurred with the RPA delineation findings referenced in that document. To date, OLGP staff has not received the required WQIA for this project. The proposed Wakeman Drive Realignment will result in an encroachment of impervious roadway into the Cannon Branch RPA, at the south end of the project, where the proposed road will intersect with Harry J. Parrish Boulevard. Per 9VAC25-830-140 of the Regulations, the WQIA is required for any proposed land development in a RPA.

Provided adherence to the above requirements, the proposed activity would be consistent with the *Chesapeake Bay Preservation Act* and the Regulations.

#### Howard, Janine (DEQ)

From: Warren, Arlene (VDH)

Sent: Thursday, February 01, 2018 10:00 AM

To: Howard, Janine (DEQ)

Subject: RE: NEW PROJECT FAA Manassas Airport 18-022F
Attachments: 17-061F FAA Manassas Airport Project Response.pdf

FYI -

**56** 

Noting that the project area has change slightly from DEQ 17-061F review; the Office of Drinking Water's project previous comments are still valid. Attached is 17-061F Project review response.

Best Regards,

Arlene Fields Warren GIS Program Support Technician Office of Drinking Water Virginia Department of Health 109 Governor Street Richmond, VA 23220 (804) 864-7781

From: Fulcher, Valerie (DEQ)

Sent: Tuesday, January 30, 2018 2:38 PM

To: dgif-ESS Projects {DGIF} < ESSProjects@dgif.virginia.gov >; Rhur, Robbie (DCR) < Robbie.Rhur@dcr.virginia.gov >; odwreview (VDH) < odwreview@vdh.virginia.gov >; Dacey, Katy (DEQ) < Katy.Dacey@deq.virginia.gov >; Narasimhan, Kotur (DEQ) < Kotur.Narasimhan@deq.virginia.gov >; Moore, Daniel (DEQ) < Daniel.Moore@deq.virginia.gov >; Miller, Mark (DEQ) < Mark.Miller@deq.virginia.gov >; Kirchen, Roger (DHR) < Roger.Kirchen@dhr.virginia.gov >; Evans, Gregory (DOF) < Gregory.Evans@dof.virginia.gov >; Watkinson, Tony (MRC) < Tony.Watkinson@mrc.virginia.gov >; Cromwell, James R. (VDOT) < James.Cromwell@VDOT.Virginia.gov >; Jordan, Elizabeth (VDOT)

<jspatton@pwcgov.org>; Simmers, Susan H. (DOAV) <susan.simmers@doav.virginia.gov>

Cc: Howard, Janine (DEQ) < Janine. Howard@deq. virginia.gov >

Subject: NEW PROJECT FAA Manassas Airport 18-022F

Importance: High

Good afternoon - this is a new OEIR review request/project:

Document Type: Draft EA

**Project Sponsor: Federal Aviation Administration** 

Project Title: Manassas Regional Airport West Corporate Development and East Parcel Development

Location: City of Manassas, Prince William County

Project Number: DEQ #18-022F

The document is available at www.deq.virginia.gov/fileshare/oeir in the FAA folder.

The due date for comments is <u>FEBRUARY 16, 2018</u>. You can send your comments either directly to JANINE HOWARD by email (<u>Janine.Howard@deq.virginia.gov</u>), or you can send your comments by regular interagency/U.S. mail to the Department of Environmental Quality, Office of Environmental Impact Review, 1111 East Main St., Richmond, VA 23219 (please note new address).

## Letter 1 Continued (Page 33/33)

From: Warren, Arlene (VDH) To:

Howard, Janine (DEO) RE: NEW PROJECT FAA Manassas Airport 17-061F Subject:

Date: Friday, May 19, 2017 10:05:00 AM

Project Name: Manassas Regional Airport West Corporate Development and East Parcel

Development Project #: 17-061F UPC#: N/A

Location: City of Manassas, Prince William County

VDH – Office of Drinking Water has reviewed the above project. Below are our comments as they relate to proximity to public drinking water sources (groundwater wells, springs and surface water intakes). Potential impacts to public water distribution systems or sanitary sewage collection systems must be verified by the local utility.

The following public groundwater wells are located within a 1 mile radius of the project site:

PWS ID			Facility
Number	City/County	System Name	Name
6153264	PRINCE WILLIAM	BROAD RUN GOLF	WELL
6153041	PRINCE WILLIAM	BRISTOW MANOR GOLF CLUB	WELL

There are no surface water intakes located within a 5 mile radius of the project site.

The project is within the watershed of the following public surface water sources:

PWS ID		
Number	System Name	Facility Name
6059501	FAIRFAX CO WATER AUTHORITY	OCCOQUAN RESERVIOR INTAKE

· Comments from OEHS Division of Shellfish Sanitation, Mr. Eric Aschenbach, "We do not have any comments on the project."

Best Management Practices should be employed, including Erosion & Sedimentation Controls and Spill Prevention Controls & Countermeasures on the project site.

Materials should be managed while on site and during transport to prevent impacts to nearby surface water.

Best Regards,

Arlene Fields Warren GIS Program Support Technician Office of Drinking Water Virginia Department of Health 109 Governor Street

# Responses to Letter 1: Commonwealth of Virginia Department of Environmental Quality (Febrary 28, 2018)

- **1:** Section 5.11.3.2 of the Draft EA and Final EA describes that a Joint Permit is likely to be required for the Proposed Action, and that the City would coordinate with the USACE, VDEQ, and Virginia Marine Resources Commission regarding this permit.
- 2: The implementation of various best management practices during construction and operation of the Proposed Action, as described throughout Chapter 5 of the Draft EA and Final EA, would minimize impacts to surface waters. Additionally, coordination with the USACE regarding the Proposed Action and potential wetland impacts has occurred (see Section 5.11.3.2 of the Draft EA and Final EA). As Section 5.11.3.2 of the Draft EA and Final EA states, the City would coordinate with the USACE, VDEQ, and Virginia Marine Resources Commission during the design phase of the Proposed Action to determine the appropriate permit(s) and mitigation measures for the Proposed Action. No changes were made to the document.
- **3:** Recommendations 1, 2, 3, and 7 have been added to Section 5.11.3.2 of the Final EA. The Proposed Action would not temporarily affect any wetlands; therefore, recommendations 4, 5, and 6 are not applicable to the Proposed Action. In addition, Section 5.11.3.2 of the Draft and Final EA discusses measures that could be used to prevent spills of fuels or lubricants (recommendation 8); therefore, no additional information has been added regarding recommendation 8.
- **4:** Section 5.11.3.2 of the Draft EA and Final EA describes that a Joint Permit is likely to be required for the Proposed Action, and that the City would coordinate with the USACE, VDEQ, and Virginia Marine Resources Commission regarding this permit.
- **5:** Section 5.11.3.2 of the Draft EA and Final EA describes that a Joint Permit is likely to be required for the Proposed Action, and that the City would coordinate with the USACE, VDEQ, and Virginia Marine Resources Commission regarding this permit.
- **6:** Section 5.11.3.2 of the Draft EA and Final EA describes that the Proposed Action would comply with *Virginia's Erosion and Sediment Control Law* and that the City would ensure a project-specific erosion and sediment control plan is submitted to the City and County for review prior to the start of ground disturbing activities associated with the Proposed Action.
- **7:** The City acknowledges that the locality may request that the Proposed Action meet local Stormwater Management Plan requirements.
- **8:** Section 5.11.3.2 of the Draft EA and Final EA describes that the City would register for coverage under the Virginia Stormwater Management Program General Permit for Discharges of Stormwater from Construction Activities and would amend the Airport's VPDES Industrial Stormwater General Permit (VAR050985) for stormwater discharges associated with industrial activities. This update includes updating the Airport's SWPPP.

- **9:** Section 5.11.3.2 of the Draft EA and Final EA describes that the City could consider utilizing permeable paving for walkways and parking areas, where appropriate, to reduce potential stormwater runoff effects.
- **10:** Section 4.1 of Draft EA and Final EA describes that the project study area is in a nonattainment are for ozone and is an emission control area for oxides of nitrogen and VOCs.
- **11:** Section 5.1.3.3 of the Draft EA and Final EA describes that construction contractor would conduct construction activities, in accordance with 9 VAC 5-50-60 *et seq.* of the *Regulations for the Control and Abatement of Air Pollution* and FAA AC 150/5370-10G, *Standards for Specifying Construction of Airports* and describes that other BMPs could be used during construction, which would help to reduce the emissions of VOCs and NO<sub>x</sub>.
- **12:** Section 5.1.3.3 of the Draft EA and Final EA describes the control measures that the selected construction contractor may use to minimize fugitive dust emission.
- **13:** Section 5.1.3.3 of the Draft EA and Final EA describes that if open burning or use of special incineration devices were determined to be necessary, the activity would meet the requirements under 9 VAC 5-130-10 through 9 VAC 130-60 and 9 VAC 5-130-100 of the *Regulations for Open Burning*.
- **14:** Section 5.1.3.2 of the Draft EA and Final EA describes that the City would ensure that the installation of a generator(s) complies with 9 VAC 5-80, Article 6, Permits for New and Modified Sources.
- **15:** Section 5.1.3.3 of the Draft EA and Final EA describes that the City would ensure the selected construction contractor is aware of 9 VAC 5-45-780 *et seq.*, including the limitations on the use of "cut back," that asphalt must be emulsified except when specific circumstances apply, and the time-of-year restrictions on the use of asphalt.
- **16:** Section 4.6 of the Draft EA and Final EA describes that a physical inspection of the survey area was conducted in 2016, as well as an Environmental Phase I report. The information from the physical inspection and Environmental Phase I report are included in Appendix C of the Draft EA and Final EA. The hazardous waste/RCRA facilities listed in comment 16 are outside of the project study area for this EA and would not be affected by the Proposed Action. In addition, the petroleum release sites identified in comment 16 have a "closed" status.
- **17:** Section 5.6.3.2 of the Draft EA and Final EA describes that construction would not occur at sites known or suspected to be contaminated. Language regarding the characterization of construction and demolition debris prior to disposal has been added to the first paragraph of Section 5.6.3.2 in the Final EA.
- **18:** Language regarding the unlikely discovery of a petroleum release and use of temporary above ground fuel storage has been added to Section 5.6.3.2, paragraph 2, of the Final EA.

- **19:** Section 5.6.3.2 of the Draft EA and Final EA describes that all structures being demolished/renovated/removed would be checked for, and cleared of, asbestos-containing materials and lead-based paint prior to demolition/renovation/removal.
- **20:** Section 5.6.3.2 of the Draft EA and Final EA describes the potential for the reuse and/or recycling of waste. The response to Comment 16 answers the portion of Comment 20 that relates to petroleum release sites.
- **21:** Section 4.2 of the Draft EA and Final EA describes the biodiversity ranking of Broad Run, as well as the natural heritage resources associated with the area.
- **22:** Section 5.2.3.2 of the Draft EA and Final EA includes this finding regarding state-listed plant and insect species.
- **23:** The City acknowledges that there are no State Natural Area Preserves under DCR's jurisdiction near the Proposed Action.
- **24:** Section 5.2.3.3 of the Draft EA and Final EA includes a description of the best management practices that the selected construction contractor may implement during construction of the Proposed Action.
- **25:** Section 5.7.3.2 of the Draft EA and Final EA describes VDHR's finding.
- **26:** Sections 5.7.3.2 and 5.7.3.3 of the Draft EA and Final EA describe that protective measures would be utilized during construction for site 44PW0729.
- **27:** The City acknowledges that the DOAV finds the Proposed Action consistent with the approved ALP for the Airport.
- 28: The listed recommendations have been added to Section 5.6.3.3 of the Final EA.
- **29:** Text regarding the use of pesticides and herbicides has been added to Section 5.6.3.2, paragraph 4, of the Final EA.
- **30:** Section 4.4 of the Draft EA and Final EA describes that the City of Manassas is not subject to the Chesapeake Bay Preservation Act or Regulations, and, therefore, the West Corporate Development portion of the Proposed Action is not subject to review for Chesapeake Bay Preservation Act compliance.
- **31:** Section 4.4 of the Draft EA and Final EA describes that the East Parcel Development portion of the Proposed Action is within Prince William County, which is subject to review for the Chesapeake Bay Preservation Act compliance. Section 5.4.3.2 describes that the proposed realignment of Wakeman Drive would occur within the Cannon Branch RPA.

- **32:** Language regarding the Chesapeake Bay Preservation Act and Water Quality Impact Assessment from Comment 32 has been added to Section 5.4.3.2, paragraph 1, of the Final EA.
- **33:** Language regarding the Water Quality Impact Assessment for the proposed realignment of Wakeman Drive has been added to Section 5.4.3.2, paragraph 2 of the Final EA.
- **34:** Language specific to public water supplies has been added to Section 5.11.3.2, under the surface water subsection, of the Final EA.
- **35:** Section 4.11 of the Draft EA and Final EA describes the two public groundwater wells that are within one mile of the project study area.
- **36:** Sections 5.2.3.3, 5.11.3.2, and 5.11.3.3 of the Draft EA and Final EA describe that erosion and sediment controls would be in place during construction. Section 5.11.3.2 of the Draft EA and Final EA also describes the various BMPs that the selected construction contractor may use during construction to reduce the potential effects to surface waters.
- **37:** Language specific to public water supplies has been added to Section 5.11.3.2, under the surface water subsection, of the Final EA.
- **38:** Section 5.11.3.2 of the Draft EA and Final EA describes that a Joint Permit is likely to be required for the Proposed Action, and that the City would coordinate with the USACE, VDEQ, and Virginia Marine Resources Commission regarding this permit.
- **39:** Section 5.11.3.2 of the Draft EA and Final EA describes that the Proposed Action would comply with *Virginia's Erosion and Sediment Control Law* and that the City would ensure a project-specific erosion and sediment control plan is submitted to the City and County for review prior to the start of ground disturbing activities associated with the Proposed Action.
- **40:** Section 5.11.3.2 describes that the City would register for coverage under the Virginia Stormwater Management Program General Permit for Discharges of Stormwater from Construction Activities (9 VAC 25-870-1 *et seq.*) and would amend the Airport's VPDES Industrial Stormwater General Permit (VAR050985) for stormwater discharges associated with industrial activities.
- **41:** Section 5.1.3.3 of the Draft EA and Final EA describes the state air pollution regulations that may apply to the Proposed Action.
- **42:** Section 5.6.3.2 of the Draft EA and Final EA describes that waste would be managed in accordance with applicable federal, state, and local environmental regulations. In addition, language regarding the unlikely discovery of a petroleum release and use of temporary above ground fuel storage has been added to Section 5.6.3.2, paragraph 2, of the Final EA.

- **43:** Section 5.6.3.2 of the Draft EA and Final EA describes that all structures being demolished/renovated/removed would be checked for, and cleared of, asbestos-containing materials and lead-based paint prior to demolition/renovation/removal.
- **44:** The City acknowledges that the construction and operation of the Proposed Action must comply with the U.S. Department of Labor, Occupational Safety and Health Administration regulations, and with the Virginia Lead-Based Paint Activities Rules and Regulations, as applicable.
- **45:** The City would contact the VDCR to secure updated information on natural heritage resources if the scope of the project changes and/or six months has passed before the project is implemented.
- **46:** As Section 5.4.3.2 of the Draft EA and Final EA describes, the City would ensure that the Proposed Action is consistent with the enforceable policies of the VCP to the maximum extent practicable.
- **47:** The City will coordinate with VDHR regarding the protective measures for site 44PW0729, as necessary.
- **48:** Section 5.11.3.2 of the Final EA describes that the extension of utilities, including water and sewer lines, associated with the Proposed Action would be coordinated with, and verified by, the local utility entities.
- **49:** See responses to Comments 10 through 15.
- **50:** See responses to Comments 16 through 20.
- **51:** See responses to Comments 1 through 6, 8, 12, 13, 39, 40, and 42.
- **52:** See responses to Comments 21 through 26 and 45.
- 53: See responses to Comments 25, 26, and 47.
- **54:** See response to Comment 27.
- **55:** See responses to Comments 30 through 33, and 46.
- **56:** See responses to Comments 34 through 37, and 48.



#### UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION III 1650 Arch Street Philadelphia, Pennsylvania 19103-2029

March 1, 2018

Ms. Susan Stafford Federal Aviation Administration Beckley Airports District Office 176 Airport Circle; Room 101 Beaver, West Virginia 25813-9350

Subject: Draft Environmental Assessment for the West Corporate Development and East Parcel Development at the Manassas Regional Airport in Manassas, Virginia January 2018

Dear Ms. Stafford:

In accordance with the National Environmental Policy Act (NEPA), Section 309 of the Clean Air Act, and the Council on Environmental Quality regulations 40 CFR Parts 1500-1508, the United States Environmental Protection Agency (EPA), has reviewed the Draft Environmental Assessment (EA) for the West Corporate Development and East Parcel Development at Manassas Regional Airport in the City of Manassas, Virginia. The EA discusses the Proposed Action, which includes development of corporate hangars, t-hangars, apron expansion, maintenance and storage building, wash rack, road improvements, and extension of utilities and security fence. The EA states that the purpose of the Proposed Action is to meet the need to develop and maintain safe and modern facilities and the need to improve the Airport's ability to be financially self-sustaining.

The Proposed Action could potentially affect 1.62 acres of palustrine emergent and palustrine forested wetlands on the west side of the Airport. The EA explains that 1.60 acres of forested wetland impacts would be to meet floodplain mitigation requirements. While we understand the constraints at the Airport, we encourage the project team to continue efforts to avoid and minimize impacts to aquatic resources. Please see the attached technical enclosure for detailed comments.

Thank you for the opportunity to provide comments on this EA. For any questions or assistance EPA can provide, please contact Ms. Barbara Okorn (okorn.barbara@epa.gov, 215-814-3330).

Sincerely,

Barbara Rudnick NEPA Team Leader

Office of Environmental Programs

Enclosure

#### **Technical Comments**

Draft EA for the West Corporate Development and East Parcel Development at the Manassas Regional Airport

- An overview map of the entire airport, including labelling for roads, would be helpful to documentation in the EA. Figure 1-2 does not indicate the names of roads referenced in the text. Page 2-1 states that Piper Lane and Observation Road are within the Broad Run floodway and 100-year floodplain and indicates Wakeman Drive separates the east parcel of the airport. We recommend the document clarify the location of the roads in relation to each other and impacts associated with the improvements. The EA states that Wakeman Drive is a public roadway; please clarify if Piper Lane and Observation Road are also public.
- We suggest that additional clarification related to purpose and need would provide a more informative NEPA document. As presented, the purpose and needs section may be confusing to the reader. This section identifies two needs for the Proposed Action in Section 2.1 but introduces additional needs in Section 2.1.1, as a result of the Airport's Master Plan Updates and the 2032 Comprehensive Plan Manassas Next. The needs should be clearly explained and presented in the EA to ensure that alternatives can be discussed and evaluated in regard to addressing need.
- We suggest that the EA discuss any coordination with local, state, or public entities that may be necessary during the proposed road improvements.
  - Page 4-8 states that there is the potential for three federally listed species to occur in the area, but none were observed during field surveys. Page 5-5 states that Virginia Department of Game and Inland Fisheries did not indicate that wildlife or threatened and endangered species would be affected by the Proposed Action. The project team should continue coordination with the state and federal agencies to ensure that the conclusions related to potential project impacts in this EA are supported. It would be helpful if the document indicated qualifications of the personnel participating in the surveys and protocols followed.
  - The EA states that the project is in the floodplain of Broad Run. We recommend the EA discuss, and the design of the proposed alternative accommodate, extreme weather events.
    - Stormwater management should not be placed in waters of the US. In addition, we recommend the EA address stormwater management and spill containment on an airport-wide basis. Explanation of the purpose of the wash rack and handling of liquids there would also be important to the EA. The proposed project would permanently increase the amount of impervious surface by 25 acres, which would increase the volume stormwater runoff in the area. To control this increase stormwater runoff volume, it is proposed to construct on-site detention facilities. While detention facilities can control peak flows at the airport, these discharges can lead to downstream flooding problems. To reduce the runoff volume and improve water quality, EPA recommends where possible the incorporation of Low Impact Development (LID) design features into the overall project stormwater management including redevelopment of the existing airport facilities. The Virginia Stormwater Management Handbook provides guidance on the function and application of LIDs for stormwater management.
    - We suggest LID options be considered for design of other features such as parking, paving, and landscaping. Technical guidance in implementing green infrastructure practices can be found at:

2

1

4

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### Letter 2 Continued (Page 3/3)

# 7 (continued)

https://19january2017snapshot.epa.gov/sites/production/files/2015-09/documents/eisa-438.pdf. For these measures to be effective, they should be incorporated early in the design phase of the project. Other information can be found at: U.S. EPA's Low Impact Development Website: <a href="https://www.epa.gov/nps/lid">www.epa.gov/nps/lid</a>; U.S. EPA's Smart Growth Website: <a href="https://www.epa.gov/smartgrowth">www.epa.gov/smartgrowth</a>; and the International Stormwater BMP Database: <a href="https://www.bmpdatabase.org">http://www.bmpdatabase.org</a>

8

We recommend a discussion of wetland function be provided in the EA. As the project area is
prone to flooding, these wetlands may provide an important ecosystem service to buffer high
water conditions. The EA states that the project would impact wetlands. All efforts should be
made to avoid and minimize these impacts.

9

- We suggest the secondary and cumulative impacts section analyze the potential effects of the
  loss of the wetland functions in the watershed. As stated above, further avoidance and
  minimization of impacts to aquatic resources should be evaluated. Selection of appropriate
  mitigation should consider loss of these functions to the watershed.
- We suggest the EA discuss how any demolition material will be handled.

11

• We note that the proposed alternative does not trigger air thresholds for general conformity, though the project location does lie in a nonattainment areas for ozone and is a maintenance area for fine particulates (PM2.5). The study methodology averages annual construction and other direct/indirect emissions over the 5-year project life, rather than determining actual emissions for each year. Though not a concern for this project, we recommend future analysis provide yearly data.

12

The documentation of the MOVES model analysis to support air emissions estimates is limited.
Though not a concern for this project, we suggest future analysis include the MOVES files,
modeling assumptions, a project construction schedule with annual information, more detailed
annual breakdown of emissions and a construction equipment and activity list.

### Responses to Letter 2: U.S. Environmental Protection Agency (March 1, 2018)

- **1:** The roadway names have been added to Figures 1-2 and 1-3 in the Final EA. Clarification has been added that Observation Road and Piper Lane are public roadways (Section 2.1.1, paragraph 2, of the Final EA).
- **2:** Section 2.1 of the Draft EA and Final EA provides the reader an overview of the two purposes of the Proposed Action. Section 2.1.1 provides details on one purpose of the Proposed Action (i.e., to develop and maintain safe and modern facilities), while Section 2.1.2 provides details on the second purpose of the Proposed Action (i.e., to improve financial self-sustainability). With regards to Section 2.1.1, the West Corporate Redevelopment Study, Airport Master Plan Update, and 2032 Comprehensive Plan Manassas Next directly support the purpose and need to develop and maintain safe and modern facilities at the Airport. As such, the information in Section 2.1 is applicable to the more detailed description of the City's purpose and need for the Proposed Action.
- **3:** Coordination with the Virginia Department of Transportation is described in Section 5.9.3.2, paragraph 10, of the Draft EA and Final EA. Text describing that the City would coordinate with the appropriate local entities during the design and construction of the proposed roadway improvements has been added to Section 5.9.3.2, paragraph 10, of the Final EA.
- **4:** Coordination with the VDGIF and VDCR occurred throughout the preparation of the Draft and Final EA (see Appendices B and F of the Draft EA and Final EA). Appendix B of the Draft EA and Final EA includes the USFWS certification for the determination for federally-listed species as it related to the Proposed Action. The qualifications of the personnel involved in the field survey is included in Section 7.2.3 of the Draft and Final EA, with additional details regarding the individual's qualifications added to the Final EA. A description of the protocols followed during the survey has been added to the third paragraph of Section 4.2 of the Final EA.
- **5:** The floodplain analysis prepared for this EA follows the requirements and guidance of FAA Order 1050.1F and FAA Order 5050.4B. During design of the Proposed Action, the City may consider measures to accommodate extreme weather events.
- **6:** Stormwater management would not be placed in in Waters of the U.S. Sections 5.6.3.2 and 5.11.3.2 of the Draft EA and Final EA describes, in detail, that the City would be responsible for obtaining a VPDES construction permit prior to the start of ground disturbing activities. The permit includes the development of a SWPPP to address any hazardous material issues, as necessary, associated with the Proposed Action. Section 5.11.3.2 also describes that the City would meet VSMP requirements for water quality and that the City would amend the Airport's VPDES Industrial Stormwater General Permit for stormwater discharges associated with the Proposed Action, as necessary. The stormwater management associated with the Proposed Action would be designed in a manner that does not cause downstream flooding. The selected design contractor may consider Low Impact Development techniques in the design of the Proposed Action.

- **7:** The selected design contractor may consider Low Impact Development techniques in the design of the Proposed Action.
- **8:** Section 5.11.3.2 of the Draft EA and Final EA describes why the impact to 1.62 acres of wetlands cannot be avoided. A discussion of the wetlands' functions has been added to Section 4.11 of the Final EA. In addition, the wetland mitigation takes into consideration the function of the wetlands.
- **9:** The potential cumulative impacts associated with the loss of 1.62 acres of wetlands is described in Section 5.12.3.2 of the Draft EA and Final EA. In addition, Section 5.11.3.2 of the Draft EA and Final EA describes why the impact to 1.62 acres of wetlands cannot be avoided, and that the wetland mitigation would take into consideration the function of the wetland being affected. Language further explaining this loss of wetland function has been added to Section 5.11.3.2 of the Final EA.
- 10: Section 5.6.3.2 of the Draft and Final EA describes how demolition material would be handled.
- **11:** The City acknowledges the USEPA's recommendation to provide yearly air quality emissions in future analyses.
- **12:** Appendix G of the Draft EA and Final EA provides the MOVES model analysis files for the analysis related to the Proposed Action.

#### Heath, Natalie

From: Howard, Janine (DEQ) < Janine. Howard@deq. virginia.gov>

Sent: Monday, March 05, 2018 8:22 AM

To: Heath, Natalie
Cc: Ewing, Amy (DGIF)

Subject: FW: ESSLog# 38126\_18-022F\_Manassas\_DGIF\_AME20180302

Good Morning Natalie,

I am passing on the below comments from DGIF on the Manassas airport project. They were received after we submitted our comments on the draft EA and therefore were not included. Please take them into consideration and forward them on to your client.

Thank you,

Janine Howard

Environmental Impact Review Coordinator Office of Environmental Impact Review Virginia Department of Environmental Quality

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#### **DEQ Mailing Address:**

Post Office Box 1105 Richmond, Virginia 23218

From: Ewing, Amy (DGIF)

Sent: Friday, March 02, 2018 4:51 PM

**To:** Howard, Janine (DEQ) **Cc:** nhreview (DCR)

Subject: ESSLog# 38126\_18-022F\_Manassas\_DGIF\_AME20180302

- Broad Run, which borders the airport on the southern side, is designated a Threatened and Endangered Species Water due to the presence of state Endangered brook floaters. It does not appear any instream work is proposed in which case we do not anticipate this project to result in significant adverse impacts upon this species. If instream work becomes necessary, we recommend additional coordination with us.
- This project is located within 2 miles of a documented occurrence of a state or federal threatened or endangered plant or insect species and/or other Natural Heritage coordination species. Therefore, we recommend coordination with VDCR-DNH regarding the protection of these resources.
- We recommend coordination with the USFWS regarding potential impacts upon federally Threatened northern long-eared bats associated with tree removal.

To minimize the adverse impacts of linear utility/road project development on wildlife resources, we offer the following general recommendations: avoid and minimize impacts to undisturbed forest, wetlands, and streams to the fullest extent practicable; maintain naturally vegetated buffers of at least 100 feet in width around wetlands and on both sides of perennial and intermittent streams, where practicable; conduct significant tree removal and ground clearing activities outside of the primary songbird nesting season of March 15 through August 15; and, implement and maintain appropriate erosion and sediment controls throughout project construction and site restoration. We understand that adherence to these general recommendations may be infeasible in some situations. We are happy to work with the applicant to develop project-specific measures as necessary to minimize project impacts upon the Commonwealth's wildlife resources.

Assuming adherence to erosion and sediment controls, we find this project consistent with the Fisheries Management Section of the CZMA.

Thanks, Amy

# Amy M. Ewing

Environmental Services Biologist

Manager, Fish & Wildlife Information Services

VA Dept. of Game and Inland Fisheries

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"That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics" Allo Leopolt, 1948



# Responses to Letter 3: Virginia Department of Game and Inland Fisheries (March 2, 2018)

- **1:** Section 4.2 of the Draft EA and Final EA describes the designation of Broad Run. No instream work is required as part of the Proposed Action.
- **2:** The City has coordinated with VDCR regarding the Proposed Action (see Appendices B and F of the Draft EA and Final EA, and Appendix I of the Final EA).
- **3:** The City has coordinated with USFWS regarding the Proposed Action (see Appendix B of the Draft EA and Final EA).
- 4: The recommendations provided are included in Section 5.2.3.3 of the Draft EA and Final EA.
- **5:** The determination regarding the Proposed Action's consistency with the Virginia Coastal Zone Management Program is described in Section 5.4.3.2 of the Draft EA and Final EA, as well Appendix F of the Draft and Final EA.