Appendix A:

Public Involvement

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SCOPING NEWSLETTER

Chesapeake and Ohio Canal National Historical Park

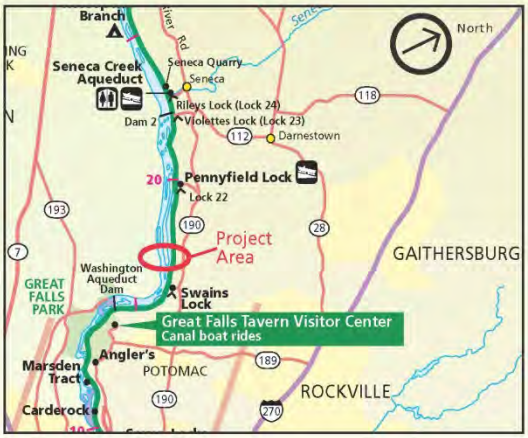
Proposed Offshore Submerged Channel Intake for
Washington Suburban Sanitary Commission
Potomac Water Filtration Plant

National Park Service
U.S. Department of the Interior

Project Description

The Washington Suburban Sanitary Commission (WSSC) is proposing to construct an offshore submerged channel intake for water supply at the Potomac Water Filtration Plant (WFP). Some components of the Potomac WFP are located within the Chesapeake and Ohio Canal National Historical Park (C&O Canal NHP) and therefore WSSC will be seeking a construction Special Use Permit from the National Park Service (NPS). The NPS is initiating an Environmental Assessment (EA) to evaluate WSSC's proposal and to identify and evaluate the impacts to Park resources prior to the issuance of a construction Special Use Permit.

The Potomac WFP is located in Montgomery County, Maryland near mile marker 17 of the Park's towpath. The proposed project would include the construction of an intake for water supply in the Potomac River channel; a tunnel or trench conduit system to connect the new intake to the existing onshore water filtration plant; and a new boat ramp to provide access to the new intake for maintenance and emergency rescue activities. In addition, a land exchange between the NPS and WSSC would occur for lands affected by the project. An EA is being prepared to evaluate potential impacts of the proposed project to the natural, cultural, and human environment, in accordance with the National Environmental Policy Act (NEPA).



Impact Topics

Potential impacts to natural, cultural, and socioeconomic resources associated with the submerged channel intake have been identified and are listed below. Decisions regarding the anticipated impacts are subject to change as the planning process continues.

- Air Quality
- Geology and Soils
- Noise
- Water Resources
- Wetlands
- Wildlife and Aquatic Life
- Rare, Threatened, and Endangered Species
- Cultural Resources
- Socioeconomics
- Visitor Use and Experience
- Park Operations

Purpose and Need For Action

The Potomac WFP treats and distributes water to more than one million people throughout Montgomery and Prince George's counties. The purpose of the new submerged channel intake is to provide a consistently higher quality raw water source for the WFP than can be achieved using the existing onshore intake. The local tributary inflows, approximately 0.25 miles upstream of the Potomac WFP intake on the north bank of the Potomac River, have been identified as having a significant negative impact on raw water quality and treatment plant operation during local storm events. Storm flows from the largely urbanized portion of Rockville and surrounding areas drain into the local tributary (Watts Branch), and these localized high flows cause rapid negative changes in raw water quality including increases in suspended solids, fecal coliforms, and decreases in pH and alkalinity. These changes in water quality increase the challenge and cost for the plant to maintain its excellent finished water quality. The construction of an additional intake would also provide redundancy which would improve reliability as the existing intake occasionally is subject to blockage from debris and ice.

An offshore intake would, therefore, benefit public health by improving the consistency and quality of the raw water source for the Potomac WFP as well as the reliability of the WFP. It would also decrease costs for treatment and residuals handling from the plant by decreasing the solids loading to the WFP.


Downstream of the Existing Intake

United States Department of the Interior
Chesapeake and Ohio Canal National Historical Park
1850 Dual Highway, Suite 100
Hagerstown, MD 21740

Official Business
Penalty for Private Use $300

FIRST CLASS MAIL
POSTAGE & FEES PAID
NATIONAL PARK SERVICE
PERMIT NO. G-83

Chesapeake and Ohio Canal National Historical Park

District of Columbia, Maryland, and West Virginia

July 2013

National Park Service
U.S. Department of the Interior

Scoping for the Proposed Offshore Submerged Channel Intake Open for Public Comment

The National Park Service (NPS) announces a 30-day public comment period to solicit public comments for the proposed offshore submerged channel intake. During this scoping period, the public is invited to identify any issues or concerns they may have with the proposed project so that NPS can appropriately consider them in the EA. Public comment will be accepted through August 18, 2013. You may provide comments in any of the following ways:

- Attend the public open house meeting on August 1, 2013;
- Comment online at http://parkplanning.nps.gov; or
- Mail comments to:
  Simon Baidoo, Project Manager,
  Washington Suburban Sanitary Commission,
  14501 Sweitzer Lane
  Laurel, Maryland 20707.

Public Meeting
Thursday , August 1, 2013
6:00 - 8:00 pm
Potomac Elementary School
10311 River Road
Potomac, Maryland, 20854

The meeting will consist of an open house format to provide you with opportunities to discuss your interests and concerns with NPS staff.

Please be aware that your entire comment, including your personal identifying information, may be publically available at any time. Although you may request in your comment that we withhold your personal information from public review, we cannot guarantee that we will be able to do so.

Once the EA is developed, it will be made available for a 30 day public review period.

Printed on Recycled Paper

PRESS RELEASE

National Park Service
U.S. Department of the Interior
Chesapeake and Ohio Canal National Historical Park

Chesapeake and Ohio Canal National Historical Park
News Release – July 19, 2013

Proposed Offshore Submerged Channel Intake for Washington Suburban Sanitary Commission

The Washington Suburban Sanitary Commission (WSSC) is proposing to construct an offshore submerged channel intake for water supply at the Potomac Water Filtration Plant (WFP). Some components of the Potomac WFP are located within the Chesapeake and Ohio Canal National Historical Park (C&O Canal NHP) and therefore WSSC will be seeking a construction Special Use Permit from the National Park Service (NPS). The NPS is initiating an Environmental Assessment (EA) to evaluate WSSC's proposal and to identify and evaluate the impacts to Park resources prior to the issuance of a construction Special Use Permit.

The Potomac WFP produces approximately three-quarters of the water used by 1.8 million customers in Montgomery and Prince George's Counties. WSSC is not seeking increased water withdrawals from the river, but is seeking higher quality source water from an alternate location. Previous studies recommend and support this evaluation of an alternate intake location. The current Potomac River raw water intake structure is adversely impacted by its location along the Potomac River shoreline. During local storm events, sediments in runoff from local tributary inflows – particularly from nearby Watts Branch – cause the source water quality to change dramatically and affect the water treatment plant operation. Water quality is cleaner and more stable in the middle of the Potomac River than at the intake along the shoreline during local storm events. The submerged intake would draw higher quality water from the middle of the river during these times.

A scoping newsletter has been prepared to solicit public comments on the proposed project. The scoping newsletter will be available on the National Park Service's Planning, Environment, and Public Comment (PEPC) website http://parkplanning.nps.gov. Under "Choose a Park" click on "Chesapeake and Ohio Canal National Historical Park" and follow the link to WSSC Submerged Channel Intake Environmental Assessment.

NPS and WSSC also invite you to attend a public meeting on Thursday, August 1, 2013 from 6:00 to 8:00 pm at Potomac Elementary School, 10311 River Road Potomac, Maryland, 20854. The meeting will consist of an open house format to provide you with opportunities to discuss your interests and concerns with NPS staff. Please send comments by August 18, 2013. Please be aware that your entire comment, including your personal identifying information, may be publically available at any time. Although you may request in your comment that we withhold your personal information from public review, we cannot guarantee that we will be able to do so.

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Appendix B:

Agency Consultation

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COOPERATING AGENCY LETTER

United States Department of the Interior

NATIONAL PARK SERVICE
C&O Canal National Historical Park
1850 Dual Highway, Suite 100
Hagerstown, Maryland 21740

IN REPLY REFER TO
10.B (Management)

July 18, 2013

Ms. Kathy Anderson
Chief, Maryland Section Southern
U.S. Army Corps of Engineers,
Baltimore District, Regulatory Branch
10 South Howard Street
Baltimore, MD21201

Dear Ms. Anderson:

The Chesapeake and Ohio Canal National Historical Park (C&O Canal) would like to invite the U.S. Army Corps of Engineers (ACOE) to participate as a cooperating agency in the National Park Service's environmental review of the proposed Potomac River Submerged Channel Intake Project.

As you are aware, pursuant to the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. 4332(2)(C), the National Park Service (NPS) is preparing an Environmental Assessment (EA) for the evaluation of a special use permit requested in relation to the proposed Potomac River Submerged Channel Intake Project. The applicant, Washington Suburban Sanitary Commission (WSSC), will be seeking project approvals from other respective federal and state resource and permitting agencies, including the Corps. No environmental permits from regulatory agencies have been issued to date.

As part of the NEPA process the NPS will seek consultation with the Corps, Baltimore District as a permitting agency in this process. WSSC will be required to seek permits from the Corps under Section 404 of the Clean Water Act.

The Council on Environmental Quality (CEQ) regulations addressing cooperating agencies status (40 C.F.R. §§ 1501.6 & 1508.5) implement the NEPA mandate that federal agencies responsible for preparing NEPA analyses and documentation do so "in cooperation with State and local governments" and other agencies with jurisdiction by law or special expertise (42 U.S.C. §§ 4331(a), 4332(2)). Because of your jurisdiction by law and expertise and local knowledge of the resources we request your participation as a cooperator in the development and review of the EA. We expect that coordination in this manner will result in improved understanding of each of our respective agency's roles and will result in the most informed decision for protecting and preserving the valuable natural, cultural, scenic and recreational resources of these resources.

As part of the project team, we welcome your participation in the planning and implementation of the upcoming scoping process. Additionally, the EA files will be available for your review as they are developed. We look forward to your response. If you have any questions please call John Hitchcock, compliance officer, at (301) 745-5817.

Sincerely,

For Kevin D. Brandt
Superintendent

AGENCY CONSULTATION LETTERS

EA Engineering, Science, and Technology, Inc.

225 Schilling Circle, Suite 400
Hunt Valley, MD 21031
Telephone: 410-584-7000
Fax: 410-771-1625
www.eaest.com

December 10, 2013

Cherry Keller
Endangered Species Program Leader
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401

RE: Washington Suburban Sanitary Commission Proposed Offshore Submerged Channel Intake

Dear Ms. Keller:

The Washington Suburban Sanitary Commission (WSSC) is proposing to construct an offshore submerged channel intake for water supply at the Potomac Water Filtration Plant (WFP). The Potomac WFP is located in Montgomery County, Maryland (Figure 1). Some components of the Potomac WFP are located within the Chesapeake and Ohio Canal National Historical Park; therefore, the National Park Service (NPS) is initiating an Environmental Assessment, in accordance with the National Environmental Policy Act, to evaluate WSSC's proposal and to identify and evaluate impacts to park resources. The project will also require a permit from the Corps of Engineers (USACE), as such, USACE is serving as a cooperating agency for this environmental assessment.

The proposed project would include the construction of an intake for water supply in the Potomac River channel; a tunnel trench conduit system to connect the new intake to the existing onshore water filtration plant; and a new boat ramp to provide access to the new intake for maintenance and emergency rescue activities. In addition, a land exchange between the NPS and WSSC would occur for lands affected by the project.

The purpose of the new submerged channel intake is to provide a consistently higher quality raw water source for the Potomac WFP than can be achieved using the existing onshore intake. Currently, a local tributary inflows, approximately 0.25 miles upstream of the Potomac WFP intake on the north bank of the Potomac River, have been identified as having a significant negative impact on raw water quality and treatment plant operation during local storm events. These high flows have caused rapid negative changes in raw water quality including increases in suspended solids, fecal coliforms, and decreases in pH and alkalinity. These changes in water quality increase the challenge and cost for the plant to maintain its excellent finished water quality. The construction of an additional intake would also provide redundancy which would improve reliability as the existing intake occasionally is subject to blockage from debris and ice.

In accordance with Section 7 of the Endangered Species Act, we are informing you of this proposed project to request consultation on data you have on the proposed or listed species or their critical habitat that could potentially be affected by this project and request your comments on the proposed action.

Your response within 30 days from the date of receipt of this letter would be greatly appreciated.

Please forward written comments to me at the address above in the letterhead. Thank you for your assistance with this project. If you have any questions, please contact me at 410-329-5143.

Sincerely yours,

Suzanne E Boltz

Suzanne Boltz
Project Manager
EA Engineering, Science, and Technology

cc:
Chris Stubbs, C & O Canal National Historical Park
Vera Koskelo, Baltimore District, Corps of Engineers
Simon Baidoo, Washington Suburban Sanitary Commission

EA Engineering, Science, and Technology, Inc.

225 Schilling Circle, Suite 400
Hunt Valley, MD 21031
Telephone: 410-584-7000
Fax: 410-771-1625
www.eaest.com

December 10, 2013

Genevieve LaRouche
Field Supervisor
Chesapeake Bay Field Office
U.S. Fish & Wildlife Service
177 Admiral Cochrane Drive
Annapolis, MD 21401

RE: Washington Suburban Sanitary Commission Proposed Offshore Submerged Channel Intake

Dear Mr. Smith:

The Washington Suburban Sanitary Commission (WSSC) is proposing to construct an offshore submerged channel intake for water supply at the Potomac Water Filtration Plant (WFP). The Potomac WFP is located in Montgomery County, Maryland (Figure 1). Some components of the Potomac WFP are located within the Chesapeake and Ohio Canal National Historical Park; therefore, the National Park Service (NPS) is initiating an Environmental Assessment, in accordance with the National Environmental Policy Act, to evaluate WSSC's proposal and to identify and evaluate impacts to park resources. The project will also require a permit from the Corps of Engineers (USACE), as such, USACE is serving as a cooperating agency for this environmental assessment.

The proposed project would include the construction of an intake for water supply in the Potomac River channel; a tunnel trench conduit system to connect the new intake to the existing onshore water filtration plant; and a new boat ramp to provide access to the new intake for maintenance and emergency rescue activities. In addition, a land exchange between the NPS and WSSC would occur for lands affected by the project.

The purpose of the new submerged channel intake is to provide a consistently higher quality raw water source for the Potomac WFP than can be achieved using the existing onshore intake. Currently, a local tributary inflows, approximately 0.25 miles upstream of the Potomac WFP intake on the north bank of the Potomac River, have been identified as having a significant negative impact on raw water quality and treatment plant operation during local storm events. These high flows have caused rapid negative changes in raw water quality including increases in suspended solids, fecal coliforms, and decreases in pH and alkalinity. These changes in water quality increase the challenge and cost for the plant to maintain its excellent finished water quality. The construction of an additional intake would also provide redundancy which would improve reliability as the existing intake occasionally is subject to blockage from debris and ice.

In accordance with Section 7 of the Endangered Species Act, we are informing you of this proposed project to request consultation on data you have on the proposed or listed species or their critical habitat that could potentially be affected by this project and request your comments on the proposed action.

Your response within 30 days from the date of receipt of this letter would be greatly appreciated.

Please forward written comments to me at the address above in the letterhead. Thank you for your assistance with this project. If you have any questions, please contact me at 410-329-5143.

Sincerely yours,

Suzanne E Boltz

Suzanne Boltz
Project Manager
EA Engineering, Science, and Technology

cc:
Chris Stubbs, C & O Canal National Historical Park
Vera Koskelo, Baltimore District, Corps of Engineers
Simon Baidoo, Washington Suburban Sanitary Commission

EA Engineering, Science, and Technology, Inc.

225 Schilling Circle, Suite 400
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Telephone: 410-584-7000
Fax: 410-771-1625
www.eaest.com

December 10, 2013

Gary Setzer, Program Manager
Maryland Department of the Environment
Wetlands and Waterways Construction Program
1800 Washington Boulevard
Baltimore, Maryland 21230

RE: Washington Suburban Sanitary Commission Proposed Offshore Submerged Channel Intake

Dear Mr. Setzer:

The Washington Suburban Sanitary Commission (WSSC) is proposing to construct an offshore submerged channel intake for water supply at the Potomac Water Filtration Plant (WFP). The Potomac WFP is located in Montgomery County, Maryland (Figure 1). Some components of the Potomac WFP are located within the Chesapeake and Ohio Canal National Historical Park; therefore, the National Park Service (NPS) is initiating an Environmental Assessment, in accordance with the National Environmental Policy Act (NEPA), to evaluate WSSC's proposal and to identify and evaluate impacts to park resources.

The proposed project would include the construction of an intake for water supply in the Potomac River channel; a tunnel trench conduit system to connect the new intake to the existing onshore water filtration plant; and a new boat ramp to provide access to the new intake for maintenance and emergency rescue activities. In addition, a land exchange between the NPS and WSSC would occur for lands affected by the project.

The purpose of the new submerged channel intake is to provide a consistently higher quality raw water source for the Potomac WFP than can be achieved using the existing onshore intake. Currently, a local tributary inflows, approximately 0.25 miles upstream of the Potomac WFP intake on the north bank of the Potomac River, have been identified as having a significant negative impact on raw water quality and treatment plant operation during local storm events. These high flows have caused rapid negative changes in raw water quality including increases in suspended solids, fecal coliforms, and decreases in pH and alkalinity. These changes in water quality increase the challenge and cost for the plant to maintain its excellent finished water quality. The construction of an additional intake would also provide redundancy which would improve reliability as the existing intake occasionally is subject to blockage from debris and ice.

As part of the NEPA process, we are requesting consultation with your division for this project. WSSC is proposing a new intake, resulting in potential impacts to wetlands, and construction in a waterway. It is important to note that the withdrawal of water will remain the same, no request for additional withdrawal is being made.

Your response within 30 days from the date of receipt of this letter would be greatly appreciated. Please forward written comments to me at the address above. Thank you for your assistance with this project. If you have any questions, please contact me at 410-329-5143.

Sincerely yours,

Suzanne E Boltz

Suzanne Boltz
Project Manager
EA Engineering, Science, and Technology

cc:
Chris Stubbs, C & O Canal National Historical Park
Vera Koskelo, Baltimore District, Corps of Engineers
Simon Baidoo, Washington Suburban Sanitary Commission

EA Engineering, Science, and Technology, Inc.

225 Schilling Circle, Suite 400
Hunt Valley, MD 21031
Telephone: 410-584-7000
Fax: 410-771-1625
www.eaest.com

December 10, 2013

Maryland Department of Natural Resources
Project Review Division
Integrated Policy and Review Unit
Tawes State Office Building
580 Taylor Avenue
Annapolis, Maryland 21401
ATTN: Greg Golden

RE: Washington Suburban Sanitary Commission Proposed Offshore Submerged Channel Intake

Dear Mr. Golden:

The Washington Suburban Sanitary Commission (WSSC) is proposing to construct an offshore submerged channel intake for water supply at the Potomac Water Filtration Plant (WFP). The Potomac WFP is located in Montgomery County, Maryland (Figure 1). Some components of the Potomac WFP are located within the Chesapeake and Ohio Canal National Historical Park; therefore, the National Park Service (NPS) is initiating an Environmental Assessment, in accordance with the National Environmental Policy Act (NEPA), to evaluate WSSC's proposal and to identify and evaluate impacts to park resources.

The proposed project would include the construction of an intake for water supply in the Potomac River channel; a tunnel trench conduit system to connect the new intake to the existing onshore water filtration plant; and a new boat ramp to provide access to the new intake for maintenance and emergency rescue activities. In addition, a land exchange between the NPS and WSSC would occur for lands affected by the project.

The purpose of the new submerged channel intake is to provide a consistently higher quality raw water source for the Potomac WFP than can be achieved using the existing onshore intake. Currently, a local tributary inflows, approximately 0.25 miles upstream of the Potomac WFP intake on the north bank of the Potomac River, have been identified as having a significant negative impact on raw water quality and treatment plant operation during local storm events. These high flows have caused rapid negative changes in raw water quality including increases in suspended solids, fecal coliforms, and decreases in pH and alkalinity. These changes in water quality increase the challenge and cost for the plant to maintain its excellent finished water quality. The construction of an additional intake would also provide redundancy which would improve reliability as the existing intake occasionally is subject to blockage from debris and ice.

As part of the NEPA process, we are requesting consultation on fisheries resources concerns within the vicinity of the project site. We are also contacting the Maryland DNR Wildlife and Heritage Program for state and federally listed species, and the United States Fish and Wildlife Service for federally listed species.

Your response within 30 days from the date of receipt of this letter would be greatly appreciated. Please forward written comments to me at the address above. Thank you for your assistance with this project. If you have any questions, please contact me at 410-329-5143.

Sincerely yours,

Suzanne E Boltz

Suzanne Boltz
Project Manager
EA Engineering, Science, and Technology

cc:
Chris Stubbs, C & O Canal National Historical Park
Vera Koskelo, Baltimore District, Corps of Engineers
Simon Baidoo, Washington Suburban Sanitary Commission

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225 Schilling Circle, Suite 400
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Telephone: 410-584-7000
Fax: 410-771-1625
www.eaest.com

December 10, 2013

Lori A. Byrne
Environmental Review Specialist
Maryland Department of Natural Resources
Wildlife and Heritage Service
Tawes State Office Building
580 Taylor Avenue
Annapolis, Maryland 21401

RE: Washington Suburban Sanitary Commission Proposed Offshore Submerged Channel Intake

Dear Ms. Byrne:

The Washington Suburban Sanitary Commission (WSSC) is proposing to construct an offshore submerged channel intake for water supply at the Potomac Water Filtration Plant (WFP). The Potomac WFP is located in Montgomery County, Maryland (Figure 1). Some components of the Potomac WFP are located within the Chesapeake and Ohio Canal National Historical Park; therefore, the National Park Service (NPS) is initiating an Environmental Assessment, in accordance with the National Environmental Policy Act (NEPA), to evaluate WSSC's proposal and to identify and evaluate impacts to park resources.

The proposed project would include the construction of an intake for water supply in the Potomac River channel; a tunnel trench conduit system to connect the new intake to the existing onshore water filtration plant; and a new boat ramp to provide access to the new intake for maintenance and emergency rescue activities. In addition, a land exchange between the NPS and WSSC would occur for lands affected by the project.

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As part of the NEPA process, we are requesting consultation on State Rare, Threatened, and Endangered Species within the vicinity of the project site. We are also contacting the United States Fish and Wildlife Service for federally listed species.

Your response within 30 days from the date of receipt of this letter would be greatly appreciated. Please forward written comments to me at the address above. Thank you for your assistance with this project. If you have any questions, please contact me at 410-329-5143.

Sincerely yours,

Suzanne E Boltz

Suzanne Boltz
Project Manager
EA Engineering, Science, and Technology

cc:
Chris Stubbs, C & O Canal National Historical Park
Vera Koskelo, Baltimore District, Corps of Engineers
Simon Baidoo, Washington Suburban Sanitary Commission

EA Engineering, Science, and Technology, Inc.

225 Schilling Circle, Suite 400
Hunt Valley, MD 21031
Telephone: 410-584-7000
Fax: 410-771-1625
www.eaest.com

December 10, 2013

J. Rodney Little
State Historic Preservation Officer
Maryland Historical Trust
100 Community Place
Crownsville, Maryland 21035

RE: Washington Suburban Sanitary Commission Proposed Offshore Submerged Channel Intake

Dear Mr. Little:

The Washington Suburban Sanitary Commission (WSSC) is proposing to construct an offshore submerged channel intake for water supply at the Potomac Water Filtration Plant (WFP). The Potomac WFP is located in Montgomery County, Maryland (Figure 1). Some components of the Potomac WFP are located within the Chesapeake and Ohio Canal National Historical Park; therefore, the National Park Service (NPS) is initiating an Environmental Assessment, in accordance with the National Environmental Policy Act, to evaluate WSSC's proposal and to identify and evaluate impacts to park resources. The project will also require a permit from the Corps of Engineers (USACE), as such, USACE is serving as a cooperating agency for this environmental assessment.

The proposed project would include the construction of an intake for water supply in the Potomac River channel; a tunnel trench conduit system to connect the new intake to the existing onshore water filtration plant; and a new boat ramp to provide access to the new intake for maintenance and emergency rescue activities. In addition, a land exchange between the NPS and WSSC would occur for lands affected by the project.

The purpose of the new submerged channel intake is to provide a consistently higher quality raw water source for the Potomac WFP than can be achieved using the existing onshore intake. Currently, a local tributary inflows, approximately 0.25 miles upstream of the Potomac WFP intake on the north bank of the Potomac River, have been identified as having a significant negative impact on raw water quality and treatment plant operation during local storm events. These high flows have caused rapid negative changes in raw water quality including increases in suspended solids, fecal coliforms, and decreases in pH and alkalinity. These changes in water quality increase the challenge and cost for the plant to maintain its excellent finished water quality. The construction of an additional intake would also provide redundancy which would improve reliability as the existing intake occasionally is subject to blockage from debris and ice.

The purpose of this letter is to inform you of the proposed project, to request data or information you may have on resources potentially affected by the proposed project and comments on the proposed action.

Your response within 30 days from the date of receipt of this letter would be greatly appreciated. Please forward written comments to the address above. Thank you for your assistance with this project. If you have any questions, please contact me at 410-329-5143.

Sincerely yours,

Suzanne E Boltz

Suzanne Boltz
Project Manager
EA Engineering, Science, and Technology

cc:
Chris Stubbs, C & O Canal National Historical Park
Vera Koskelo, Baltimore District, Corps of Engineers
Simon Baidoo, Washington Suburban Sanitary Commission

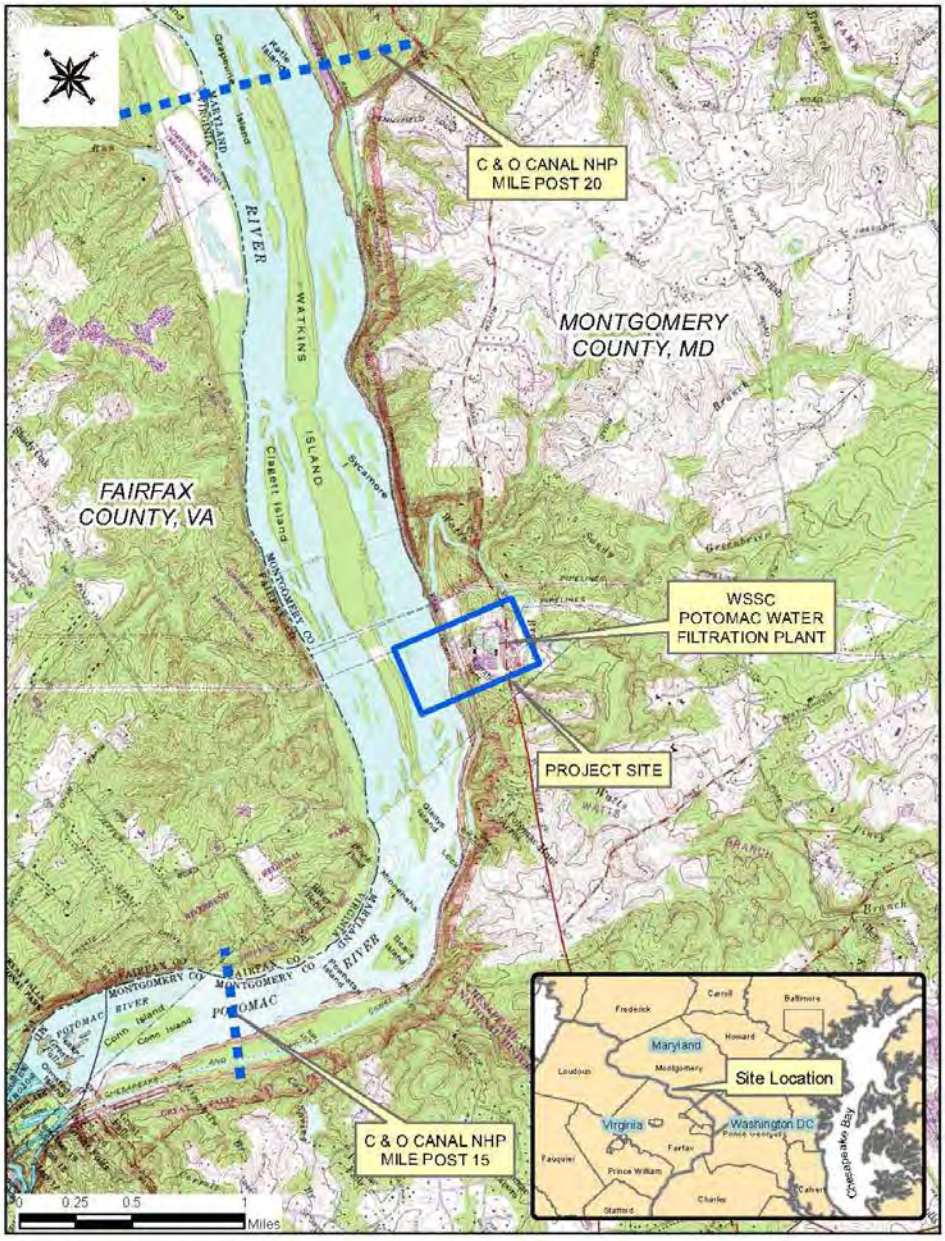

Figure 1 – Location of Project Site

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AGENCY RESPONSE LETTERS

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401
http://www.fws.gov/chesapeakebay

EA Engineering, Science, and Technology, Inc.

January 14, 2014

JAN 15 2014

RECEIVED HUNT VALLEY, MD

EA Engineering, Science and Technology, Inc.
225 Schilling Circle, Suite 400
Hunt Valley, MD 21031

RE: Washington Suburban Sanitary Commission Proposed Offshore Submerged Channel Intake

Dear Suzanne Boltz:

This responds to your letter, received December 10, 2013, requesting information on the presence of species which are federally listed or proposed for listing as endangered or threatened within the vicinity of the above referenced project area. We have reviewed the information you enclosed and are providing comments in accordance with section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

Except for occasional transient individuals, no federally proposed or listed endangered or threatened species are known to exist within the project impact area. Therefore, no Biological Assessment or further section 7 Consultation with the U.S. Fish and Wildlife Service is required. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered.

This response relates only to federally protected threatened or endangered species under our jurisdiction. For information on the presence of other rare species, you should contact Lori Byrne of the Maryland Wildlife and Heritage Division at (410) 260-8573.

Effective August 8, 2007, under the authority of the Endangered Species Act of 1973, as amended, the U.S. Fish and Wildlife Service (Service) removed (delist) the bald eagle in the lower 48 States of the United States from the Federal List of Endangered and Threatened Wildlife. However, the bald eagle will still be protected by the Bald and Golden Eagle Protection Act, Lacey Act and the Migratory Bird Treaty Act. As a result, starting on August 8, 2007, if your project may cause "disturbance" to the bald eagle, please consult the "National Bald Eagle Management Guidelines" dated May 2007.

TAKE PRIDE® IN AMERICA

If any planned or ongoing activities cannot be conducted in compliance with the National Bald Eagle Management Guidelines (Eagle Management Guidelines), please contact the Chesapeake Bay Ecological Services Field Office at 410-573-4573 for technical assistance. The Eagle Management Guidelines can be found at:
http://www.fws.gov/northeast/ecologicalservices/pdf/NationalBaldEagleManagementGuidelines.pdf

In the future, if your project can not avoid disturbance to the bald eagle by complying with the Eagle Management Guidelines, you will be able to apply for a permit that authorizes the take of bald and golden eagles under the Bald and Golden Eagle Protection Act, generally where the take to be authorized is associated with otherwise lawful activities.

An additional concern of the Service is wetlands protection. Federal and state partners of the Chesapeake Bay Program have adopted an interim goal of no overall net loss of the Basin's remaining wetlands, and the long term goal of increasing the quality and quantity of the Basin's wetlands resource base. Because of this policy and the functions and values wetlands perform, the Service recommends avoiding wetland impacts. All wetlands within the project area should be identified, and if construction in wetlands is proposed, the U.S. Army Corps of Engineers, Baltimore District, should be contacted for permit requirements. They can be reached at (410) 962-3670.

We appreciate the opportunity to provide information relative to fish and wildlife issues, and thank you for your interests in these resources. If you have any questions or need further assistance, please contact Trevor Clark at (410) 573-4527.

Sincerely,

G. LaRouche

Genevieve LaRouche
Supervisor

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401
http://www.fws.gov/chesapeakebay

August 5, 2015

Diane Pavek, PhD.
Research and T&E Coordinator
Natural Resources & Science, National Capital Region
4598 MacArthur Blvd, NW
Washington, DC 20007

Re: "Not likely to adversely affect" determination for northern long-eared bat and Indiana bat for the seven projects to be conducted in the National Capital Region

Dear Ms. Pavek:

The U.S. Fish and Wildlife Service (Service) has reviewed the information that you sent to us with a letter dated June 19, 2015 pertaining to seven projects that are planned for various locations within the National Capital Region. We have reviewed these projects and the proposed conservation measures you have described for potential impacts to the northern long-eared bat (*Myotis septentrionalis*), a federally listed threatened species. Additionally, we have reviewed these projects for any adverse effects to the Indiana bat (*Myotis sodalis*), a federally endangered species which may occur on a few sites. The comments provided below are in accordance with Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

We received your information describing the following seven projects and note that you have already proposed to conduct clearing in the winter for all projects. This commitment to winter clearing will avoid impacts to these species, and we would recommend *not clearing forest between April 15 and August 30* for some of the projects described below. In our assessment of the impacts of these projects, we considered the landscape setting, proximity to survey records of the species, and size of the project. Where needed, we have provided the appropriate time of year restriction for clearing in order to avoid adverse effects to these species:

1) **C & O Canal National Historical Park (CHOH) Hancock Rewatering** EA MP122.12 to 124.59; (2.5 acres). Given the commitment that clearing will *not* occur between April 15 and August 30, we conclude the project is not likely to adversely affect these species of bats.

2) **CHOH – Water Intake EA** – Mile Marker 17; (4.8 acres). Given the commitment that clearing will *not* occur between April 15 and August 30, we conclude the project is not likely to adversely affect these species of bats.

3) **CHOH Extension of the Western Maryland Rail Trail** between Pearre, Washington County, MD and Paw Paw, Morgan County, WV; (11.78 acres along 8.1 miles of trail). Given the commitment that clearing will *not* occur between April 15 and August 30, we conclude the project is not likely to adversely affect these species of bats.

4) **George Washington Memorial Park (GWMP) Potomac Yards Metro**; (3.54 acres). No time of year restriction for forest clearing is needed at this site given the isolated urban setting and negative survey results in the surrounding area. We conclude the project is not likely to adversely affect these species of bats.

5) **GWMP Fort Hunt**; (less than 1 acre). No time of year restriction for forest clearing is needed at this site given the isolated urban setting and negative survey results in the surrounding area. We conclude the project is not likely to adversely affect these species of bats.

6) **National Capital Parks East (NACE) Oxon Cove Multi-Use Biker Trail**; (1 to 3 acres). No time of year restriction for forest clearing is needed at this site given the isolated urban setting and negative survey results in the surrounding area. We conclude the project is not likely to adversely affect these species of bats.

7) **Rock Creek (ROCR) Multi-Use Trail Resurfacing and Widening**; (less than 1 acre). Given the commitment that clearing will *not* occur between April 15 and August 30, we conclude the project is not likely to adversely affect these species of bats.

Based on our analysis and your commitment to the conservation measures of clearing outside the active season, we conclude that these seven projects are not likely to adversely affect the northern long-eared bat or the Indiana bat.

We appreciate the opportunity to provide information relevant to threatened and endangered fish and wildlife resources. If you have any questions or concerns regarding this letter, please contact Cherry Keller of my Endangered Species staff at (410) 573-4532 or by email at cherry_keller@fws.gov.

Sincerely,

Genevieve LaRouche
Supervisor

Maryland Department of Planning
Maryland Historical Trust

Larry Hogan, Governor
Boyd Rutherford, Lt. Governor

David R. Craig, Secretary
Wendi W. Peters, Deputy Secretary

October 9, 2015

Mr. Justin Ebersole
Archeological Technician, Division of Resource Management
Chesapeake & Ohio Canal National Historical Park
1850 Dual Highway, Suite 100
Hagerstown, MD 21740

Re: MHT Review of Phase II Archeological Investigations for WSSC Potomac River Submerged Intake – Potomac Water Filtration Plant -- Montgomery County, Maryland

Dear Mr. Ebersole:

The Maryland Historical Trust (MHT) has been provided with a copy of the draft report detailing the results of the Phase II archeological investigations that have been conducted for the above-referenced project. The proposed construction of an intake for the Potomac Water Filtration Plant (which will impact a section of the Chesapeake & Ohio Canal National Historical Park) will require permits from the U.S. Army Corps of Engineers and the Maryland Department of the Environment (MDE) and will also require approvals from the National Park Service (NPS), making the project subject to state and federal historic preservation law. We have therefore reviewed the draft report in accordance with Section 106 of the National Historic Preservation Act and §§ 5A-325 and 5A-326 of the State Finance and Procurement Article and are writing to provide the following comments and recommendations regarding potential effects on historic properties.

The draft Phase II report was prepared by Dovetail Cultural Resource Group on behalf of the Washington Suburban Sanitary Commission (WSSC). The document, *Phase II Archeological Evaluation of Sites 18MO633 and 18MO719, C&O Canal National Historical Park, Montgomery County, Maryland* (Klein et al. 2015) presents the necessary documentation on the goals, methods, results, and recommendations of the Phase II investigations that have been conducted within the project area. The report is well-organized and is consistent with the reporting requirements of the *Standards and Guidelines for Archeological Investigations in Maryland* (Shaffer and Cole 1994). Please note, however, that the following item should be addressed in the preparation of the final document:

- The final report should indicate the final disposition of the records and artifacts generated by the Phase II investigations.

The Phase II archeological investigations were carried out between June and August of 2014 and consisted of pedestrian survey and the excavation of nine test units at sites 18MO633 and 18MO719 – two sites that were

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initially identified during previous Phase I surveys that were conducted in 2007 and 2013. The results of these studies indicate that site **18MO633** contains the remains of a prehistoric encampment area that people occupied repeatedly over millennia. The site does, in fact, exhibit stratigraphically discrete occupations ranging in age from the Early Woodland through the Late Woodland (and possible Early Contact) Periods. A total of 362 artifacts were recovered from 18MO633 during the Phase II study, including a variety of projectile points and lithic debitage (primarily quartz, quartzite, chert, and rhyolite), ceramics, fire cracked rock, and a hammerstone. As noted in the Phase II report, such intact and stratified multi-component sites are rare in the Mid-Atlantic region and have the potential to yield significant information relating to the Native American occupation of the Potomac River Valley and the overall region over a period of several thousand years.

Similarly, site **18MO719** contains the remains of a Late Woodland (possibly Contact) period encampment that was likely occupied for longer periods of time and witnessed more varied activities than those apparent at site 18MO633. A total of 690 prehistoric artifacts were recovered from the site, including triangular projectile points, early stage bifaces, ceramics, fire cracked rock, and a hammerstone. While construction of the C&O Canal and other historic activities have clearly impacted the upper strata of a segment of the site, the deposition of soil during the excavation of the canal appears to have capped and protected much of the portion of the site that is located north of the canal. As a result of their findings, Dovetail has recommended that these lower, capped strata contain additional artifacts and cultural features that have the potential to yield significant information relating to our understanding of the Late Woodland Period in the Potomac River Valley.

Following our review of these findings and recommendations, it is our opinion that sites 18MO633 and 18MO719 are indeed eligible for listing in the National Register of Historic Places under *Criterion D* and should be preserved in place. Given the presence of these two National Register-eligible sites within the intake project area, MHT is requesting that we be provided with **current and updated site plans** that illustrate the location of all proposed impact areas (including staging areas) in relation to the boundaries of sites 18MO633 and 18MO719 so that we can fully assess the project's potential impacts on these sites. As these resources are located within the C&O Canal National Historical Park, we are also requesting that we be provided with copies of all correspondence documenting the WSSC's coordination and consultation with the NPS, including all comments/concerns that the NPS may have regarding potential impacts to these cultural resources.

The WSSC will need to continue to coordinate with the NPS and MHT on specific construction plans and on ways to reduce and/or mitigate any adverse effects on sites 18MO633 and 18MO719. If it is determined that site avoidance is not feasible, then the WSSC will need to provide the NPS, MHT and the Corps with documentation detailing the constraints and providing justification as to why one or both of the sites cannot be avoided during construction. If site avoidance is not possible, Phase III data recovery investigations will be considered as a way to mitigate the undertaking's adverse effects on archeological resources. All parties will need to negotiate and execute a Memorandum of Agreement (MOA) that stipulates the agreed-upon mitigation measures.

The cultural resources investigations that have been conducted for the WSSC Potomac River intake project have generated important information regarding resource integrity and significance within the project's APE.

We appreciate the conscientious efforts that have been made to recover this information and to consider the effects that the proposed activities may have on cultural resources. We look forward to continued coordination and to receiving a copy of the final Phase II report, when it becomes available. If you have any questions or require further information, please do not hesitate to contact me at 410-514-7638 or dixie.henry@maryland.gov. Thank you for providing us with this opportunity to comment.

Sincerely,

Dixie L. Henry, Ph.D.
Preservation Officer
Maryland Historical Trust

DLH/201501482
cc: Stephen R. Potter (NPS)
Kathy Anderson (COE)
Steve Harman (COE)
Paula Stonesifer (MDE)
Hira Shrestha (MDE)
Simon Baidoo (WSSC)
Sophia Liskovich (Gannett Fleming)
Mike Carmody (Dovetail)

December 8, 2015

Beth Cole
Maryland Historic Trust
100 Community Place
3rd Floor
Crownsville, MD 21032

RE: Phase II Archeological Evaluation Report

Ms. Cole,

Attached, please find two copies of the final draft of the report on the Phase II Archeological Evaluation of Sites 18MO633 and 18MO719, C&O Canal National Historic Park, Montgomery County, MD. The evaluation and report was put together by Gannett Fleming and Dovetail Cultural Resource Group on behalf of the Washington Suburban Sanitary Commission.

If you have any questions or would like any additional copies, please feel free to call me at 443-348-2017 or email at sliskovich@gfnet.com.

Thank you,

Sophia Liskovich, PE
Assistant Project Manager

Gannett Fleming, Inc.
Rutherford Plaza Building • Suite 300 • 7133 Rutherford Road • Baltimore, MD 21244-2718
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Appendix C:

Air Quality General Conformity Applicability Analysis

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AIR QUALITY GENERAL CONFORMITY APPLICABILITY ANALYSIS

The proposed project would be constructed within the U.S. Environmental Protection Agency (USEPA) designated northeastern ozone (O_3) transport region (OTR), a multi-state ozone nonattainment area. The project is therefore potentially subject to the federal General Conformity Rule established at 40 Code of Federal Regulations (CFR) Part 93 Subpart B. A General Conformity applicability analysis was conducted to determine if increases in air pollution from the project would cause or contribute to new violations of the National Ambient Air Quality Standards (NAAQS).

REGULATORY BACKGROUND: GENERAL CONFORMITY APPLICABILITY ANALYSIS

The General Conformity Rule was established to ensure that federal actions do not interfere with efforts to return nonattainment areas back into compliance with the NAAQS. In particular, Section 176(c) of the Clean Air Act (CAA) prohibits federal agencies, departments or instrumentalities from engaging in, supporting, licensing, or approving any action, in an area that is in nonattainment of the NAAQS, which does not conform to an EPA approved state implementation plan (SIP). Therefore, the National Park Service (NPS) must determine whether or not the project would interfere with the goals in the affected State Implementation Plans.

Pursuant to CAA Section 176(c) requirements, the USEPA promulgated Title 40 CFR Part 51, Subpart W and Part 93, Subpart B, "Determining Conformity of General Federal Actions to State or Federal Implementation Plans." These regulations, commonly referred to as the General Conformity Rule, apply to all Federal actions except for those Federal actions related to transportation plans, programs, and projects under Title 23 U.S. Code or the Federal Transit Act, which are subject to Transportation Conformity (40 CFR Part 93 Subpart A).

The entire State of Maryland is part of the Northeast OTR, which was established in the 1990 Clean Air Act Amendments in recognition of the long-standing ozone non-attainment problems in the northeast. The OTR is the area consisting of the Northeast and Mid-Atlantic States that historically has had a ground-level ozone attainment problem, a large amount of which is accounted for by emissions generated outside the region in up-wind states. To regulate the emission levels resulting from a project, federal actions located in nonattainment areas are required to demonstrate compliance with the General Conformity Rule. The project area is located within a nonattainment area; therefore, a General Conformity Rule applicability analysis was conducted.

GENERAL CONFORMITY APPLICABILITY ANALYSIS

The proposed project would be constructed in Montgomery County, Maryland which is part of the Washington, DC – Maryland – Virginia Air Quality Control Region (AQCR). This region is classified as a marginal nonattainment area for the 2008 8-hour ozone standard and a nonattainment area for particulate matter with size less than 2.5 microns in diameter ($PM_{2.5)}$. The region is in attainment for carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead.

Section 93.153 of the General Conformity Rule sets applicability requirements for projects through establishment of *de minimis* levels for annual criteria pollutant emissions. These *de minimis* levels are set according to criteria pollutant nonattainment area designations. Projects with total emissions below the *de minimis* levels are exempt from the Rule. Projects with emissions at or above the *de minimis* levels are required to perform a Conformity Determination as established in the Rule. The *de minimis* levels apply to the largest single-year total of direct and indirect project emissions, from both stationary and mobile sources, that can occur during both the construction and operation phases of the action.

The NPS has completed a General Conformity Rule applicability analysis in order to determine if air quality impacts from the proposed project are significant. For ozone, emissions have been estimated for the ozone precursor pollutants nitrogen oxides (NO_X) and volatile organic compounds (VOCs). Annual emissions for these compounds were estimated for the project activities to determine if they would be below or above the *de minimis* levels established in the Rule. The *de minimis* threshold for moderate ozone nonattainment areas in an ozone transport region is 100 tons per year for NO_X and 50 tons per year for VOCs. The *de minimis* levels for $PM_{2.5}$ established in the Rule are 100 tons per year for directly emitted $PM_{2.5}$ and 100 tons per year for each of the precursor pollutants sulfur dioxide (SO_2) and NO_X.

Sources of NO_X, VOCs, $PM_{2.5}$, and SO_2 associated with the proposed project would include the operation of non-road construction equipment, on-road delivery trucks including dump truck and hauler truck, and small diesel locomotives associated with tunneling operations. It has been assumed that the construction will occur within a one-year time frame for the conservatism - the actual construction duration will be 2-3 years.

This project General Conformity analysis was performed for alternatives 2, 3, and 4, in accordance with the criteria specified in 40 CFR Part 51, and 93, Determining Conformity of General Federal Actions to State or Federal Implementation Plans: Final Rule (April 5, 2010). The emissions evaluation also follows NEPA-related criteria provided in 40 CFR Part 6.

The analysis of construction emissions was based on estimates of the type and quantity of construction equipment likely to be involved in the project. Air emissions have been evaluated by use of the National Mobile Inventory Model (*NMIM*) software package, which incorporates data from the USEPA *NONROAD* 2005 and *MOBILE* 6.02 programs.

Table H-1shows that emissions associated with each of three alternatives, when compared to the *de minimis* values for an area that is in marginal nonattainment for ozone and nonattainment for $PM_{2.5}$, as established in 40 CFR 93.153 (b) for NO_X, $PM_{2.5}$, and SO_2 for 100 tons per year; and for VOCs of 50 tons per year; fall below the *de minimis* thresholds.

Table H-1. Annual Emissions

Alternative	Pollutants (tons/year)			
	VOC	NO_X	SO_2	$PM_{2.5}$
de minimis levels	50	100	100	100
2	1.44	14.66	0.01	0.13
3	0.49	5.91	0.01	0.06
4	2.30	23.46	0.02	0.21

Note: NMIM input data and emission calculation details are attached.
NOx - nitrogen oxides
$PM_{2.5}$ - particulate matter with size less than 2.5 microns in diameter
SO_2 - sulfur dioxide
VOC - volatile organic compounds

The total emissions from stationary and mobile sources associated with the proposed project are less than the *de minimis* levels established under the General Conformity Rule. Hence, a full conformity determination is not required and the proposed project is not subject to the General Conformity Rule.

REFERENCES

Jones, M. B. and Donnelly, A. 2004. Carbon sequestration in temperate grassland ecosystems and the influence of management, climate and elevated CO2. New Phytologist, 164: 423–439, 30 Oct. 2004. <http://onlinelibrary.wiley.com/doi/10.1111/j.1469-8137.2004.01201.x/citedby>.

U.S. Department of Transportation, Federal Highway Administration. 2010. Office of Planning, Environment and Realty. Estimated Land Available for Carbon Sequestration in the National Highway System. Carbon Sequestration Pilot Program, May 2010. <http://www.fhwa.dot.gov/hep/climate/carbon_sequestration/index.htm#ftn14>.

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National Mobile Inventory Model Input Data

Equipment	NMIM Classification	CLASS/SCC	No of Units[a]	Max HP[b]	Hour of Operation	Miles Traveled
A. Onshore Shaft						
1. Crane	Dsl - Cranes	2270002045	1	600	1,464	
2. Compressor to operate the drills	Dsl - Air Compressors	2270006015	1	50	1,464	
3. Front End Loader (load muck into haulage trucks)	Dsl - Tractors/Loaders/Backhoes	2270002066	1	300	1,464	
4. Backhoe for soil and rock	Dsl - Tractors/Loaders/Backhoes	2270002066	1	300	1,464	
5. Haul trucks	Class 8b Heavy-Duty Diesel Vehicles (>60,000 lbs. GVWR)	HDDV8B	1	N/A	1,464	21,960
6. Generator for dewatering pumps	Dsl - Generator Sets	2270006005	1	300	1,464	
7. Compactor	Dsl - Rollers	2270002015	1	100	1,464	
8. Pickup Truck	Light-Duty Diesel Vehicles	LDDT34	2	N/A	1,464	43,920
B. Intake Shaft						
1. Crane	Dsl - Cranes	2270002045	1	600	312	
2. Compressor to operate the drills	Dsl - Air Compressors	2270006015	1	50	312	
3. Front End Loader (load muck into haulage trucks)	Dsl - Tractors/Loaders/Backhoes	2270002066	1	300	312	
4. Backhoe for soil and rock	Dsl - Tractors/Loaders/Backhoes	2270002066	1	300	312	
5. Haul trucks	Class 8b Heavy-Duty Diesel Vehicles (>60,000 lbs. GVWR)	HDDV8B	1	N/A	312	4,680
6. Generator for dewatering pumps	Dsl - Generator Sets	2270006005	1	300	312	
7. Compactor	Dsl - Rollers	2270002015	1	100	312	
8. Pickup Truck	Light-Duty Diesel Vehicles	LDDT34	2	N/A	312	9,360
C. Trenching						
1. Backhoe	Dsl - Tractors/Loaders/Backhoes	2270002066	1	300	1,648	
2. Front End Loader (load muck into haulage trucks)	Dsl - Tractors/Loaders/Backhoes	2270002066	1	300	1,648	
3. Hauler trucks	Class 8b Heavy-Duty Diesel Vehicles (>60,000 lbs. GVWR)	HDDV8B	1	N/A	1,648	24,720
4. Compressor to operate the drilling machine	Dsl - Air Compressors	2270006015	1	50	1,648	
5. Generator (for dewatering pumps)	Dsl - Generator Sets	2270006005	1	300	1,648	
6. Compactor	Dsl - Rollers	2270002015	1	100	1,648	
7. Pickup Truck	Light-Duty Diesel Vehicles	LDDT34	2	N/A	1,648	49,440

Equipment	NMIM Classification	CLASS/SCC	No of Units[a]	Max HP[b]	Hour of Operation	Miles Traveled
D. Tunneling (Alt 2)						
1. Crane	Dsl - Cranes	2270002045	1	600	4,000	
2. Compressor for drilling machine	Dsl - Air Compressors	2270006015	1	50	4,000	
3. Low profile rear dump	Dsl - Dumpers/Trenders	2270002078	1	175	4,000	
4. Tire mounted shotcrete liner	Dsl - Cement & Motar Mixers	2270002042	1	40	4,000	
5. Diesel locomotive	N/A	N/A	1	N/A	4,000	
6. Rail mounted shovel loaders	Dsl - Rubber Tire Loaders	2270002060	1	25	4,000	
7. Ventilating blowers	Dsl - Other Constrution Equipment	2270002081	2	40	4,000	
8. Generator (for dewatering pump)	Dsl - Generator Sets	2270006005	1	300	4,000	
9. Pickup Truck	Light-Duty Diesel Vehicles	LDDT34	2	N/A	4,000	120,000
10. Hauler truck	Class 8b Heavy-Duty Diesel Vehicles (>60,000 lbs. GVWR)	HDDV8B	2	N/A	4,000	120,000
E. Tunneling (Alt 3)						
1. Crane	Dsl - Cranes	2270002045	1	600	750	
2. Compressor for drilling machine	Dsl - Air Compressors	2270006015	1	50	750	
3. Low profile rear dump	Dsl - Dumpers/Trenders	2270002078	1	175	750	
4. Tire mounted shotcrete liner	Dsl - Cement & Motar Mixers	2270002042	1	40	750	
5. Diesel locomotive	N/A	N/A	1	N/A	750	
6. Rail mounted shovel loaders	Dsl - Tractors/Loaders/Backhoes	2270002066	1	25	750	
7. Ventilating blowers	Dsl - Other Constrution Equipment	2270002081	2	40	750	
8. Generator (for dewatering pump)	Dsl - Generator Sets	2270006005	1	300	750	
9. Pickup Truck	Light-Duty Diesel Vehicles	LDDT34	2	N/A	750	22,500
10. Hauler truck	Class 8b Heavy-Duty Diesel Vehicles (>60,000 lbs. GVWR)	HDDV8B	2	N/A	750	22,500

Equipment	NMIM Classification	CLASS/SCC	No of Units[a]	Max HP[b]	Hour of Operation	Miles Traveled
F. Tunneling (Alt 4)						
1. Crane	Dsl - Cranes	2270002045	1	600	7,000	
2. Compressor for drilling machine	Dsl - Air Compressors	2270006015	1	50	7,000	
3. Low profile rear dump	Dsl - Dumpers/Trenders	2270002078	1	175	7,000	
4. Tire mounted shotcrete liner	Dsl - Cement & Motar Mixers	2270002042	1	40	7,000	
5. Diesel locomotive	N/A	N/A	1	N/A	7,000	
6. Rail mounted shovel loaders	Dsl - Tractors/Loaders/Backhoes	2270002066	1	25	7,000	
7. Ventilating blowers	Dsl - Other Constrution Equipment	2270002081	2	40	7,000	
8. Generator (for dewatering pump)	Dsl - Generator Sets	2270006005	1	300	7,000	
9. Pickup Truck	Light-Duty Diesel Vehicles	LDDT34	2	N/A	7,000	210,000
10. Hauler truck	Class 8b Heavy-Duty Diesel Vehicles (>60,000 lbs. GVWR)	HDDV8B	2	N/A	7,000	210,000
G. Sheeting & Shoring with Trenching						
1. Lifting crane for sheet piles, and bracing installations	Dsl - Cranes	2270002045	1	600	480	
2. Pile driving hammer w/crane	Dsl - Cranes	2270002045	2	300	480	
3. Generator (jet grouting equip. & dewatering pumps)	Dsl - Generator Sets	2270006005	1	300	480	
4. Compressor to operate the drills	Dsl - Air Compressors	2270006015	2	100	480	
5. Pick up truck	Light-Duty Diesel Vehicles	LDDT34	2	N/A	480	14,400
6. Backhoe	Dsl - Tractors/Loaders/Backhoes	2270002066	1	600	480	
7. Front End Loader (load muck into haulage trucks)	Dsl - Tractors/Loaders/Backhoes	2270002066	1	600	480	
8. Hauler trucks	Class 8b Heavy-Duty Diesel Vehicles (>60,000 lbs. GVWR)	HDDV8B	1	600	480	7,200
9. Compressor to operate the drilling machine	Dsl - Air Compressors	2270006015	1	50	480	
10. Generator (for dewatering pumps)	Dsl - Generator Sets	2270006005	1	300	480	
11. Compactor	Dsl - Rollers	2270002015	1	100	480	

Equipment	NMIM Classification	CLASS/SCC	No of Units[(a)]	Max HP[(b)]	Hour of Operation	Miles Traveled
H. Embankments & Cofferdams						
1. Compactor	Dsl - Rollers	2270002015	1	100	667	
2. Dozer	Dsl - Crawler Dozers	2270002069	1	175	667	
3. Dump truck	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs. GVWR)	HDDV8A	1	N/A	667	10,000
4. Front End Loader	Dsl - Tractors/Loaders/Backhoes	2270002066	1	600	667	
5. Grader	Dsl - Graders	2270002048	1	300	667	
6. Roller	Dsl - Rollers	2270002015	2	175	667	
7. Scraper	Dsl - Scrapers	2270002018	2	175	667	
I. Boat Ramp & Permanent Road						
1. Compactor	Dsl - Rollers	2270002015	1	100	224	
2. Dozer	Dsl - Crawler Dozers	2270002069	1	175	224	
3. Dump truck	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs. GVWR)	HDDV8A	1	N/A	224	3,360
4. Front End Loader	Dsl - Tractors/Loaders/Backhoes	2270002066	1	600	224	
5. Grader	Dsl - Graders	2270002048	1	300	224	
6. Paver	Dsl - Pavers	2270002003	1	300	224	
7. Roller	Dsl - Rollers	2270002015	1	100	224	
8. Scraper	Dsl - Scrapers	2270002018	1	600	224	

(a) Estimated quantity of equipment types necessary to complete the work.
(b) Based on estimated capacity of equipment needed to complete the work.
Dsl - diesel
GVWR - Gross vehicle weight rating
HP - Horsepower
NMIM - National Mobile Inventory Model
SCC - Source classification code

Diesel Locomotives Emissions

Phase	Estimated Usage (bhp-hr)
Phase D	740,000
Phase E	138,750
Phase F	1,295,000

Pollutants	Emission Factors[(a)] (g/bhp-hr)	Estimated Emissions (tons)		
		Phase D	Phase E	Phase F
PM_{10}	0.43	0.35	0.07	0.61
VOC	1.01	0.82	0.15	1.44
NO_X	9.9	8.06	1.51	14.10
CO	1.83	1.49	0.28	2.61

(a) - Tier 1, Emission Factors for Locomotives, EPA-420-F-09-025, April 2009
bhp-hr - Brake horsepower per hour
g/bhp-hr - Grams per break horsepower-hour
CO - carbon monoxide
NOx - nitrogen oxides
PM10 particulate matter with size less than 10 microns in diameter
VOC - volatile organic compounds

NMIM Modeling Results for Each Phase

Phases	Activity Types	Estimated Emissions (tons/yr)						
		CO	CO_2	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
A	On-road	2.67E-02	5.80E+01	9.50E-03	2.88E-03	1.54E-03	3.98E-04	7.16E-03
	Non-road	1.42E-01	3.91E+02	1.09E+00	1.26E-02	1.23E-02	1.92E-03	1.01E-01
B	On-road	5.69E-03	1.24E+01	2.02E-03	6.15E-04	3.27E-04	8.48E-05	1.53E-03
	Non-road	3.02E-02	8.32E+01	2.33E-01	2.69E-03	2.61E-03	4.09E-04	2.15E-02
C	On-road	3.01E-02	6.52E+01	1.07E-02	3.25E-03	1.73E-03	4.48E-04	8.06E-03
	Non-road	1.33E-01	2.69E+02	7.83E-01	1.15E-02	1.11E-02	1.33E-03	6.93E-02
D	On-road	7.30E-02	1.58E+02	2.59E-02	7.88E-03	4.20E-03	1.09E-03	1.96E-02
	Non-road	7.81E-01	9.45E+02	3.66E+00	1.03E-01	1.00E-01	5.00E-03	3.08E-01
	Locomotive	1.49E+00		8.06E+00	3.50E-01			8.22E-01
E	On-road	1.37E-02	2.97E+01	4.87E-03	1.48E-03	7.87E-04	2.04E-04	3.67E-03
	Non-road	1.46E-01	1.77E+02	6.86E-01	1.94E-02	1.88E-02	9.37E-04	5.77E-02
	Locomotive	2.79E-01		1.51E+00	6.56E-02			1.54E-01
F	On-road	1.28E-01	2.77E+02	4.54E-02	1.38E-02	7.34E-03	1.90E-03	3.42E-02
	Non-road	1.37E+00	1.65E+03	6.40E+00	1.81E-01	1.76E-01	8.74E-03	5.39E-01
	Locomotive	2.61E+00		1.41E+01	6.13E-01			1.44E+00
G	On-road	8.76E-03	1.90E+01	3.11E-03	9.46E-04	5.04E-04	1.30E-04	2.35E-03
	Non-road	6.76E-02	2.37E+02	6.47E-01	5.89E-03	5.71E-03	1.15E-03	6.07E-02
H	On-road	1.35E-01	1.38E+01	2.42E-03	6.87E-04	2.95E-04	2.53E-04	3.79E-03
	Non-road	7.43E-02	2.64E+02	6.81E-01	4.41E-03	4.28E-03	1.27E-03	6.66E-02
I	On-road	4.53E-02	4.65E+00	8.12E-04	2.31E-04	9.92E-05	8.50E-05	1.27E-03
	Non-road	2.53E-02	9.30E+01	2.40E-01	1.53E-03	1.49E-03	4.49E-04	2.35E-02

CO - carbon monoxide
CO_2 - carbon dioxide
NOx - nitrogen oxides
PM_{10} particulate matter with size less than 10 microns in diameter
$PM_{2.5}$ - particulate matter with size less than 2.5 microns in diameter
SO_2 - sulfur dioxide
VOC - volatile organic compounds

Total Emissions for Each Alternative

Alternative	Phase Involved	Estimated Emissions (tons/yr)						
		CO	CO_2	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
2	A, B, D, G, H, I	2.90	2,278	14.66	0.49	0.13	0.01	1.44
3	A, B, C, E, G, H, I	1.16	1,715	5.91	0.13	0.06	0.01	0.58
4	A, B, F, G, H, I	4.66	3,105	23.46	0.84	0.21	0.02	2.30
de minimis Level		100	N/A	100	100	100	100	50

CO - carbon monoxide
CO_2 - carbon dioxide
NOx - nitrogen oxides
PM_{10} particulate matter with size less than 10 microns in diameter
$PM_{2.5}$ - particulate matter with size less than 2.5 microns in diameter
SO_2 - sulfur dioxide
VOC - volatile organic compounds

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Appendix D:

Habitat Restoration Plan

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Washington Suburban Sanitary Commission

Potomac River Submerged Intake Project
Montgomery County, Maryland

Habitat Restoration Plan

July 2016

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ACRONYMS AND ABBREVIATIONS

COMAR	Code of Maryland Regulations
EAEST	EA Engineering, Science, and Technology, Inc.
FCA	Forest Conservation Act
GPS	Global Positioning System
MDA	Maryland Department of Agriculture
NNI	Nonnative Invasive
NPS	National Park Service
O.C.	On Center
SAV	Submerged Aquatic Vegetation
SOF	Statement of Findings
USEPA	Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
WFP	Water Filtration Plant
WSSC	Washington Suburban Sanitary Commission

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HABITAT RESTORATION PLAN

INTRODUCTION

This Habitat Restoration Plan is part of the environmental assessment prepared by the National Park Service (NPS). The purpose of this plan is to provide guidelines for habitat and resource restoration and mitigation necessary to reduce the impacts associated with the construction and operation of the new offshore intake structure for the Washington Suburban Sanitary Commission's (WSSC) Potomac Water Filtration Plant (WFP). This plan includes mitigation activities associated with freshwater mussels and reforestation of the project area. Mitigation associated with wetlands can be found in the Statement of Findings (SOF) (appendix E). This Habitat Restoration Plan also includes monitoring activities associated with submerged aquatic vegetation (SAV), floating paspalum (*Paspalum fluitans*), species planted for reforestation and wetland mitigation, nonnative invasive (NNI) species, and freshwater mussels. Monitoring for vernal amphibians, halberd-leaved hibiscus (*Hibiscus laevis*), and rough avens (*Geum laciniatum*) would be done along with reforestation monitoring activities. Since monitoring may indicate the need to alter or adjust mitigation measures to ensure their success, an adaptive management plan for the project site is also included herein.

PROJECT BACKGROUND

WSSC is proposing to construct a new offshore intake structure for their Potomac WFP. The Potomac WFP is located along River Road on the north side of the Potomac River, in Montgomery County, Maryland (figure 1). The WFP is located at 39° 02' 24.28" north, 77° 15' 14.45" west, respectively. The proposed project would include the construction of an intake for water supply in the Potomac River channel, a tunnel, or trench conduit system to connect the new intake to the existing onshore WFP, and a new boat ramp to provide access to the new intake for maintenance and emergency rescue activities.

MITIGATION

Mitigation measures will be implemented to restore the integrity of natural resources at the project site. These resources include freshwater mussels and forested land. The following sections contain the proposed mitigation plans for each resource. The SOF (appendix E) includes detailed information on wetland mitigation, as required by NPS. That information is incorporated by reference into this plan.

Freshwater Mussel Relocation

Mussel Survey and Relocation

Prior to construction, a mussel survey will be conducted within the construction area limits for the project and include an upstream (100 m) and downstream (200 m) buffer zone for mussel relocation. The survey methods for the future survey will follow the methods described in the 2013 Freshwater Mussel Study Plan (EAEST 2013a). Figure 2 presents the results of the 2013 mussel survey.

The construction area limits will be surveyed for live freshwater mussels immediately prior to any instream construction related to the proposed project. The survey will be conducted during the Summer Index Period where snorkeling will be the primary method of collection, followed by underwater viewers in the shallow areas. Timed searches will be recorded as divers survey specific areas within the construction area limits (e.g., intake structure location). Additionally, if any threatened or endangered species are collected during the survey, state or federal authorities will be contacted within 24 hours for further guidance.

All live mussels collected during the relocation will be identified to species and photographed. Species, abundance, diversity, and estimated community density will be recorded on datasheets. Shell condition of live individuals will be noted if there are predation marks, umbo erosion, or other notable marks on shells. Relic shells found within the project area will not be relocated but will be photo documented and a few will be retained for identification purposes only. Any federally listed species (live or relic) that is encountered will not be retained for identification. All relocated mussels will be placed in burrows to avoid rapid predation by muskrats and other resident carnivores known to be present. No voucher specimens of any live unionids will be preserved for this project.

Relocation activities can place additional stress on mussels and therefore extra care will be taken to minimize these stresses. Mussels collected within the project area will be transferred to a designated relocation area the same day to minimize the stress they may experience from being removed from their original burrows. During the short holding time, mussels will be held in containers that allow flow-through of Potomac River water. If needed, battery-powered aerators will be used to ensure that dissolved oxygen in the water column remains near saturation.

Substrate characterization will also be visually estimated to determine the range of particle sizes within the project site and the proposed relocation site (Wentworth 1922).

Relocation Area

Mussels collected from within the construction area limits will be transferred upstream [about 2,000 feet (600 m)] to a relocation area and out of any physical disturbance occurring in the Potomac River. A relocation area will be identified prior to movement of collected mussels. The relocation area should include suitable substrate, water depth, and the space to accommodate all live mussels collected during the downstream survey. Relocated mussels will be placed in burrows to avoid rapid predation by resident carnivores known to be present. The upstream and downstream boundaries of the relocation area will be marked using a Trimble® Global Positioning System (GPS).

Data Analysis

A written report that summarizes the methodology and technical findings (mussel species, abundance, and substrate characterization) will be prepared following relocation. Data collected from the relocation will be summarized as the total abundance, species composition, and associated age determinations of mussels collected from the project area. Statistical evaluations of the data will not be conducted; however, estimated community density will be calculated so that during placement at the relocation site, similar density patterns can be replicated. Data summarizing substrate composition and water quality as well as a photolog will be included in the report.

Summary of 2013 Mussel Survey

A total of 88 live individuals, comprising two species, were collected from seven stations within the project footprint of the Potomac River. The Eastern elliptio *(Elliptio complanat*a) dominated the collection with 99% of the individuals collected from all seven stations. The highest numbers of Eastern elliptio were found at station 1 (n=23), along the southern shoreline of Unnamed Island, and station 6 (n=27), directly upstream of the proposed project footprint. The plain pocketbook mussel (*Lampsilis cardium*) was the only other species collected during the survey and is considered nonnative to the State of Maryland. Only one plain pocketbook mussel was collected at station 4. Figure 2 presents the locations of the survey stations and the number of mussels found at each station.

Reforestation of Project Area

The following reforestation plan addresses the forested project area that will be cleared for construction under the preferred alternative. It is meant to address the requirements of the environmental assessment. Further forest mitigation may be required by Montgomery County during the site plan and forest conservation plan review process once the actual alternative is selected and the construction area limit is finalized prior to construction.

The Forest Conservation Act (FCA) was enacted in 1991 to minimize the loss of Maryland's forest resources during land development by making the identification and protection of forests and other sensitive areas an integral part of the site planning process. The FCA is implemented on a local level and includes the approval of a Forest Stand Delineation Plan. A Forest Stand Delineation Plan was prepared and provided details on the forest types and notable trees found throughout the project area (EAEST 2013b). Any additional forest conservation and mitigation actions beyond what is proposed within this plan will comply with Maryland's FCA, the Code of Maryland Regulations (COMAR) 08.19.01 through 08.19.06.

The forest mitigation proposed within this reforestation plan is designed to mitigate the impacts to forest resources cleared during the proposed construction. The restoration goal for forest mitigation would be to revegetate the project area in such a way that it would succeed into the current habitat type, deciduous woodlands.

Reforestation Plan

The reforestation plan includes the replanting of native vegetation associated with the clearing of forested area for construction purposes. Approximately 4.7 acres of forest vegetation will be removed from the limits of construction (figure 3) during the construction activities associated with the project and are proposed to be replaced in a phased planting plan with native species of trees, shrubs, and understory species that are common to the surrounding area. A detailed planting plan will be prepared and approved prior to construction. Native vegetation species that were found onsite during the forest stand delineation have been selected for reforestation of the project area. Overall tree and shrub spacing proposed will have a spacing average of 8 feet on center (O.C.) with a greater quantity of trees than shrubs. Trees will cover 70% of the replanting area, and shrubs will cover 30% of the area. The detailed planting plan will address phased planting - trees would be planted first and once a tree canopy has been established, the understory plants (e.g., shrubs, understory trees) would be planted to promote a higher success of the understory plantings. The higher percentage of trees has been proposed in order to better outcompete any nonnative species that may be inadvertently introduced into the reforestation area.

Trees and shrubs that are planted in the reforestation area will be planted in a 1:1 ratio to compensate for the vegetation removed during construction. The trees and shrubs will not be planted in a grid-like pattern, rather they will follow a random planting scheme where all plants are installed following the overall average spacing, however the spacing of trees may vary from two to three feet above or below the average 8-feet spacing. Since the reforestation area is approximately 4.7 acres and trees and shrubs are being placed at an 8-feet O.C. spacing, then 3,213 trees will be needed to replace the removed trees at a 1:1 ratio. Approximately 2,250 total trees and 963 shrubs will be needed for the reforestation.

Herbaceous plant species will be planted intermittently between shrubs and trees as necessary to provide adequate cover and planted approximately 2-feet O.C. Since the reforestation area is approximately 4.7 acres and herbaceous plants are being placed at a 2-feet O.C. spacing, 51,402 herbaceous plants will be needed. Approximately 17,134 plants of each species will be needed.

The plant material selected is representative of the existing species composition of the project. However, final selection of plant stock will be determined to some extent by availability**.** The selected tree species will consist of 1-3 gallon containerized and/or bare root stock protected by tree shelters. The tree shelters will provide protection from wildlife depredation, wind, or other damaging influences. Table 1 presents the species that are proposed for reforestation as well as spacing specifications and sizes.

Table 1. Reforestation Species and Planting Specifications

Common Name	Scientific Name	Quantity	Overall Average Spacing	Classification	Size
Total reforestation area is approximately 4.8 acres					
Pin oak	*Quercus palustris*	450	8' O.C.	Canopy	1.5 - 2” caliper
Sycamore	*Platanus occidentalis*	450	8' O.C.	Canopy	1.5 - 2” caliper
Red maple	*Acer rubrum*	400	8' O.C.	Canopy	1.5 - 2” caliper
Silver maple	*Acer saccharinum*	400	8' O.C.	Canopy	1.5 - 2” caliper
American hornbeam	*Carpinus caroliniana*	275	8' O.C.	Understory Tree	1 - 1.5” caliper
Red osier dogwood	*Cornus sericea*	275	8' O.C.	Understory Tree	1 - 1.5” caliper
Spicebush	*Lindera benzoin*	321	8' O.C.	Shrub	1 gallon container
Highbush blueberry	*Vaccinium corymbosum*	321	8' O.C.	Shrub	1 gallon container
Sweet pepperbush	*Clethra alnifolia*	321	8' O.C.	Shrub	1 gallon container
Cinnamon fern	*Osmunda cinnamomea*	12,851	2’ O.C.	Herbaceous	1 quart
Switch fern	*Panicum virgatum*	12,851	2’ O.C.	Herbaceous	1 quart
New York fern	*Thelypteris noveboracensis*	12,851	2’ O.C.	Herbaceous	1 quart
Rough avens	*Geum laciniatum*	12,851	2’ O.C.	Herbaceous	1 quart

O.C. = on center

Nonnative Invasive Species

A higher percentage of trees than shrubs have been proposed for the replanting area. The higher percentage of trees has been proposed in order to better outcompete any NNI species that may be inadvertently introduced into the reforestation area, such as Japanese honeysuckle (*Lonicera japonica*), Japanese stiltgrass (*Microstegium vimineum*), Chinese bushclover (*Lespedeza cuneata*), and ground ivy (*Glechoma hederacea*), all of which have been found in forested areas in previous site visits.

The reforestation area will be monitored for NNI species seasonally (once every 3 months) for 5 years following the reforestation effort. The monitoring will be conducted through a species inventory of the area that documents the location and population size of nonnative species that is found along with recommended treatment actions. Thresholds for NNI species control will be determined during the permitting phase of this project. Actions to eradicate nonnative plant populations will be taken if necessary.

MONITORING

Following the completion of construction activities, monitoring will be performed by WSSC to ensure that natural resources at the project site have re-established. Resources to be monitored include SAV, floating paspalum, species planted for forest mitigation, and nonnative plants. Freshwater mussels will be

monitored during construction since they will be relocated prior to construction. The following sections contain monitoring plans for each resource.

Submerged Aquatic Vegetation

Following construction activities, monitoring will be conducted in the Potomac River to document the recovery of SAV in the project area. SAV monitoring activities will include surveys of SAV to document its presence or absence in the project area as well as surveys of SAV in upstream habitats used as reference locations. A report summarizing the methodology used for the monitoring of SAV as well as the technical findings will be produced after each survey. The monitoring methodology will be approved before the surveys are conducted.

This section includes the results of the 2013 SAV survey (EAEST 2013c), monitoring protocols, a discussion of the SAV survey methodology, and data analysis.

Results of the 2013 SAV Survey

A total of five species of true SAV were observed during the July and September 2013 surveys: common waterweed (*Elodea canadensis*), water star grass (*Heteranthera dubia*), southern water nymph (*Najas guadalupensis*), sago pondweed (*Stuckenia pectinata*), and wild celery (*Vallisneria americana*). All five species of SAV observed during the surveys are considered native to the Chesapeake Bay and not nuisance species. In addition to SAV species, one species of a multi-cellular algae, muskgrass species (*Chara* species), was observed during the surveys. Muskgrass is considered a native algal species which rarely creates a nuisance. Figure 4 presents results of both the July and September 2013 SAV surveys.

Monitoring

Monitoring for SAV will be conducted by WSSC annually each summer for a 5-year monitoring period. Year 1 of the monitoring effort will be conducted during the summer of the same year of completion of the construction, unless the construction is completed after April 1st. If the construction is not completed prior to April 1st, the first year monitoring event will be performed the following year. Each monitoring event will be followed by an annual monitoring report which will be submitted before December 31st of each monitoring year. The monitoring report will summarize the technical findings of the survey. Details on the survey methodology are presented in the following section "Survey Methods."

Due to the transient nature of yearly SAV presence in this portion of the Potomac River, an SAV reference area within the vicinity of the project area was identified during the 2013 field survey and was marked using a Trimble® GPS. The moderately dense SAV populations that were found upstream of the SAV populations in the project area are visible in figure 4. These reference populations will provide reseeding of the impacted populations as well as a baseline to determine whether a low SAV population in the project area is due to construction or is due to poor temporal conditions that inhibit SAV growth.

The mitigation goal for SAV would be that the project area would succeed into the current SAV habitat type. Following the 5-year monitoring period, a determination will be made by NPS as to whether the project achieved the final mitigation goal or whether additional efforts are required. If additional efforts are required, monitoring will continue until the project has achieved final mitigation goals.

Survey Methods

Survey methods will follow the methods described in the 2013 SAV work plan for the proposed project.

The SAV survey will be conducted within the project area of the Potomac River as defined in the 2013 work plan. The project area was divided into 122 grids, each 100 feet by 100 feet (figure 4). A center point (X and Y coordinates) was determined for each grid. Forty-three grids fell on top of the various alternatives for the new intake. Thirty additional center points were selected, at random, for inclusion in the SAV survey. Approximately 60% of the grids within the project area will be surveyed directly. The survey area will be confined by the left bank of the mainstem and the shoreline of Watkins Island (approximately 800 feet "bank to bank"), and the area from the mouth of Watts Branch to the upstream side of the existing intake weir (approximately 1,700 feet) (figure 4).

The survey will be conducted from an open work boat. A Trimble® GPS with submeter accuracy will be used to navigate to station locations. The X and Y coordinates determined in the office for the center points of each grid will be uploaded to the GPS unit prior to starting the field survey.

Vegetation will be identified to species level. A modified iron garden rake will be used as a collection device if needed. The density for each rake throw will be recorded on field datasheets. Measurements of density will be recorded as 0 through 4, based upon methods developed by United States Fish and Wildlife Service (USFWS). For the density classification of collected SAV, a "0" corresponded to a lack of SAV, "1" corresponded to a very sparse density class, "2" corresponded to a sparse density class, "3" corresponded to a moderate density class, and "4" corresponded to a dense density class (USFWS 2002).

Data Analysis

Data collected from this qualitative survey will be summarized as the presence/absence, species composition, and density of SAV present within the project area at the time of the survey. Tidal stage, weather conditions, water clarity, and the time of day, will be noted as these variables can substantially affect the visibility of SAV beds. Text, summary tables, and a figure will be created to present the observations and results of the survey. Statistical evaluations of the data will not be conducted, which is consistent with this type of qualitative survey. A written report that summarizes the methodology and technical findings will be prepared following the survey.

Floating Paspalum Monitoring

Following construction activities, monitoring will be conducted to document the recovery of floating paspalum (*Paspalum fluitans*) in the project area. Floating paspalum is a state endangered grass species that was found in the project area along the muddy shorelines of the Potomac River. Floating paspalum monitoring activities will include surveys of floating paspalum to document its presence or absence in the project area as well as surveys of floating paspalum in upstream habitats used as reference locations. A report summarizing the technical findings will be produced after each survey.

This section includes the results of the 2013 and 2014 floating paspalum surveys (EAEST 2014), monitoring protocols, a discussion of the survey methodology, and data analysis.

Results of 2013 and 2014 Surveys

During the fall 2013 rare, threatened, and endangered plant survey, floating paspalum was found in the project area along the muddy shorelines of the Potomac River in both habitat stations 1 and 2. Approximately 76 plants of floating paspalum were found at habitat station 1 and approximately 395 plants were found at habitat station 2. Floating paspalum plants were also observed outside of the survey area for habitat station 2.

The 2014 floating paspalum survey documented that floating paspalum was in the same locations where it was found in 2013. Approximately 2,000 plants were located along the shoreline during this survey. In

addition, this survey documented large (thousands of stems) populations of floating paspalum in areas immediately upstream and continuing several miles above the project site. Figure 5 presents the locations where floating paspalum was found during the 2014 survey.

Monitoring

Monitoring for floating paspalum will be conducted annually by WSSC each summer for a 5-year monitoring period. Year 1 of the monitoring effort will be conducted during the summer of the same year of completion of the construction, unless the construction is completed after April 1st. If the construction is not completed prior to April 1st, the first year monitoring event will be performed the following year. Each monitoring event will be followed by an annual monitoring report which will be submitted before December 31st of each monitoring year. The monitoring report will summarize the technical findings of the survey. Details on the survey methodology are presented in the following section.

A reference area for floating paspalum within the vicinity of the project area will need to be identified during the survey and marked using a Trimble® GPS.

The mitigation goal for floating paspalum would be that the project area would succeed into the current floating paspalum extent. Following the 5-year monitoring period, a determination by NPS will be made as to whether the project achieved the final mitigation goal or whether additional efforts are required. If additional efforts are required, monitoring will continue until the project has achieved final mitigation goals.

Survey Methods

The project area will be surveyed for floating paspalum, including locations (stations) where floating paspalum was documented in 2013 and 2014 (figure 4 and 5) using a GPS unit. The number of plants found will be counted and recorded, as well as notes regarding floating paspalum presence/absence. Associated plant species that were observed along the shoreline with floating paspalum and notes to describe the habitat at the stations that support floating paspalum will be recorded to further document the distribution of this listed plant species.

Data Analysis

A written report that summarizes the methodology and technical findings will be prepared following the survey. The report will include text, summary tables, and a figure will be created to present the observations and results of the survey. Statistical evaluations of the data will not be conducted, which is consistent with this type of qualitative survey.

Forest Mitigation Monitoring

Following construction activities, monitoring will be conducted by WSSC in the project area to document the survival of plants that were planted for reforestation. Forest plant monitoring activities will include surveys of plants to document survival and reports summarizing the survey methodology and findings. Monitoring for vernal amphibians, halberd-leaved hibiscus, and rough avens would be done during the reforestation monitoring. This section includes a discussion of the forest plant survey methodology, data analysis, and monitoring protocols.

The SOF (appendix E) includes detailed information on wetland mitigation, as required by NPS. Monitoring for the enhancement of the Lock 13 wetland mitigation site would also follow the methods described below.

Post Construction Survey Methods

Annual monitoring reports will be prepared for a period of five consecutive years from the completion of construction. The first monitoring report is due the year the mitigation planting occurs, unless planting occurs after April 15, in which case the first monitoring report will not be due until the end of the next year. For each monitoring report, at least one monitoring visit shall be conducted during the growing season for the vegetative monitoring. These site visits should preferably be during a period with normal precipitation and groundwater levels. Monitoring for vernal amphibians would be done along with wetland plant species monitoring.

For each monitoring year, the estimate of the percent cover by dominant plant species (including volunteer plants) and any invasive plant species will be documented. The percent cover by plants will be estimated with a wetland indicator status of FAC or wetter. The percent survival of woody planted material and number of native trees/shrubs per acre (including volunteer woody species taller than ten inches) will be estimated. Sites where the woody species density is inconsistent throughout the site may not meet the Project Standards (e.g., a site where some portions have high densities of woody species but other portions have low densities).

Measurements of vegetation should be based upon performance standard criteria and methods used to assess the vegetative success of the mitigation site.

For years when vegetative plots are assessed, the results from the vegetation plot study will be summarized, including the density of trees/shrubs and percent cover of wetland species present in order of dominance and for each vegetative stratum. Raw plot data will not be included in the monitoring report.

Recommended Vegetation Density Measurement Technique

The following method for measuring the success of the vegetative colonization should be conducted once between May and September of the second, third, and fifth growing seasons subsequent to the completion of the construction of the mitigation project, unless an alternate schedule is agreed upon by MDE.

Vegetation sample plots will be located on a stratified random basis over the site in order to sample all areas of restored/constructed wetlands at locations adjacent to each photo location marker. The following minimum numbers of samples will be required:

- If the site is < 5 acres, then a minimum of 3 plots/acre is necessary.
- If the site is > 5 acres but less than 20 acres, then a minimum of 3 plots/acre is required for the first 5 acres, then 2 plots/acre is required for the remaining acreage.
- If the site is > 20 acres, then a minimum of 2 plots/acre is required for the first 20 acres, then 1 plot/acre is required for the remaining acreage.
- All cells, fields, or blocks shall be sampled. A targeted vegetation monitoring approach that correlates monitoring stations with vegetative signatures on aerial photography may be useful for larger mitigation sites.

Each plot shall be of a size no less than 400 square feet for woody plants and 3'x3' for herbaceous plants (or circular with approximately the same surface area). The vegetation data shall be collected during the growing season and shall include:

- Dominant vegetation species identification
- Percent ground cover assessment
- Number of woody plant stems greater than 10 inches in height (total and number/acre)

- The percentage of dominant species FAC or wetter
- Percent survival by planted species
- An invasive/noxious species assessment including percent cover

Evaluation of Success

If success criteria have been satisfied at the completion of the 5-year monitoring program, a request for release from monitoring will be made. Additional monitoring may be required as a special condition of the issued permits or after reviewing the success of the mitigation sites during the initial monitoring period.

Appropriate measures to address deficiencies identified during monitoring will be developed in consultation with NPS, WSSC, and the appropriate agency. These appropriate measures will be part of the adaptive management plan, and will ensure that the modification of the mitigation project provides ecological resource functions comparable to the project objectives. Extended monitoring of the site for a longer period than proposed may be required. Additional monitoring may be required as a special condition of the issued permits or after reviewing the success of the site during the initial monitoring period.

Nonnative Invasive Species Monitoring

Background

Nonnative invasive species are generally defined as plants which quickly invade, out-compete, and replace native species that are indigenous, occur naturally within an ecosystem, and which existed prior to significant human impacts and alterations to the landscape of a region or particular habitat. The spread of NNI species disrupts newly reforested areas in addition to established forest ecosystems or other habitat types, and often results in negative impacts on the overall biodiversity of an ecosystem, especially if the NNI species becomes a monoculture or significantly dominates the vegetation within a plant community. NNI species found at the project site during rare plant surveys are listed in table 2.

Table 2. Nonnative Invasive Species Identified at the Project Site

Common Name	Scientific Name
Grass Species	
Nepalese browntop	*Microstegium vimineum*
Herbaceous Species	
Wild garlic	*Allium vineale*
Spotted knapweed	*Centaurea maculosa*
Bull thistle	*Cirsium vulgare*
Beefsteak plant	*Perilla frutescens*
Garlic mustard	*Alliaria petiolata*
Vine Species	
Japanese honeysuckle	*Lonicera japonica*
Tatarian honeysuckle	*Lonicera tatarica*
Mile-a-minute	*Polygonum perfoliatum*
Japanese hops	*Humulus japonicus*

Common Name	Scientific Name
English ivy	*Hedera helix*
Oriental bittersweet	*Celastrus orbiculatus*
Shrub Species	
Common mugwort	*Artemisia vulgaris*
Amur honeysuckle	*Lonicera maackii*
Morrow's honeysuckle	*Lonicera morrowii*
Japanese barberry	*Berberis thunbergii*
Autumn olive	*Elaeagnus umbellata*
Multiflora rose	*Rosa multiflora*
Tree Species	
Norway maple	*Acer platanoides*
Tree-of-heaven	*Ailanthus altissima*

Objective

During the construction of the new submerged intake, NNI species will be managed at the project site based upon practices detailed in this plan. Following completion of construction, monitoring of revegetated and disturbed areas within the construction area limits will be conducted for a minimum of two years. Revegetation will be considered successful if upon visual survey, the density and cover of NNI species are similar in density and cover to adjacent undisturbed lands.

During Construction Management

The period of NNI species management defined as during construction will start coincident with earth disturbance activities and cease upon final permanent stabilization of the project area. NNI species plant material will require removal and disposal from the designated treatment areas. Field verification of proper NNI species removal and management shall be conducted immediately after completion of the construction activities to determine success of the controls during construction or to determine if any additional controls are necessary. Thresholds for NNI species control will be determined during the permitting phase of this project.

Post-Construction Management

The period of NNI species management defined as post-construction will commence upon the final permanent stabilization and continue for a period of 5 years beyond this time. During the 5-year monitoring period, areas that contain a predominance of NNI species which will require additional control will be identified. The requirements detailed in the methodology section below will be followed for post-construction management of NNI species.

Monitoring for the enhancement of the Lock 13 wetland mitigation site would include the monitoring of the invasive reed canarygrass that is proposed to be removed from the mitigation site.

Methodology

Management practices of NNI species are variable and for the purposes of this plan, prevention, mechanical control, and chemical control will be the primary methods recommended for use. Control of NNI species will require manual removal and/or herbicide application, depending on the time of year and species

specific protocol. The NPS will pre-approve all pesticide use on an annual basis. All necessary permits prior to initiating herbicide application will be obtained, and all work will follow the best management practices established by the USFWS, U.S. Department of Agriculture-Natural Resource Conservation Service, Maryland Department of Agriculture's (MDA's) Pesticide Regulations, and conditions and practices that may be established in the non-tidal wetlands permit. Herbicide labeling will be incorporated into these best management practices, accounting for species, application concentration, application time of year, and materials safety as compliant with applicable permits.

Prevention

Prevention of NNI species is the most effective and least expensive method of managing NNI species. Due to the disturbance of the site during construction activities, the potential for previously absent NNI species to become established is of concern. Field efforts during post-construction activities will allow for observations and accurate identification of on-site vegetation throughout the growing season which will identify if NNI species management is necessary. Upon identification of a previously absent NNI species, the extent of coverage shall be determined to identify whether mechanical or chemical control is necessary.

Additionally, equipment used for construction should be washed and inspected prior to entering the project site to prevent the introduction of NNI species from outside the project boundaries, when appropriate based on the potential for off-site NNI species to be present on the equipment. Any imported fill, mulch, or other materials should be free of NNI materials (certified weed-free mulch would be used), and seed mixes utilized in the stabilization of the site would meet the erosion and sediment control standards as specified in the Erosion and Sediment Control Plans for the project site. In addition an NPS-approved annual and permanent grass seed mix would be used.

Mechanical Control

Although mechanical control is an alternative for all NNI species, some NNI species may require mechanical control as the only effective management practice. The mechanical control of NNI species requires effective removal of the root system and timely implementation, specifically prior to the seed set. In addition, proper disposal of plant material is necessary to prevent regeneration or further spread of NNI species through discarded material. Seed from NNI species have potential to remain in the soil seedbank; therefore, mechanical control methods are most effective if they are implemented annually for up to 2 years.

Mechanical control options include several methods and are generally practical for smaller areas of targeted control. The options are hand-pulling, using hand and power tools to cut, girdling plants to kill them prior to removal, mowing and/or roto-tilling. Seedlings and small or shallow-rooted plants can be pulled when soil is moist. Larger plants should be dug out to remove as much of the root system as possible. The removal of seed heads prior to ripening and dispersal is an option, particularly for annual NNI species. Mechanical control of perennial NNI species such as mowing or cutting back NNI species requires a minimum of three times per growing season to be effective and may require additional mowing efforts annually. This will be determined based on field observations early in the growing season and subsequent field visits, as necessary.

Equipment shall include, but is not limited to hand tools: lever-based tools, machetes, power pruners/trimmers, chainsaws, metal blade brush cutters, brush axes/hooks, shovels, spading forks, loppers, hedge shears and associated safety equipment. Limited use of wood chippers, forestry mowers, and conventional rotary mowers may be applicable. Depending on the species specific protocol (type, size, density) and existing on-site conditions, mechanical/ manual removal of NNI species may or may not require a follow-up herbicidal application component. Some areas of NNI species may only require

manual removal treatments; however, subsequent herbicide application may be necessary to control and ultimately avoid re-emergence of the species.

Chemical Control

Herbicides can offer an effective and cost-efficient way to control NNI species in areas where manual control is not practical, such as areas with large infestations of NNI species. In addition, some NNI species are ineffectively managed using mechanical controls. Herbicides should be selected based on targeted NNI species and site constraints, such as proximity to aquatic resources. In addition, the use of chemical control should be sensitive to adjacent property vegetation and usage that may be adversely impacted by the potential for drifting chemicals, and adjacent property owner sensitivity to the chemicals being used. Depending on species-specific protocol (type, size, and density), specific area of the site, and the spatial extent of the particular NNI vegetation, three different treatments may be utilized two times annually:

- Cut-Stem Treatment
  - Cut stump/stem
  - Hack and Squirt
- Basal Bark Treatment
- Foliar Treatment

Equipment shall include, but is not limited to: backpack sprayers, spray bottles, wick-applicators, squirt bottles, injection gun, paint brush, or other equivalents as approved by the responsible party. All herbicide applications shall be selective low volume treatments. Broadcast high volume applications and equipment mounted spray operations shall not be used due to the potential for off-target drift. Herbicides approved for use by the U.S. Environmental Protection Agency (USEPA) include the following items listed in table 3; however, there are no pre-approved herbicides for use in national parks. Therefore, NPS will pre-approve all pesticide use on a case-by-case and chemical-by-chemical basis annually.

Table 3. USEPA Approved Herbicides

Active Ingredient	Examples of Approved Trade Name Products
Aquatic glyphosate	Aqua Neat
Aquatic non-ionic wetting agent	Alenza 90
Glyphosate	Roundup Pro Concentrate Rodeo Herbicide Pathfinder II (marker dye shall be added)
Triclopyr	Garlon 3A, Garlon 4
Imazapyr	Arsenal, Chopper, Stalker, Habitat

Materials shall include the herbicides, wetting agents, basal oil, marking dye, and any other incidental materials needed to successfully eradicate NNI species. All herbicides shall be USEPA-registered chemicals and MDA approved chemicals that are approved for use in forested areas and/or adjacent to waterways to control and prevent regrowth of undesirable vegetation. Manufacturer recommended wetting agents, basal oils (when appropriate), and marking dye or equivalents, would be used as approved. (NOTE: Not all of the herbicides listed in table 3 are approved for use in and/or directly adjacent to waterways/wetlands; only herbicides approved for use in proximity of aquatic resources may be utilized for such applications). Herbicides other than those listed above must be approved by the responsible agency with written approval prior to use. Manufacturer's specification sheets (labels) and

Safety Data Sheets for herbicides, wetting agents, basal oils, and dyes shall be provided to and approved by NPS, and maintained on-site throughout any application of the materials.

All herbicide applications shall be as specified in the MDA's *Regulations Manual for Maryland Highways* (October 2003), and in conformance with the manufacturer's recommendations as shown on the product label. Marking dye shall be from a commercial source, shall be herbicide compatible, and shall be water soluble. Marking dye shall be mixed with all herbicide prior to application at rates necessary to be readily visible in the field for at least three days after application.

Implementation of Recommended Methods

Personnel who will perform and/or supervise chemical control on the project site are recommended to have the following qualifications:

- Maryland Pesticide Applicator's License in appropriate categories (II, IIIA, V, and/or VI)
- Maryland Tree Expert License

During construction and post construction periods of the project, inspections of the project site would be conducted every two months during each growing season (April – November), for a total of four times to identify the areas of invasive species that require implementation of control methods.

During the management of NNI species in the construction and post-construction periods, NNI species control may occur at any point during the project based on monitoring results. Control may require manual removal or herbicide treatment, or both, depending on conditions, and should occur regardless of schedule or work load. Delays to other components of the construction project shall not be granted or allowed due to NNI species control and management. Execution of the NNI species control and management requires that all aspects of NNI species control work be executed concurrently with the construction project, whenever necessary. Manual control should be conducted a minimum of three times annually and chemical control should be conducted a minimum of two times annually.

A pre-construction meeting shall be scheduled prior to commencement of any NNI species control operations. The areas planned for treatment shall be clearly flagged in the field and reviewed by NPS and WSSC prior to commencement of treatment activities. Native plant species shall be protected and preserved from impacts associated with NNI species eradication. WSSC will be responsible for replacing and/or pruning any native plant material killed or damaged through any act of negligence during NNI species management. Due to the nature of the treatment area and the density of NNI species, some damage to desired vegetation may occur. Extreme caution shall be used when spraying adjacent to non-target, non-invasive vegetation. Areas of concern in the proximity of rare, threatened, or endangered species shall be given special priority and all applications in these areas will be coordinated with the Maryland Department of Natural Resources, prior to execution. Herbicide application will only be conducted during appropriate weather conditions as indicated on the product label (e.g., spraying during high winds, rain, high humidity, and/or high temperatures may result in uptake by off-target vegetation due to the volatility of certain herbicides).

Field verification of herbicide application success will be conducted after completion of the work and within six weeks following application. Additional applications of herbicide treatments may be required if the initial application is determined to be unsuccessful. The management of NNI species will be considered successful if, upon visual survey, the density and cover of NNI species are similar in density and cover to adjacent undisturbed lands after a two year period.

Freshwater Mussel Monitoring

Monitoring of freshwater mussels will begin one year following relocation to ensure that mussels relocated from the project area are still surviving. A general survey of the relocation area will occur and will follow the methods described in the 2013 Freshwater Mussel Study Plan for the proposed project (EAEST 2013a). Mussel relocation monitoring will continue for at least 5 years. The mitigation monitoring effort will include the collection of specific data for reporting:

- The presence or absence of the relocated mussel species.
- The abundance of the relocated mussel species.
- The density of the relocated mussel species.

ADAPTIVE MANAGEMENT

Mitigation efforts described for reforestation, wetlands, SAV, mussels, and floating paspalum may require modification in order to be successful, due to the unpredictable nature of environmental conditions and their result on the survival of wildlife and vegetation. An adaptive management and monitoring plan is recommended for use at this site. Adaptive management will take into account conditions that affect habitat restoration which were not predicted or accounted for during this initial habitat restoration plan.

The performance standards outlined in the previous sections of this report can be revised through adaptive management procedure to take into account appropriate measures implemented to address deficiencies, such as unsuccessful regeneration of vegetation or unsuccessful reestablishment of mussels. The performance standards may also be modified to reflect changes in management strategies and objectives as long as the modifications lead to ecological benefits comparable to or superior to the approved compensatory mitigation project. For example, the tree protection used onsite as part of reforestation efforts may not prevent deer grazing on the new plants, preventing the vegetation from establishing. Adaptive management to replace the plants using a new method to reduce grazing may be utilized. Adaptive management procedures can be implemented under any circumstances in which the function of the impacted vegetation, wetlands, or wildlife is not being performed by the mitigation project and secondary impacts are not being prevented.

REFERENCES

EA Engineering, Science, and Technology (EAEST). 2013a. *Freshwater Mussel Study Plan: Potomac River Mainstem Near WSSC Diversion Channel*. Prepared for Maryland Department of Natural Resources, Annapolis, MD. 8 pages.

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EA Engineering, Science, and Technology (EAEST). 2013c. *Submerged Aquatic Vegetation (SAV) Survey of the Potomac River, Montgomery County, Maryland.* Prepared for Washington Suburban Sanitary Commission, Laurel, MD. 29 pages.

EA Engineering, Science, and Technology (EA). 2014. *Floating Paspalum (Paspalum fluitans) Potomac River 2014 Survey.* Prepared for Maryland Department of Natural Resources, Annapolis, MD. 38 pages.

U.S. Fish and Wildlife Service (USFWS). 2002. *Adaptation of Braun-Blanquet Scale to Rate SAV Density through Rake Throws*. Adapted from Virginia Institute of Marine Science (VIMS) website. June 2004.

Wentworth, CK. 1922. *A scale of grade and class terms for clastic sediments*. J Geol 30:377-392.

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Attachment A:

Figures

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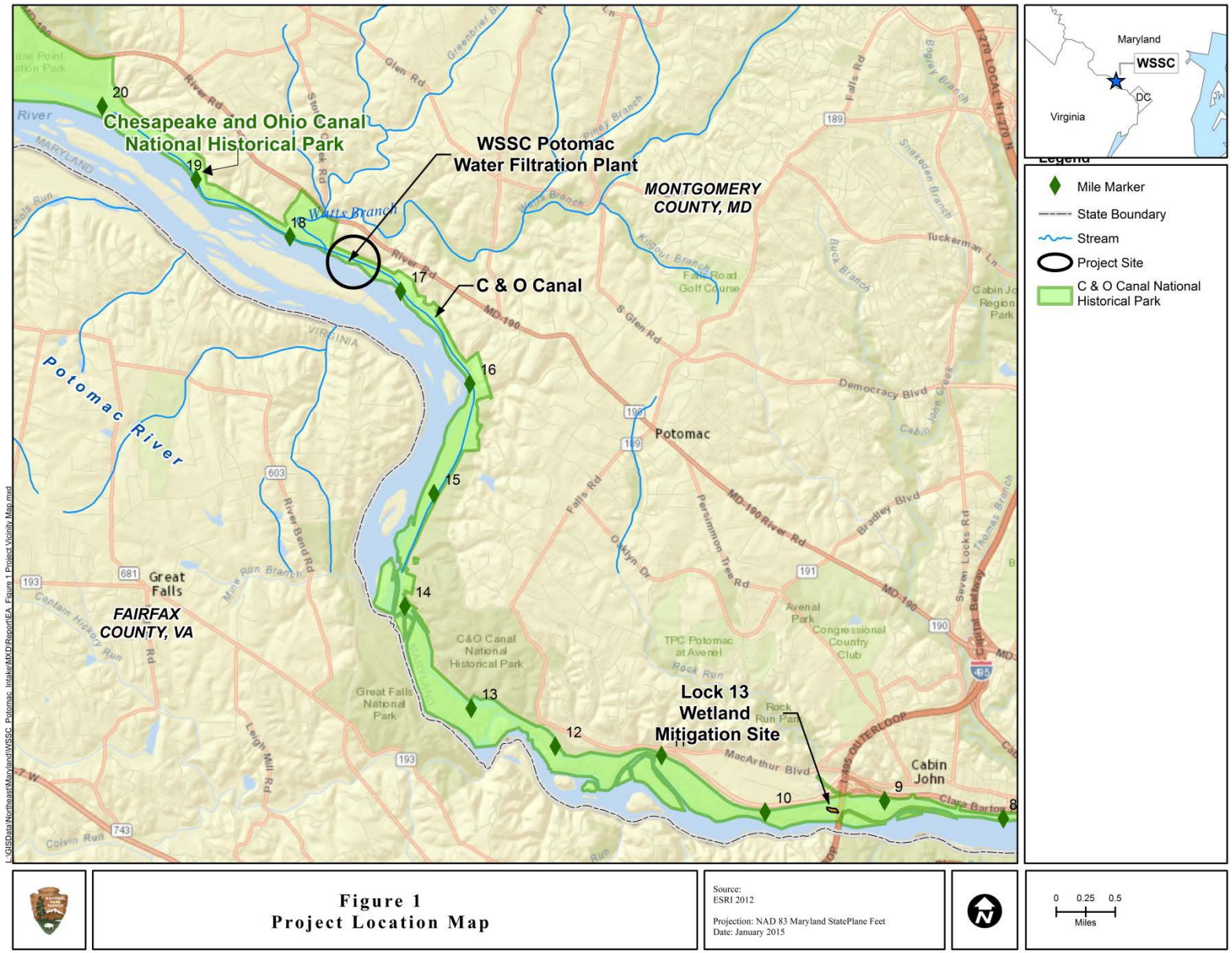

Figure 1
Project Location Map

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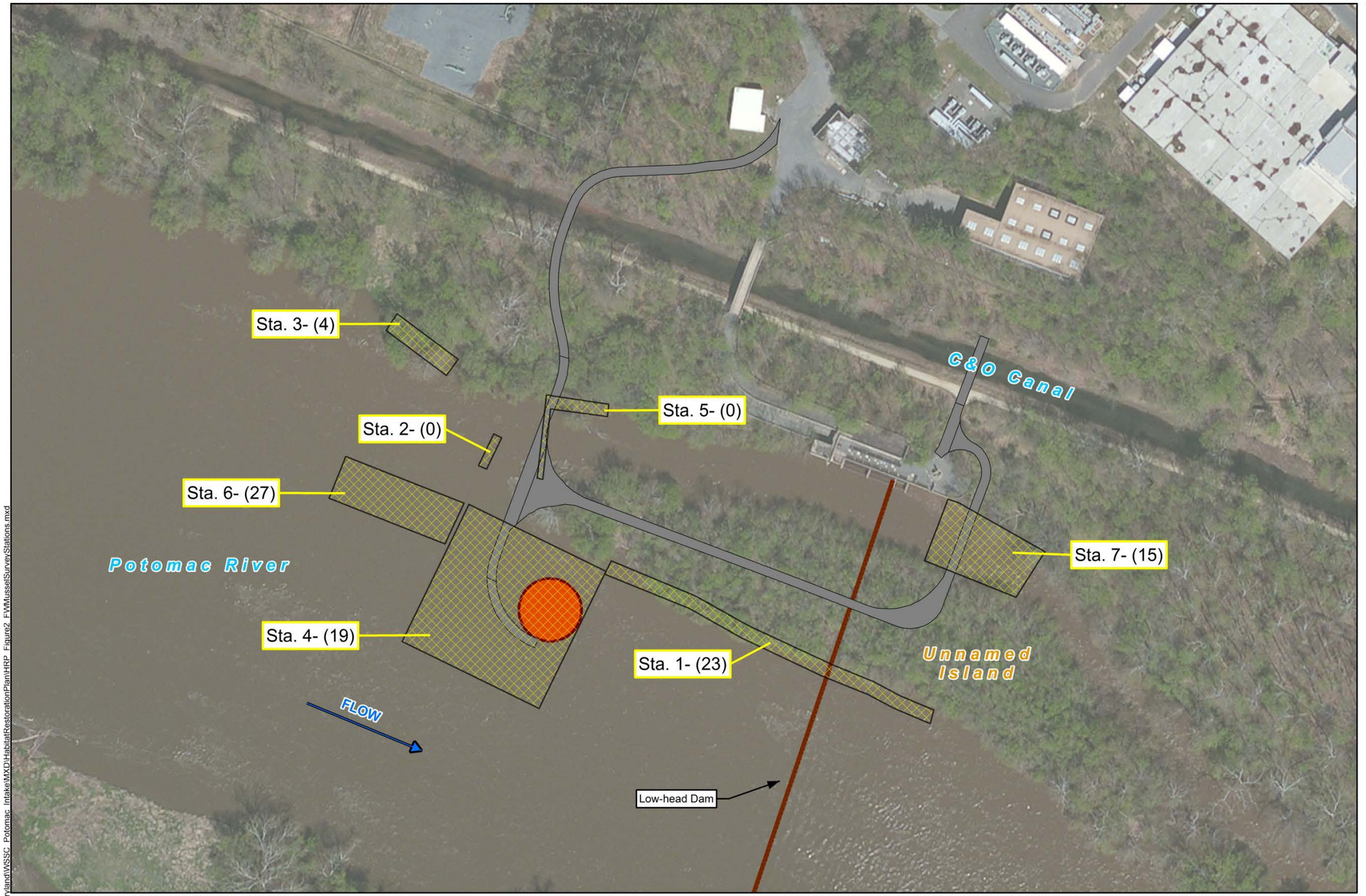

Legend

- Survey Area
- Intake Structure
- Temporary Road
- Dam

NOTE: Number of mussels collected at each station given in ()

Figure 2
Freshwater Mussel Survey Stations

Source:
Black & Veatch 2013
ESRI 2012

Projection: NAD 83 Maryland StatePlane Feet
Date: December 2014

0 25 50
Meters

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Legend

Reforestation Area

\\lovetonas\GIS\data\State and Local\Northeast Maryland\WSSC_Potomac_Intake\MXD\Habitat\RestorationPlan\IRP_Figure 3 Reforestation Areas_new.mxd

Figure 3
Reforestation Areas

Source:
Black & Veatch 2013
ESRI 2012

Projection: NAD 83 Maryland StatePlane Feet
Date: July 2015

0 100 200
Feet

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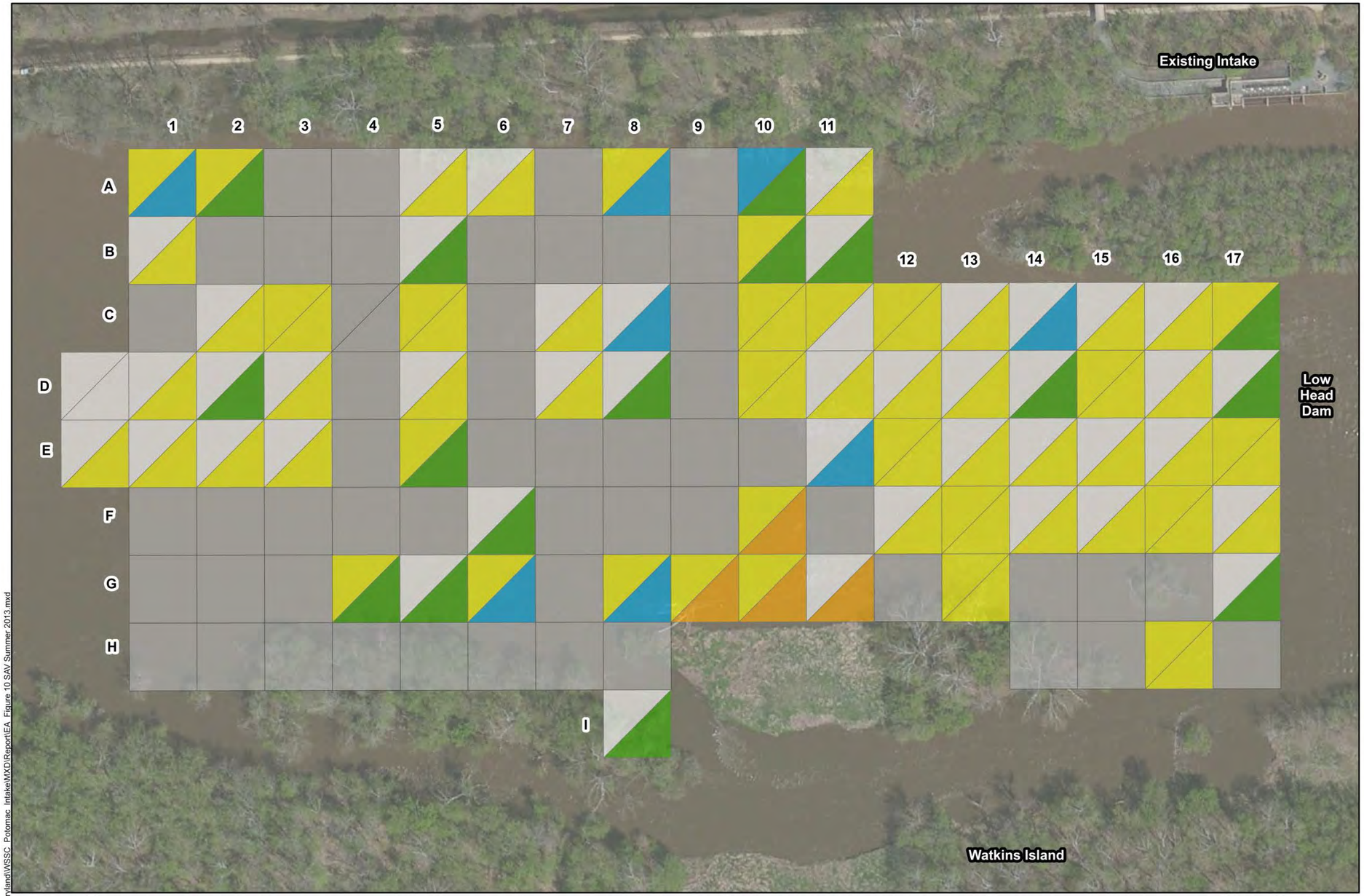

Legend

- Grid Not Sampled
- No Areal Coverage
- 1-10 % Areal Coverage
- 10-40 % Areal Coverage
- 40-70 % Areal Coverage
- 70-100 % Areal Coverage

Areal Coverage
2013 Sample Month Results

July / Sept.

L:\GISData\Northeast\Maryland\WSSC_Potomac_Intake\MXD\Report\EA_Figure 10 SAV Summer 2013.mxd

Figure 4
Submerged Aquatic Vegetation in the Potomac River, Summer 2013

Source:
ESRI 2012

Projection: NAD 83 Maryland StatePlane Feet
Date: January 2015

0 100 200
Feet

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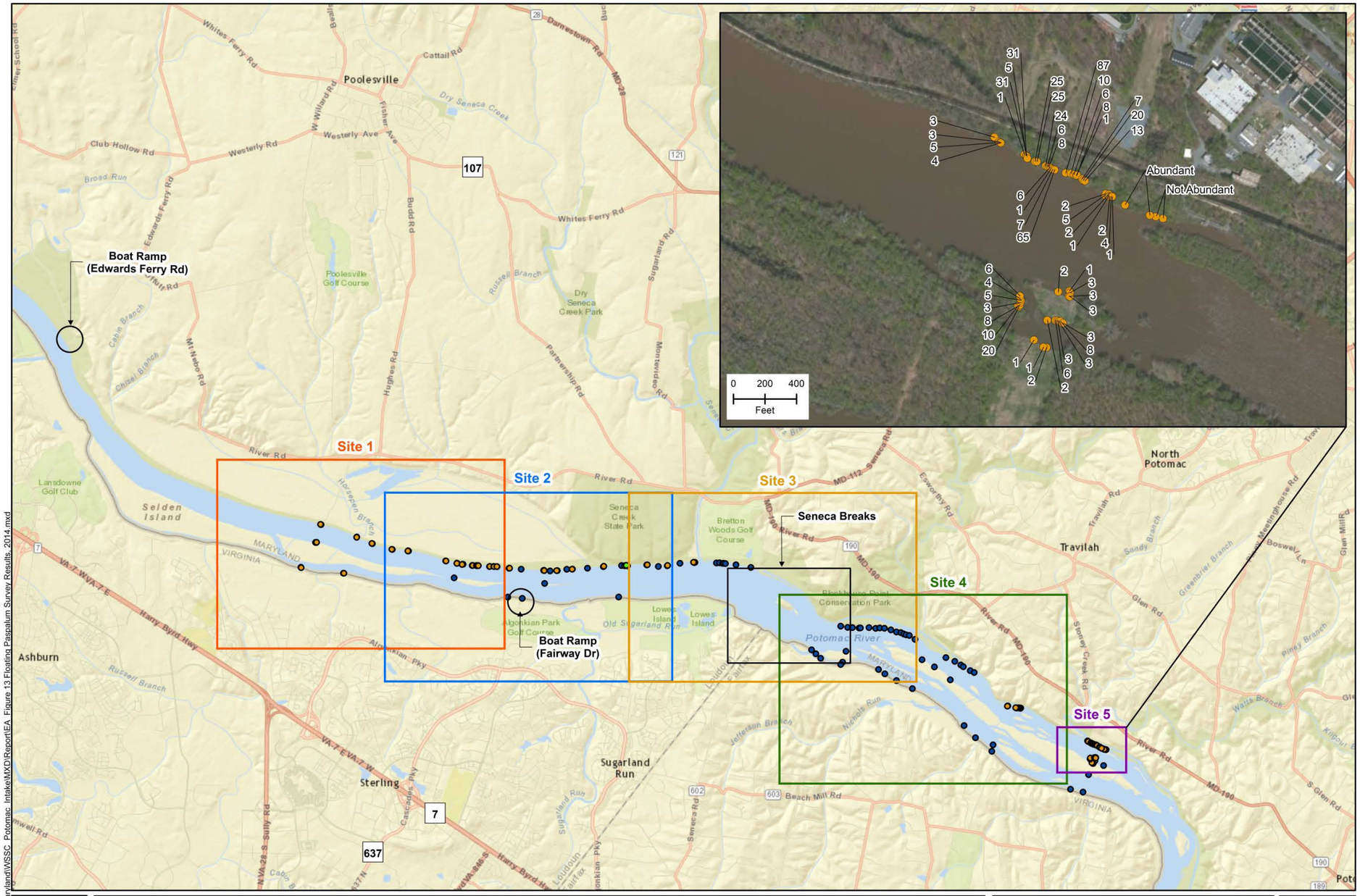

L:\GIS\Data\Northeast\Maryland\WSSC_Potomac_Intake\MXD\Report\EA_Figure 13.Floating Paspalum Survey Results, 2014.mxd

Figure 5
Floating Paspalum Survey Results, 2014

Source:
ESRI 2012

Projection: NAD 83 Maryland StatePlane Feet
Date: January 2015

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Appendix E:

Statement of Findings

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Statement of Findings for
Executive Order 11990, "Protection of Wetlands" and
Executive Order 11988, "Floodplain Management"

Chesapeake & Ohio Canal National Historical Park

Potomac Submerged Channel Intake

Montgomery County, Maryland

Recommended:	Superintendent, Chesapeake & Ohio Canal National Historical Park	Date
Certification of Technical Adequacy and Servicewide Consistency:	Chief, Water Resources Division	Date
Approved:	Regional Director, National Capitol Region	Date

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ATTACHMENT A: FIGURES

ACRONYMS AND ABBREVIATIONS

BMP	Best Management Practices
C&O Canal NHP	Chesapeake and Ohio Canal National Historical Park
EA	Environmental Assessment
FEMA	Federal Emergency Management Agency
GPS	Global Positioning System
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
NEPA	National Environmental Policy Act
NPS	National Park Service
NWI	National Wetlands Inventory
OHWM	Ordinary High Water Mark
PFO1B	Palustrine, Forested, Broad-Leaved Deciduous, Saturated
R2UBH	Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded
R2UBHx	Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded, Excavated
RPW	Relatively Permanent Water
SAV	Submerged Aquatic Vegetation
SOF	Statement of Findings
TNW	Traditional Navigable Waters
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WFP	Water Filtration Plant
WSSC	Washington Suburban Sanitary Commission

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STATEMENT OF FINDINGS

INTRODUCTION

Wetlands

Executive Order 11990, "Protection of Wetlands," issued May 24, 1977, directs all federal agencies, to avoid to the maximum extent possible, the long- and short-term adverse impacts associated with the occupancy, destruction, or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. In the absence of such alternatives, parks must modify actions to preserve and enhance wetland values and minimize degradation.

To comply with Executive Order 11990 within the context of the agency's mission, the National Park Service (NPS) has developed a set of policies and procedures found in Director's Order 77-1: *Wetland Protection* (NPS 2002) and Procedural Manual 77-1: *Wetland Protection* (NPS 2012). These policies and procedures emphasize: 1) exploring all practical alternatives to building on, or otherwise adversely affecting, wetlands; 2) reducing impacts to wetlands whenever possible; and 3) providing direct compensation for any unavoidable wetland impacts by restoring degraded or destroyed wetlands on other NPS properties. If a preferred alternative would have adverse impacts on wetlands, a Statement of Findings (SOF) must be prepared that documents the above steps and presents the rationale for choosing an alternative that would have adverse impacts on wetlands.

Floodplains

Pursuant to Executive Order 11988, "Floodplain Management," and Director's Order 77-2: *Floodplain Management*, flooding hazards have been evaluated related to the proposed alternatives for the project. This SOF describes the proposed project and alternatives, project site, floodplain determination, use of floodplain, investigation of alternatives, flood risks, and mitigation for the continued use of facilities within the floodplain.

PROJECT AREA

The NPS prepared an environmental assessment (EA) to consider the environmental consequences related to the potential construction of a new offshore submerged channel intake for water supply at the Washington Suburban Sanitary Commission's (WSSC) Potomac Water Filtration Plant (WFP). The Potomac WFP is located along River Road near Potomac, Montgomery County, Maryland, on the north side of the Potomac River (attachment A, figure 1). The Chesapeake and Ohio Canal National Historical Park (C&O Canal NHP or the park) is located parallel to the Potomac River and passes between the existing water intake structure and the remaining facilities of the WFP. The C&O Canal NHP extends for 184.5 miles from Washington, DC to Cumberland, Maryland. The project area is located near mile marker 17.5 of the C&O Canal NHP. The project would involve construction activities in and adjacent to the C&O Canal NHP.

There are three landowners within the project area: NPS, WSSC, and the State of Maryland (attachment A, figure 2). For the purposes of this SOF, the mitigation of wetlands within NPS property is addressed.

ALTERNATIVES CONSIDERED

The purpose of the federal action is to respond to WSSC's proposal considering the purpose and resources of C&O Canal NHP, as expressed in statute, regulation, policy, and the NPS objectives in taking action Figure 2 (attachment A) depicts the project area and existing riverine systems and wetland features. The project is necessary because the applicant has submitted an application and preliminary plans to construct a submerged intake and supporting features in and adjacent to C&O Canal NHP. The park's enabling legislation recognizes the potential need for utility projects to cross the park and provides the Secretary authority to permit crossings "if such crossings are not in conflict with the purposes of the park and are in accord with any requirements found necessary to preserve park values." Public Law 91-644, Section 5 (b), 1971. The applicant requests NPS permission to construct a new submerged channel intake in the Potomac River, as well as an onshore intake shaft, a boat ramp, a parking area, and a permanent access road. Construction would include temporary cofferdams in the Potomac River for the submerged intake and boat ramp and a temporary construction access road including embankments across the Potomac River and C&O Canal.

Alternative 1: No-Action Alternative

The no-action alternative is required under National Environmental Policy Act (NEPA) to compare feasible alternatives to existing conditions. Under the no-action alternative, the existing operations at the Potomac WFP would continue, and no alterations would be made to the Potomac WFP, the C&O Canal NHP structures, or the Potomac River.

The Potomac WFP draws water directly from the Potomac River and can treat up to 285 million gallons of water each day. The main facilities that support the Potomac WFP include the existing intake, diversion weir, two raw water pumping stations, and six raw water intake conduits. The existing intake is located along the shoreline of the Potomac River opposite the Unnamed Island. The diversion weir is located at the eastern end of the structure and creates a pond from which the intake draws. Water flows through the existing intake by gravity through six conduits under the C&O Canal to the raw water pumping stations. Current average and maximum day production rates are approximately 130 and 200 million gallons of water per day, respectively; however, the existing intake structure has a maximum capacity of 400 million gallons per day.

An access road to the existing intake extends from the south gate of the Potomac WFP and across the C&O Canal at the west side of the intake. The road divides into the upper access road that follows a retaining wall and the intake access road that parallels the Potomac River and terminates at the WSSC monument. The intake access road is connected to the towpath via a foot path.

The C&O Canal, operated by the NPS, runs between the intake and the pumping stations. The C&O Canal is a historic man-made structure that is the focus of the C&O Canal NHP. This is generally a linear park that occupies the north bank of the Potomac River and extends from Cumberland, MD downstream into the District of Columbia. The towpath along the canal is a popular area for hiking and the canal itself can be navigated by small nonmotorized recreational watercraft. Within the Potomac WFP site, the canal itself is a dish or trapezoidal shaped section approximately 5 feet deep at the center and approximately 60 feet wide. An approximately 10 feet wide towpath is located on the south bank of the canal. The towpath is connected to the intake access road at the WSSC interpretive monument at the east end of the intake. The canal property extends from approximately 20 feet north of the northern canal bank to the river and includes the property on which the intake is constructed.

Because the existing intake structure would remain in the same location, the tributary runoff on the north bank of the Potomac River would continue to have an impact on the raw water quality and treatment plant operations. The raw water entering the water treatment process following storm or high flow events would continue to contain increased levels of solids, chemicals, and pathogens and require higher quantities of chemicals to treat raw water during these high flow events.

Elements Common to All Action Alternatives

The construction of a new submerged channel intake is proposed under all the action alternatives. An offshore intake would improve the quality of the raw water for the Potomac WFP; however, the quality of the water supplied to the public would not change. The proposed project would not increase water withdrawals from the river, but would provide higher quality source water from an alternate location. The current shoreline intake has a greater withdrawal capacity than that for which WSSC is permitted. Likewise, the proposed submerged channel intake would have the capacity for greater withdrawals than the current permit allows. Water consumption has been static over the last 30 years, and WSSC has no reason to expect this to change. Current average and maximum day production rates are approximately 130 and 200 million gallons of water per day, respectively; the submerged intake was designed for an ultimate or future peak flow capacity of 400 million gallons per day. The construction of the submerged intake would be a major undertaking, and the intake has been designed for long-term use. A larger intake accommodates future requirements, reducing the likelihood of future construction in the river. A new permit would be required before WSSC could increase water withdrawals from the Potomac River. The project would include the following elements, regardless of the action alternative chosen.

Construction Area Limits (Limits of Disturbance)

While the actual construction area limits vary slightly among the alternatives (8.7 – 9.1 acres), the treatment remains the same. For impact analysis, it is assumed that all areas within the depicted construction area limits could be impacted by construction. The individual elements (e.g., temporary and permanent roads, cofferdams, embankments) would essentially be as depicted for each alternative. Location and exact dimensions may shift slightly as design progresses, but all construction activity would occur within the construction area limits, and significant changes in location or dimension are not anticipated. The construction area limits for the project were designed to avoid and minimize impacts to natural resources. One of the goals of construction is to leave the existing habitat as close to natural and undisturbed as possible by constructing the project in the smallest footprint feasible.

Intake Shaft (Underground)

- River intakes and the intake shaft would be constructed southwest of the existing intake facility. River intakes would be comprised of three separate structures in a side-by-side configuration at the top of the intake shaft and above the river bottom, sized for a water inflow velocity of 0.5 feet per second. Intake structures would be connected to three corresponding separate 96-inch-diameter intake conduits, constructed within the intake shafts and tunnels/trench. Construction of the intake shaft would be done using the drill and blast method.
- The intake shaft would be used to construct the river intakes and connect them to either tunneled or trenched intake conduits.
- The location of the intake shaft would be approximately 100-feet offshore of the west end of Unnamed Island.
- The intake shaft is estimated to be 80 feet in diameter and approximately 50-feet deep in partially excavated rock for the tunneling alternatives and 40-feet deep in the trenching option.

- For all alternatives, three small shafts – one down to each of the connections between a new 8-foot intake conduit and two existing 6-foot intake conduits with 6 x 8 foot diameter steel pipe tee fittings – will be constructed.

Onshore Shaft/Junction Vault

- A new onshore shaft would be constructed west of the existing intake facility.
- The onshore shaft would be used as the main access point during tunneling operations. When tunneling operations are completed, a permanent junction vault structure would then be constructed within the shaft. The gate structure would include sluice gates used to control flow to the existing piping connections and provide operational flexibility for the Potomac WFP. The junction vault will be located primarily underground with a 16 x 52 foot at grade rectangular structure containing three 12 x 12 foot chambers with at grade, removable slabs for maintenance access to the sluice gates. Each chamber will have an above grade sluice gate operator protruding approximately 3 feet above grade.

Cofferdam (Intake Shaft)

- A temporary cofferdam would be constructed to provide a "dry" working area for construction of the intake shaft and possibly to sculpt the river bottom upstream of the intake to provide optimal flow conditions to the intake. The need for and extent of this sculpting will be determined in detailed design through additional hydraulic modeling, geotechnical investigations, and bathymetry. The cofferdam would extend approximately 150 feet into the river and 200 feet across in an oval shape.
- Each side of the cofferdam cross section would include a dam-type backfill area using select material placed at 2:1 side slopes from a bottom elevation of 152 feet (corresponding approximately to river bottom) to a top of dam elevation of 175 feet. The dimensions of each side of the dam would be 23 feet high and 104 feet wide at the base. The top section would be 12 feet wide, and would serve as a temporary road for construction access. The two sides of the dam would be separated by approximately 230 feet from each other's toe to provide sufficient area to lay back trenches or to work on the intake shaft at the River. The overall width of the dams plus the piping would be approximately 400 feet.

Boat Ramp and Permanent Access Road

- A new permanent access road, boat ramp and parking area would be constructed west of the existing intake facility.
- A temporary cofferdam would be constructed around the boat ramp location to provide a "dry" working area.
- The parking area would be sized to accommodate a truck and trailer and up to three additional parking spaces for other vehicles. It would accommodate parking and maneuvering of the vehicles, as well as other equipment necessary to maintain the offshore intake. None of the equipment would be stored on the parking area. Maintenance of the offshore intake could include launching of a small barge to collect debris and deposits around the intake. The barge-hauling truck and trailer would park in the parking area while debris collection is made. The parking area could also hold a dump truck during cleaning operations to remove the debris/deposits from the site. Cleaning/Maintenance is estimated to be needed every two years or more. Between

maintenance, no vehicle use, besides emergency vehicles, is anticipated at the boat ramp/parking area.

- Pervious materials would be used for the surface of the parking area and the portion of the boat ramp that is upland and not subject to frequent inundation.
- A permanent road would be located off of the existing intake facility access road to the location of the new boat ramp and parking area. This road will also provide access for maintenance of the junction vault. A locked security gate would be constructed restricting access from the existing intake access road to the permanent access road that leads to the junction vault and boat ramp.

Temporary Access Road and Embankment

- A temporary access road would be constructed to allow access from Potomac WFP property to construction areas. The road would provide construction access to the intake shaft on the west end of Unnamed Island and to the existing raw water conduits. The temporary access road follows the same route from the Potomac WFP property in the north to just east of the existing intake for all three alternatives. The remaining route that differs amongst the alternatives is described under each alternative. One embankment would be constructed across the C&O Canal for the temporary access road. The embankment is needed to cross the C&O Canal because the types of construction equipment required for the project would likely exceed the rated loading capacity (20 tons) of the existing bridge crossing.
- A second embankment would be constructed across the channel between Unnamed Island and the shoreline just east of the existing intake to support the construction access road.
- A protective landscape fabric barrier would be installed between the towpath and the fill and between the canal prism and the fill to protect the structural integrity of these resources where the road crosses.
- Visitor use of the towpath would be accommodated by constructing ramps on either side of the access road. The ramps would allow walkers, cyclists, strollers and wheelchair users to cross the access road as they traverse the towpath.
- Safety personnel and signs would be used to protect visitors.

Public Protection Controls

- Visitors would be excluded from all construction areas by the use of construction fencing around the perimeter of the project, and if appropriate, by the use of guards. Flag people would control towpath traffic during blasting and drilling and when construction vehicles cross the towpath.
- During construction of the embankment, temporary access roads, and the cofferdams, the C&O Canal, towpath, and portions of the Potomac River would be temporarily closed to visitors; however, detours would be provided to avoid having visitors within close proximity to the construction zone.
- Signage would be installed to inform the visitors to the towpath of closures and detours. Signage would be present for the duration of the construction phase of the project. Lighting would not be installed, as construction activities would not occur at night and the park is only open during daylight hours.

Canal Operations

- For the temporary access road, temporary culverts would be installed through the embankment to maintain flow in the canal. A protective landscape fabric barrier would be installed between the fill and the canal prism to protect the structural integrity of the canal prism.

Connection to Existing Facilities

- The proposed connection to the existing facilities for all alternatives is through the existing raw water conduits between the existing intake and towpath. This connection will be made by constructing small shafts above each connection point.

Land Exchange

- A land exchange between the NPS and WSSC would occur. WSSC is planning to purchase and provide land, identified by NPS, to the NPS in exchange for a perpetual easement for the existing and proposed intake facilities. The land for which an easement is needed has been surveyed and mapped. Lands to be purchased and provided by WSSC to NPS in exchange for the easement will be identified and the agreement between NPS and WSSC signed prior to the issuance by NPS of the special use permit (SUP) for construction. A SUP is a document issued by the superintendent to allow special park uses that do not have their own permitting instrument.

Land Ownership

- The project site involves three parcels of land under separate ownership (WSSC, NPS, and the state of Maryland). A small portion of the project (northern portion of the construction access road) is within the boundaries of the existing Potomac WFP facility owned by WSSC. The boat ramp, parking area, access road, junction vault, and onshore intake tunnels would be located on NPS property. The majority of the construction access road, the intake shaft, and in-river intake tunnel would be located on both land and riverbed that is owned by the State of Maryland.
- Unnamed Island is a small island in the Potomac River located just offshore of WSSC's existing raw water intake. The ownership of Unnamed Island was investigated by WSSC since environmental impacts are expected to the island by construction activities related to the proposed new offshore submerged channel intake. Through extensive research on the ownership of the island, it was determined vacant and a title search revealed that Unnamed Island lacks ownership (Miles and Stockbridge 2014). Any unpatented land in the Potomac River is "owned" by the state; therefore, the state of Maryland owns the island.

Wetland Mitigation Site

Since implementation of the proposed project would involve impacting wetland areas, a wetland mitigation site was identified on park property within the area of Lock 13. The Lock 13 wetland mitigation site is a 1.7-acre wetland between the Potomac River and C&O Canal, near the I-495 overpass. Figure 3 in attachment A shows the location of the wetland mitigation area.

Required Permits, Approvals, and Plans for Proposed Action

- Permits for construction of the Potomac Submerged Channel Intake Project are anticipated to be required from the following agencies:
    - NPS
    - U.S. Army Corps of Engineers (USACE)
    - Maryland Department of the Environment (MDE)
    - Montgomery County
- A general summary of the anticipated permits and approvals required for the proposed project are summarized in table 1, and a general summary of the anticipated plans required for the proposed project are summarized in the following paragraphs. In addition to required permits and plans, WSSC is planning to purchase land which it would provide to the NPS in exchange for a perpetual easement for the existing and proposed intake facilities.

Table 1. General Summary of Required Permits and Approvals

Permit/Approval Name	Agency	Description of Permit/Approval
Federal Issued Permits		
Section 404 Permit for Discharge of Dredged or Fill Material into Waters of the US	USACE	Permit required for any activity that involves filling Waters of the U.S., including wetlands. Authorizes only necessary and unavoidable impacts.
Section 10 of the Rivers and Harbors Act Permit	USACE	Permit required for any work in the Potomac River, including construction, excavation, or deposition of materials in, over, or under navigable waters, or any work that would affect the course, location, condition, or capacity of those waters.
Special Use Permit	NPS	Permit required for a short-term special park use that is issued by the superintendent such as an activity that provides a benefit to an individual, group, or organization rather than the public at large; requires written authorization and some degree of management control from the NPS in order to protect park resources and the public interest; and is neither initiated, sponsored, nor conducted by the NPS.
Perpetual Easement	NPS	WSSC is planning to purchase land which it would provide to the NPS in exchange for a perpetual easement for the existing and proposed intake facilities.
State Issued Permits		
Section 401 Water Quality Certification	MDE	Permit required for wetlands and waterways construction to prevent violation of water quality standards.
Nontidal Wetlands and Waterways Permit	MDE	Permit required for any activity that alters nontidal wetland or its 25-foot buffer.
Waterways Construction Permit	MDE	Permit required for construction in river and 100-year floodplain to prevent increased flooding and impacts on river channel, wetlands, floodplains, and impacts on fish and wildlife.
General Discharge Permit for Stormwater Associated with Construction Activities	MDE	Permit required in areas of disturbance >1 acre to control stormwater runoff during construction.

Permit/Approval Name	Agency	Description of Permit/Approval
Water and Sewerage Construction Permit	MDE	Permit required for major modifications of public water systems.
Memorandum of Agreement	SHPO	A Memorandum of Agreement will be prepared with stipulations that outline appropriate treatment measures to minimize or mitigate adverse effects to cultural resources.
County Issued Permits		
Sediment Control Permit	Montgomery County	Permit required for work in the Potomac River. Permit requires applicant to install booms and filter fencing in water column to reduce the quantity of solids released during construction activities.
Floodplain District Permit	Montgomery County	Permit required for any land disturbing activities within the floodplain district and for temporary or permanent construction involving the placement of a structure, regardless of the size of the disturbed area.

Erosion and Sediment Control Plan – After the detailed design has been completed, an agency approved erosion and sediment control plan would be prepared and obtained before construction begins. This plan is required by MDE to control soil erosion and sediment runoff from construction sites. It is required for projects that involve land clearing, land disturbance or grading where more than 5,000 square feet are disturbed within the limits of the project area. MDE and its Water Management Administration oversee the approval of erosion/sediment control and stormwater management plans and documentation, as well as the issuance of permits and state regulatory standards. Stormwater runoff (discharge) from Maryland construction sites are regulated under section 402 of the Clean Water Act. Section 402 outlines the National Pollutant Discharge Elimination System permitting program. MDE and Montgomery County would review and approve this plan prior to construction.

The plan typically includes:

- Environmental site design to be utilized throughout all stages of the construction project.
- Best Management Practices (BMPs) to minimize total land disturbances caused by construction activities.
- Control of vehicles and construction equipment entering and exiting the site.
- Evaluations and Inspection records throughout the duration of construction.
- Identification of disturbed or high risk locations within the construction site.
- Final and temporary stabilization methods to remedy all environmental site disturbances.
- Protective measures to ensure all discharges into the Chesapeake Bay and other Maryland water bodies are in accordance with an established Total Maximum Daily Load.

Erosion and sediment controls, which include both stabilization and structural control measures, prevent or reduce erosion, and redirect stormwater flow during construction activities. Examples of construction stabilization include:

- Temporary seeding: Vegetation such as grass that grows quickly to hold the soil in place preventing erosion due to wind currents or stormwater. An NPS-approved annual grass seed mix would be used.
- Permanent seeding: Vegetation is used during construction to prevent soil erosion and remains as part of the final landscaping. An NPS-approved permanent grass seed mix would be used.
- Mulching: Material such as hay, grass, wood chips, gravel, or straw is placed on top of the soil to prevent erosion and only certified weed-free mulch would be used.

Structural control measures prevent pollutants from leaving the construction site, limit the amount of water flow, or change the direction it travels. Examples include:

- Silt fences: A trapping device captures sediment on one side of the fence while allowing water to flow through.
- Sediment traps: Sediment settles out in a specified area such as an empty pond.
- Sediment basins: Sediment basins allow sediment to settle out in a specified area but require a controlled release of the water flow.

Stormwater Management Plan – After the detailed design has been completed, an agency approved stormwater management plan would be prepared and required permits obtained before construction initiation. The plan is required by regulation if more than 5,000 square feet are disturbed to prevent stream bank erosion by controlling the rate of stormwater runoff from newly developed areas. Examples of stormwater management controls include:

- Retention Ponds: Stormwater runoff is retained in a pond and may be removed through evaporation, infiltration, or emergency bypass.
- Detention Ponds: Water is held then slowly released, allowing sediments to settle.
- Infiltration: Measures can include infiltration trenches, basins, and dry wells that allow water to percolate from the surface into the soil below.
- Vegetated Swales and Natural Depressions: Vegetation, usually grass, lines the swale and removes sediments from runoff, allowing it to better infiltrate into subsurface soil.

This plan would include sufficient information, drawings, computations, and notes to describe how soil erosion and off-site sedimentation would be minimized. The plan would serve as the basis for all subsequent grading and stabilization that would take place on the construction site. Coordination and approval with MDE is required based on how much impervious surface remains onsite after construction.

Construction Safety Plan – Prior to construction, a construction safety plan would be prepared that addresses appropriate elements to provide for visitor, worker, and park staff safety. A construction safety plan is important for several reasons. First, it helps protect workers and the public from injury or harm. Second, it is often required by land owners or developers to help limit their liability during construction. A construction safety plan typically includes the following topics: scope of project work, project risks and methods of control such as unauthorized public access to the site and exposure to construction site hazards and worker exposure to general site hazards, site inspections, public protection controls such as erecting fences or barricades and displaying signs “Construction Site - Do Not Enter Authorized Personnel Only,” project site rules, and emergency preparedness. These fences or barriers would also act as a visual barrier to reduce the visual impacts from vegetation removal and construction activities.

Habitat Restoration Plan – A Habitat Restoration Plan was developed through consultation with NPS, USACE, U.S. Fish and Wildlife Service (USFWS), and Maryland Department of Natural Resources (MDNR). This comprehensive plan provides guidelines for habitat and resource restoration and mitigation associated with the construction and operation of the new offshore intake structure. This plan includes mitigation activities associated with freshwater mussels and reforestation of the project area. This plan also includes monitoring activities associated with submerged aquatic vegetation, floating paspalum (*Paspalum fluitans*), species planted for reforestation, nonnative invasive species, and freshwater mussels. Adaptive management was also included since mitigation efforts may require more advanced management and modification in order to be viable.

Alternative 2: Tunneling to Onshore Shaft -West of Existing Intake (Preferred Alternative)

Figure 4 (attachment A) depicts the location of the project elements for alternative 2, which is the preferred alternative for this project. In addition to elements common to all action alternatives, alternative 2 would include the following elements:

Construction Method

- Alternative 2 would utilize tunneling for the installation of all new piping.
- The tunneling for each of three 8-foot-diameter intake conduits (pipes) requires a 10-foot-diameter tunnel with a horseshoe-shaped cross section. The three tunnels are separated 10 feet from each other's side walls. The tunnels are 30-feet deep from the tunnel invert to the river bottom. There is a 5-foot separation at each side of the overall piping section to the boundary of the impact area.

Construction Schedule

- Phase 1 - construction (mainly onshore) before installation of the intake cofferdam: site preparation, clear and grub site (4.7 acres), install stormwater management, temporary construction laydown areas, site security, install access road embankments and culverts, and install temporary access road. This phase would take approximately 17 months. All vegetation within the construction area limit would be removed during Phase 1.
- Phase 2 - installation of intake cofferdam and associated construction within the cofferdam: install intake cofferdam, install intake shaft, install onshore shaft and construct junction vault (note: this is onshore construction), install tunnels from onshore shaft to intake shaft, install conduits in tunnel, grout around conduits in tunnels, fill and cover intake shaft and onshore shaft, and remove intake cofferdam. This phase would take approximately 2 years.
- Phase 3 - construction (mainly onshore) after removal of intake tunnel cofferdam: construct boat ramp, parking area, and permanent access road; remove temporary embankments and temporary access road; and conduct site restoration of approximately 4.4 acres. This phase would take approximately 6 months.

Onshore Shaft

- A new onshore shaft would be constructed west of the existing intake facility.

Intake Tunnels

- The three intake tunnels would head north from the new intakes to the onshore shaft, and then head east before connecting into the six existing 6-foot-diameter intake conduits on the downstream side of the existing intake facility.

Temporary Access Road

- The eastern portion of the temporary access road ends northeast of the existing intake.

Embankment

- An additional temporary road embankment would be constructed across the Potomac River channel to allow construction vehicles to cross and traverse over the western portion of Unnamed Island and to continue back onshore. This would allow access to construction areas needed to construct the intakes and intake shaft and perform the pipeline connections. Culverts would be provided in the embankments (see "Common to All Action Alternatives" section for the eastern embankment) to maintain flow in the channel.

Alternative 3: Trenching/Tunneling to Onshore Shaft - West of Existing Intake

Alternative 3 is similar to alternative 2 with respect to the locations of the new intakes, onshore shaft/junction vault, horizontal alignment of the new conduits, and the connections to the existing 6-foot intake conduits. However, the installation of the new piping would be completed using both open-trench and tunneling construction. The intake conduits between the intake shaft and the onshore shaft would be installed in a trench and the intake conduits between the onshore shaft and connection to existing conduits would be installed in tunnels. Some of the same design features for alternative 2 also apply to alternative 3; however, those that most significantly differ include the following:

Construction Method

- Alternative 3 would utilize open-trench construction in lieu of tunneling for the installation of new piping between the intake shaft and the onshore shaft. Tunneling construction would be used to install the piping under the existing access road, adjacent to the existing bridge abutments, to minimize risk and impacts associated with open trenching and also to keep the intake road open during construction.
- The trench section for the 8-foot-diameter piping requires a 12-foot-high and 10-foot-wide backfill trench section, including pipe bedding. The trenches are 17-feet deep from trench invert to the river bottom. A 5-foot-high concrete slab extending from the river bottom down to the top of the trench would be installed to prevent flotation or scouring of pipes. The three trenches are separated 10 feet from each other's side walls. There is a 5-foot separation at each side of the piping section to the boundary of the permanent impact area. There is also a 20-foot separation from both sides of the piping section to the edge of the cofferdam toe fill sections. The 60-foot-wide section is considered the permanent impact area.
- The intake shaft is estimated to be 80-feet (diameter) wide and slightly shallower at approximately 40-feet deep within partially excavated rock.

Construction Schedule

- Phase 1 - construction (mainly onshore) before installation of the intake tunnel cofferdam: construction during this phase would be the same as alternative 2 except that there would be an additional cofferdam in the existing intake channel to provide access to Unnamed Island and there would be an additional step of installing a temporary water supply channel across Unnamed Island. This phase would take approximately 19 months. All vegetation within the construction area limit (3.7 acres) would be removed during Phase 1.
- Phase 2 – installation of intake cofferdam and associated construction within the cofferdam: construction during this phase would be the same as alternative 2 except that a trench instead of a tunnel would be excavated within the cofferdam from the intake shaft to the onshore shaft. Conduits would then be installed in the trench. This phase would take approximately 1.8 years.
- Phase 3 - construction (mainly onshore) after removal of intake cofferdam: construct boat ramp, parking area, and permanent access road; remove temporary embankments and temporary access road; and conduct site restoration of approximately 3.4 acres. This phase would take approximately 6 months.

Trenched Conduits

- Where the sections of new conduits are placed in the channel and river, a concrete cap or cover would be installed above the conduits for pipe protection. The top of the concrete cover would match the existing channel or river bottom elevation.

Cofferdam (intake shaft and trenched conduits)

- Since this alternative utilizes open-trench construction, a larger, more extensive cofferdam is required in the river and across Unnamed Island to install new conduits from the new intake. The cofferdam across the existing intake channel would serve as the channel crossing for the temporary construction road in lieu of the western embankment in alternatives 2 and 4.

Embankment

- Since the cofferdam construction would block off flow from the existing supply channel to the existing intake facility, a temporary supply channel would recreate this flow through and across Unnamed Island. An embankment with culverts that maintain supply flow is needed across the temporary supply channel to provide construction vehicle access to the east connection to existing conduits.

Alternative 4: Tunneling to Onshore Shaft - East of Existing Intake

For alternative 4, the method of constructing the three intake tunnels and many of the design features are similar to what is described under alternative 2; however, the horizontal alignment of the tunnels/conduits and the location of the onshore shaft/junction vault are different. Some of the same design features for alternative 2 also apply to alternative 4; however, those that most significantly differ include the following:

Construction Schedule

- Phase 1 - construction (mainly onshore) before installation of the intake cofferdam: construction during this phase would be the same as alternative 2. This phase would take approximately 17 months. All vegetation within the construction area limit (4.4 acres) would be removed during Phase 1.
- Phase 2 – installation of intake cofferdam and associated construction within the cofferdam: construction during this phase would be the same as alternative 2. This phase would take approximately 2 years.
- Phase 3 - construction (mainly onshore) after removal of intake cofferdam: construct boat ramp, parking area, and permanent access road; remove temporary embankments and temporary access road; and conduct site restoration of approximately 4.1 acres. This phase would take approximately 6 months.

Onshore Shaft and Tunnels

- The onshore shaft would be located east of the existing intake facility, whereas in alternatives 2 and 3 it was located to the west of the existing intake facility. The tunneled conduits would run from the intake shaft approximately 700-feet southwest to the new river intakes located 100-feet offshore of Unnamed Island.
- Three tunneled conduits would also run to the west from the onshore shaft to connect into the six existing intake pipelines that are located downstream of the existing intake facility.

Embankment

- Similar to alternative 2 but different than alternative 3, an additional temporary road embankment would be constructed across the Potomac River channel to allow construction vehicles to cross and traverse over the western portion of Unnamed Island and to continue back onshore. This would allow access to construction areas needed to construct the intakes and intake shaft and perform the existing pipeline connections. Culverts would be provided between the embankments (see "common to all action alternatives" section for the eastern embankment) to maintain flow in the channel.

Canal Operations

- If required for construction safety and maintaining access for visitor and park staff use, temporary relocation of the towpath would be provided on the north side (left bank) of the canal. The need for temporary towpath relocation would be determined during detailed design.

DESCRIPTION OF WETLANDS AND FLOODPLAINS IN THE PROJECT AREA

Wetlands

For the NPS, any area that is classified as a *wetland* according to the USFWS "Classification of Wetlands and Deepwater Habitats of the United States" (Cowardin et al. 1979) is subject to NPS Director's Order 77-1: *Wetland Protection* (NPS 2002). Deepwater habitats are not subject to Director's Order 77-1. Under the Cowardin definition, a wetland must have one or more of the following three attributes:

1. At least periodically, the land supports predominantly hydrophytes (wetland vegetation).
2. The substrate is predominantly undrained hydric soil.
3. The substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year.

In addition, under the Cowardin definition, wetland deepwater habitat boundaries are described as a depth of up to 6.6 feet (2 meters) at low water for riverine systems. Areas containing SAV would be characterized as riverine systems. The Cowardin wetland definition encompasses more aquatic habitat types than the definition and delineation manual used by the USACE for identifying wetlands subject to Section 404 of the Clean Water Act. The 1987 C*orps of Engineers Wetlands Delineation Manual* requires that *all three* of the parameters listed above (hydrophytic vegetation, hydric soil, wetland hydrology) be present in order for an area to be considered a wetland (USACE 1987). The Cowardin wetland definition includes such wetlands, but also adds some areas that, though lacking vegetation and/or soils *due to natural physical or chemical factors* such as wave action or high salinity, are still saturated or shallow inundated environments that support aquatic life (e.g., unvegetated stream shallows, mudflats, rocky shores).

The National Resources Conservation Service web soil survey for Montgomery County, Maryland depicted one soil type within the project area: Lindside Silt Loam (0-3% slopes and occasionally flooded). This soil type does not have hydric status (i.e., soils that form under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions), although some hydric indicators can be found in the lower positions of this landform (PEER 2013).

The National Wetlands Inventory (NWI) of the USFWS produces information on the characteristics, extent, and status of the nation's wetlands and deepwater habitats. The USFWS definition of wetlands is similar to the NPS definition of wetlands in that only one of three parameters (hydric soils, hydrophytic vegetation, and hydrology) is required to characterize an area as a wetland, based upon the Cowardin Classification of Wetlands (Cowardin et al. 1979). The USFWS objective of mapping wetlands and deepwater habitats is to produce "reconnaissance-level information on the location, type and size of these resources" (USFWS/NWI 2014). NWI maps are prepared by the USFWS from the analysis of high altitude imagery and wetlands are identified based on vegetation, visible hydrology and geography. The NWI online maps identify three systems within the project area: a freshwater pond (classification code PUBHX) adjacent to the existing bridge over the C&O Canal, a freshwater forested/shrub wetland (classification code PFO1A) located on the eastern portion of unnamed island, and a riverine system (classification code R2UBH), which is the Potomac River (USFWS/NWI 2014). NWI maps are not always consistent with the exact wetland type or accurate when ground-truthing of the site is conducted. Therefore, a wetland delineation of the site was conducted to determine exact locations and current Cowardin Classification of wetlands in the project area; results are discussed below.

Wetland Functions and Values

Wetlands serve a wide range of ecological functions. They are valuable as holding areas for rising floodwaters. Wetland vegetation reduces floodwater velocity and depletes its destructive energy, thereby protecting mainland and upland areas. Wetland vegetation also forms buffers against erosion by absorbing current and storm energy, stabilizing substrates, and trapping sediments. Filtration of sediments, nutrients, pollutants, and toxic substances has the added advantage of improving water quality. Wetland functions are physical, chemical, and biological processes or attributes of wetlands that are vital to the integrity of a wetland system, while wetland values are attributes not necessarily important to the integrity of a wetland system but perceived as valuable to society. A brief description of the common function and values is provided below:

- **Groundwater recharge/discharge** — The potential for the wetland to contribute water to an aquifer or potential for the wetland to serve as an area where groundwater can be discharged to the surface.
- **Floodflow alteration (storage and desynchronization)** — Effectiveness of the wetland in reducing flood damage by attenuation of floodwaters for prolonged periods following precipitation events.
- **Fish and shellfish habitat** — Effectiveness of seasonal or permanent water bodies associated with the wetland in question for fish and shellfish habitat.
- **Sediment/toxicant/pathogen retention** — Prevents degradation of water quality relating to the effectiveness of the wetland as a trap for sediments, toxicants, or pathogens.
- **Nutrient removal/retention/transformation** — Ability for the wetland to prevent adverse effects of excess nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers, or estuaries.
- **Production export (Nutrient)** — Wetlands ability to produce food or usable products for humans or other living organisms.
- **Sediment/shoreline stabilization** — Effectiveness of a wetland to stabilize stream banks and shorelines against erosion.
- **Wildlife habitat** — The wetlands ability to provide habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species must be considered.
- **Recreation (Consumptive and Non-Consumptive)** — Ability for the wetland and associated watercourses to provide recreational opportunities such as canoeing, boating, fishing, hunting, and other active or passive recreational activities. Consumptive activities consume or diminish the plants, animals, or other resources that are intrinsic to the wetland, whereas non-consumptive activities do not.
- **Educational/scientific value** — Value of the wetland as a site for an "outdoor classroom" or as a location for scientific study or research.
- **Uniqueness/heritage** — Ability for the wetland or its associated water bodies to produce certain special values. Special values may include such things as archaeological sites, unusual aesthetic quality, historical events, or unique plants, animals, or geologic features.
- **Visual quality/aesthetics** — The presence of visual and aesthetic qualities of the wetland for society.

Wetland Delineation and Function/Value Assessment

In addition to the desktop analysis, a wetland delineation was conducted within the project area. In November 2013, natural and artificial wetlands in the project area were delineated according to the guidance in NPS Director's Order 77-1. PEER Consultants, P.C. conducted the wetland delineation. Wetlands were identified in accordance with the 1987 *Corps of Engineers Wetland Delineation Manual* (USACE 1987) and in conjunction with USFWS's *Classification of Wetlands and Deepwater Habitats of the United States* (Report FWS/OBS-79/31); (Cowardin et al. 1979). A total of two wetland areas (wetland A and wetland B) and two riverine systems (Potomac River and C&O Canal) were identified and flagged during the survey. In general, the wetlands at the site are located along the floodplain of the Potomac River. According to the wetland delineation, the mapped riverine systems did not have associated wetlands beyond the channels above the ordinary high water mark (OHWM). Wetlands A and

B are described briefly in the paragraphs that follow and in table 2. Wetlands shown on figure 2 (attachment A) meet the NPS definition of a wetland described above.

Table 2. Riverine Systems and Wetland Areas Delineated in the Project Area

Delineated Feature	Cowardin Classification*	Dimensions within the Project Area (acres)	Dimensions within the Project Area (square feet)
Wetland A	PFO1B	0.020	871.2
Potomac River	R2UBH	0.032	1393.9
C&O Canal	R2UBHx	0.137	5967.7
Total Wetlands Mapped in Project Area		**0.020**	**871.2**
Total Riverine Systems Mapped in Project Area		**0.169**	**7361.6**
Total Impacts		**0.189**	**8232.8**

Note: Above data is approximate and is applicable to wetlands and riverine systems on NPS property only. Dimensions in acres have been rounded for brevity; as a result, dimension values in square feet may appear not to be a direct conversion from the acreage value.
Wetland Definitions:
PFO1B = palustrine, forested, broad-leaved deciduous, saturated wetland
R2UBH = Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded
R2UBHx= Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded, Excavated

In addition to the standard wetland delineation methods, PEER Consultants personnel performed a Function and Value Assessment of the wetlands delineated within the project area. The functional wetland assessment was conducted in accordance with the Wetlands Functions and Values: A Descriptive Approach described in the September 1999 supplement to *The Highway Methodology Workbook (Supplement)* by the New England Division of the USACE (USACE 1999). This methodology uses a descriptive approach to characterize functions and values of wetlands.

Description of Wetlands in the Project Area

Wetland Descriptions

Wetland A - Wetland A is characterized as a palustrine, forested, broad-leaved deciduous, saturated wetland (PFO1B) wetland, located in the northwest corner of the proposed construction area limit (limit of disturbance). The portion of wetland that lies within NPS property in the project area totals 0.020 acre; however, the wetland extends outside of the project area to the north and west. Wetland A is located on the right bank of the C&O Canal and extends beyond an existing fence line, which is located outside of the project area. The three parameters (soils, hydrology, and vegetation) were met at this site. Change in vegetation and surrounding slopes were the used to define the limits of wetland A. Wetland A has 75% canopy cover and is dominated by red maple (*Acer rubrum*), sycamore (*Platanus occidentalis*), and box elder (*Acer negundo*). The understory is dominated by a shrub layer composed of American hornbeam (*Carpinus caroliniana*) and the herbaceous plant Nepalese browntop (*Microstegium vimineum*). This wetland is adjacent to the C&O Canal and contributes to its hydrology and water quality. Therefore, under the USACE Jurisdictional Determination requirements, wetland A would be classified as a relatively permanent water (RPW) or wetland directly abutting RPWs that flow directly or indirectly into traditional navigable waters (TNWs). During flood events, and heavy rains, there is a direct overland connection from wetland A to the C&O Canal.

As a wetland adjacent to a TNW, wetland A performs several functions, and has its own intrinsic value. Table 3 provides details on the functions and values of the wetland areas identified within the project area. The primary function of wetland A includes *Groundwater Recharge/Discharge*. Wetland A acts to help recharge the groundwater, by storing overland flow and keeping it from joining the C&O Canal. This runoff retention also provides *Nutrient Removal* which would otherwise run into the canal, as well as, provide an area where sediments can settle out of the stormwater runoff, thus providing *Sediment/ Toxicant Retention*. Wetland A also provides the value *Wildlife Habitat*; although no wildlife was noted during the field investigation, wetland A could provide habitat for small amphibians, birds and insects.

Table 3. Function and Values of the Wetland and Riverine Systems Delineated

Function and Values	Wetland Systems	Riverine Systems	
	Wetland A (PFO1B)	Potomac River (R2UBH)	C&O Canal (R2UBHx)
Groundwater recharge/discharge	✓		
Flood attenuation/alteration		✓	
Fish/shellfish habitat		✓	✓
Sediment/toxicant retention	✓		
Nutrient removal	✓		
Production export			
Sediment/shoreline stabilization		✓	
Wildlife habitat	✓	✓	✓
Recreation and tourism		✓	
Education/scientific		✓	
Uniqueness/heritage		✓	✓
Visual quality/aesthetic		✓	
Endangered species habitat		✓	

Wetland Definitions:
PFO1B = palustrine, forested, broad-leaved deciduous, saturated wetland
R2UBH = Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded
R2UBHx= Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded, Excavated

Riverine Systems Descriptions

As previously mentioned, there were two riverine systems noted during the field investigation. These were delineated by global positioning system (GPS) and field survey locations of the OHWM perimeters of these systems within and just beyond the project area identified. Under the Cowardin Classification system, the Potomac River is classified as riverine, lower perennial, unconsolidated bottom, permanently flooded (R2UBH) system and consists of 0.032 acre within NPS property in the construction area limits. The C&O Canal is similar in nature, but has the excavated component and is considered a riverine, lower perennial, unconsolidated bottom, permanently flooded, excavated (R2UBHx) system and consists of 0.137 acre within NPS property in the construction area limits.

As part of evaluating the feasibility of constructing a new offshore intake structure, a survey of SAV within the vicinity of the proposed project area in the Potomac River was conducted in July and September 2013 (EAEST 2013a). The purpose of the SAV survey was to investigate and document the presence/absence of SAV within the footprint or area of disturbance of the project. During the survey,

five native species of SAV were collected and recorded in the project area, including common waterweed (*Elodea canadensis*), water star grass (*Heteranthera dubia*), southern water nymph (*Najas guadalupensis*), sago pondweed (*Stuckenia pectinata*), and wild celery (*Vallisneria americana*). One species, southern water nymph, is ranked as a G5S3 species (MDNR 2010). The G5S3 species are considered globally secure, but could be rare in parts of its range. In the state of Maryland, southern water nymph is a watch list species, meaning that it is rare to uncommon in its range. Watch list species are not officially listed as threatened or endangered by the State of Maryland, nor are they considered rare enough in Maryland to currently warrant reporting and tracking by the Maryland Natural Heritage Program database. They are, however, considered uncommon species in Maryland and are often significant on a local level (MDNR 2010). The timing of the surveys was planned to capture warmer water species like wild celery and water stargrass, as well as horned pondweed (*Zannichellia palustris*), a target species identified by the MDNR; however, no horned pondweed was observed during the survey. In the canal, hydrilla (*Hydrilla verticillata*) was observed covering most of the water surface (EAEST 2013a). Hydrilla is a nonnative species that is often considered a nuisance species because of its tendency to form dense impenetrable beds that impede recreational uses of waterways. Hydrilla has lower light requirements than other SAV species and is able to grow in more turbid water (MDNR 2010).

In 2013, seasonal rare plant surveys were conducted within the project area during June, August, and September. Within wetland areas discussed in this SOF and in addition to the southern water nymph, one watch list species, halberd-leaved hibiscus (*Hibiscus laevis*) was observed (EAEST 2013b). Additionally, a state endangered plant, floating paspalum (*Paspalum fluitans*), was observed along the muddy shorelines of the Potomac River within the project area and the mosquito fern (*Azolla caroliniana*), a "Maryland Established Plant" was observed floating in the Potomac River (EAEST 2013b). Established species, such as the mosquito fern, are those that are not native to Maryland, but may be native elsewhere in North America. Mosquito fern has not been tracked since 2009 after it was determined that it was being spread by waterfowl to different parts of the state. Mosquito fern has been spread to man-made ponds and ditches and there is a general belief or concern within the region that this species is an ephemeral, nonnative cultivar that is spreading by way of waterfowl and milder winters (Stango 2013).

The Potomac River shoreline riverine system also supports pockets of emergent wetlands as well as SAV species in the submerged areas. Small pockets of herbaceous wetland areas exist along the Potomac River where suitable substrate accumulates, thus supporting hydrophytic vegetation such as water willow (*Justicia americana*) and in some locations floating paspalum. The primary function of the Potomac River appeared to be *Sediment/Shoreline Stabilization* due to some narrow areas of vegetation protection along shoreline, although some steep adjacent slopes occur immediately inland (table 3). Secondary functions included: *Floodflow Alteration* (due to location within the floodplain of the Potomac River), *Fish and Shellfish Habitat* (due to proximity to the Potomac River shoreline, particularly in areas inhabited by SAV species where snails and crayfish were observed), and secondary values included: *Wildlife Habitat* (the riverine portion of Potomac River provides excellent wildlife value, particularly for fish and aquatic bird species) and *Endangered Species Habitat* (due to observations of *Paspalum fluitans* and southern water nymph). This wetland also had the following values, generally due to its location within a National Historical Park: *Educational/Scientific Value*, *Uniqueness/Heritage*, and *Visual Quality/Aesthetics*. The C&O Canal is watered in the section located within the project area, but is largely stagnant due to low flow and no natural connection to other water sources. The primary function of the C&O Canal is to provide *Fish Habitat* and the secondary values provide *Wildlife Habitat* and *Uniqueness/Heritage*, due to proximity within a park setting.

Floodplains

Executive Order 11988, "Floodplain Management" requires federal agencies to develop policies for the minimization of impacts to floodplains, loss due to flooding, and the restoration and preservation of

natural and beneficial values of floodplains. This executive order defines floodplains as "the lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at a minimum, that area subject to a one percent greater chance of flooding in any given year." The area with a one percent chance of flooding every year is referred to as the 100-year floodplain. Flooding in the 100-year zone is expected to occur once every 100 years, on average.

Director's Order 77-2 presents the NPS policy on floodplain management in compliance with Executive Order 11988. Specifically, NPS policies state that floodplain management will provide for the protection and preservation of floodplain functions and natural resources, and will avoid environmental effects (both long-term and short-term) of use and alteration of floodplains, including development that could adversely affect the functions and/or resources of floodplains and increase the risk of flooding. In addition, NPS policy recommends restoration of affected natural floodplain functions where possible.

All federal agencies are required to avoid building in a 100-year floodplain unless no other practical alternative exists. NPS has adopted guidelines pursuant to Executive Order 11998 stating that NPS policy is to restore and preserve natural floodplain values and avoid environmental impacts associated with the occupation and modification of floodplains. The guidelines also require that, where practicable alternatives exist, Class I actions be avoided within a 100-year floodplain. Class I actions include the location or construction of administration, residential, warehouse, and maintenance buildings, non-excepted parking lots, or other man-made features that by their nature entice or require individuals to occupy the site.

According to the Federal Emergency Management Agency (FEMA) Digital Flood Insurance Rate Maps (Map ID 24031C0320D, dated September 2006), the entire low-lying riparian corridor located along the Potomac River and the C&O Canal NHP within the preferred alternative 2 project area are within the 100-year floodplain (attachment A, figure 5). This area is described as Zone A, where base flow elevations and flood hazard factors have not been determined (FEMA 2006). Basically, the entire preferred alternative 2 project area, except for a small (0.07 acre) portion of the northwest corner of the construction access road, is within the 100-year floodplain, including the construction area limits for the project. The Potomac River's floodplain contains vegetation that provides stability to the riverbank and acts as a travel route for migrating and resident wildlife. Riparian areas reduce erosion and trap sediments from runoff, replenishing the soils of the riparian corridor. By slowing the velocities of floodwaters, these natural corridors reduce potential damage to downstream areas.

The floodplain along the Potomac River is comprised of deciduous woods dominated by box elder, sycamore, slippery elm, and silver maple (*Acer saccharinum*). The canopy trees are approximately 4 to 8 inches in diameter at breast height and approximately 60 to 75 feet tall, with some very large specimen trees of sycamore and tulip poplar (*Liriodendron tulipifera*) scattered throughout the site. The sapling/shrub stratum is dominated by paw paw (*Asimina triloba*). Herbaceous species that dominate the understory include Virginia wildrye (*Elymus virginicus*), beefsteak plant, and Nepalese browntop. Poison ivy (*Toxicodendron radicans*), wingstem (*Actinomeris alternifolia*), paw paw (*Asimina triloba*), spicebush (*Lindera benzoin*), Japanese honeysuckle (*Lonicera japonica*), among other species, are also present. Along portions of the Potomac River shoreline that are not steep, a narrow fringe of emergent wetland is present within the floodplain as previously described. Other portions of the shoreline are steep and rocky with historically placed riprap.

USE OF THE WETLANDS AND FLOODPLAINS

Chesapeake and Ohio Canal

During the late 1790s and early 1800s, more than 3,000 miles of canals were built throughout the United States to transport goods and supplies from coastal to inland areas and to aid in the migration of people heading west to settle beyond the original thirteen colonies. Construction of the C&O Canal began in 1828 when President John Quincy Adams broke ground for a canal that would stretch from Georgetown, Maryland to Pittsburgh, Pennsylvania to connect the Chesapeake Bay and the Ohio River. Irish, Dutch, and English immigrants worked long hours for little pay using primitive tools to dig the canal. Masons, stonecutters, carpenters, and blacksmiths were employed to create the engineering marvels along the canal. After 22 years of construction and $13 million to build, the canal was completed in 1850, but only extended to Cumberland, Maryland.

The C&O Canal remained in operation for 96 years, from 1828 to 1924. Mules pulled boats along a 12-foot wide towpath. The boats floated several tons of cargo including hay, coal, hydraulic cement, fertilizer, and virtually any product that could be placed on a boat. Seven feeder dams were built on the Potomac River to supply water for the canal. To control the water, 74 lift locks were placed in the canal, which were typically 90-feet long and 15-feet wide. The locks raised and lowered boats 8 feet, allowing them to travel both downstream and upstream. Most boats were approximately 95-feet long and 14.5-feet wide and traveled at a speed of no more than 4 miles per hour. Flooding in 1924 finally led to the permanent closure of the canal.

Proposed Use of the Park

NPS prepared an EA to consider the environmental consequences related to the potential construction of a new offshore submerged channel intake for water supply at the WSSC's Potomac WFP. As part of the project, a land exchange between the NPS and WSSC would occur since some of the existing and proposed submerged channel intake facilities reside on NPS property as part of the C&O Canal NHP. WSSC is planning to purchase and provide land to the NPS in exchange for a perpetual easement for the existing intake facilities and proposed facilities.

The C&O Canal includes historical structures that capture the story of the canal's important role in many aspects of American history, including transportation, engineering achievement, and commerce. The park also provides a place to recreate and enjoy nature. The purpose of the park is to provide visitors the opportunity:

- to understand the canal's reason for being, its construction, its role in transportation, economic development and westward expansion, the way of life which evolved upon it, the history of the region through which it passes and to gain an insight into the era of canal building in the country;
- to appreciate the setting in which it lies and the natural and human history that can be studied along its way; and
- to enjoy the recreational use of the canal, the parklands and the adjacent Potomac River (NPS 1976).

The park's mission is to preserve and protect the natural, cultural, and historic resources of the park. The park provides hiking, biking, camping, canoeing, fishing, and boating to visitors in addition to allowing them to experience the rich history, wildlife, and geologic resources of the canal.

INVESTIGATION OF ALTERNATIVES

During the planning process, two alternatives were considered, but dismissed. These include:

- Construction of an onshore tunneling shaft located south of the C&O Canal between the existing intake and the C&O Canal. This alternative used trenched conduits to connect the onshore shaft to the existing raw water transmission pipelines south of the C&O Canal towpath and tunneled pipelines to connect the onshore shaft to the new intake structure. This alternative was eliminated because it was determined that there was not adequate space to construct the onshore shaft between the existing pipelines contained in that area.
- A combination of some of the same design elements as alternatives 2 and 3, whereby the gate structure is located to the east of the existing intake facility, but open-trench pipe construction across Unnamed Island from the river intake is proposed. However, this alternative was dismissed from further consideration due to a higher risk of impacts to the structural integrity of the weir from the close proximity of a temporary drainage channel; and the complex construction sequencing from using the open-excavation method.

For this project, a no-action alternative (alternative 1), a preferred alternative (alternative 2), and two additional action alternatives (alternatives 3 and 4) were considered and investigated in the EA. Alternatives 3 and 4 were described previously in Section 3 and summarized below:

- Alternative 3 is similar to the preferred alternative 2 with respect to the locations of the new intakes, onshore shaft/junction vault, horizontal alignment of the new conduits, and the connections to the existing 6 feet intake conduits; however, the installation of the new piping would be completed using both open-trench and tunneling construction. The intake conduits between the intake shaft and the onshore shaft would be installed in a trench and the intake conduits between the onshore shaft and connection to existing conduits would be installed in tunnels followed by open cut at the existing conduits.
- For alternative 4, the method of constructing the three intake tunnels and many of the design features are similar to what is described under the preferred alternative 2; however, the horizontal alignment of the tunnels/conduits and the location of the onshore shaft/junction vault are different.

PROPOSED IMPACTS TO WETLANDS AND FLOODPLAINS IN THE PROJECT AREA

Impact analysis and the conclusions for possible impacts to wetlands were based on the wetland delineation and SAV survey that was conducted at the site. The locations of floodplains were overlain with the proposed actions to determine impacts to this resource. As a result of the wetlands impacted by the proposed project, a Joint Federal/State Application for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland would be submitted as well as applicable permits obtained from the MDE and the USACE prior to initiating any construction activities. All regulated activities within riverine systems, jurisdictional wetland areas, and 100-year floodplain, would be conducted in accordance with permit conditions and *Maryland's Waterway Construction Guidelines* (MDE 2000).

PREFERRED ALTERNATIVE 2 WETLAND IMPACTS

Project components specific to alternative 2 would adversely affect vegetated terrestrial wetlands and include the construction of the parking area and construction access road. Project components that would adversely affect vegetated (rooted), submerged riverine systems include the installation of cofferdams,

embankments, construction access road, boat ramp, and the shaft/junction vault. Total impacts associated with the activities described above are detailed in table 4. Figure 4 (attachment A) depicts the riverine systems and wetlands affected by the preferred alternative 2 project components.

Table 4. Preferred Alternative 2 Riverine System and Wetland Impacts on NPS Property

Delineated Feature	Cowardin Classification*	Impact (acres)	Impact (square feet)
Wetland A	PFO1B	0.020	871.2
Potomac River	R2UBH	0.032	1393.9
C&O Canal	R2UBHx	0.137	5967.7
	Total (Wetlands)	**0.020**	**871.2**
	Total (Riverine)	**0.169**	**7361.6**
	Total Impacts	**0.189**	**8232.8**

Note: Measurements in this table are approximate
Note: Dimensions in acres have been rounded for brevity; as a result, dimension values in square feet may appear not to be a direct conversion from the acreage value.

Impacts – A total of 0.189 acre of wetlands (wetland A [PFO1B], Potomac River [R2UBH], and C&O Canal [R2UBHx]) would be impacted by project components associated with alternative 2 (table 4). The installation and removal of temporary cofferdams associated with the intake, intake shaft, intake conduits, and boat ramp would impact the riverine system (Potomac River) as a result of dewatering a portion of the Potomac River and disturbance of riverbed material during cofferdam placement. The riverine systems would also be impacted by construction of the embankments and placement of culverts in the C&O Canal and Potomac River. Installation of the temporary cofferdams and embankments would require the placement of rock with clay layer/liner and geotextile that would serve as the water barrier. The rock would impact SAV in the footprint of the cofferdam and emankment, resulting in a direct loss of those plants. Indirect impacts on SAV would occur from the release of fine sediment into the river from construction activities. Construction of the embankments will allow a temporary construction access road that would cross the Potomac River channel and C&O Canal. Culverts would be installed to maintain flow in the river and canal past the construction areas. In addition to impacts on existing SAV populations], a state endangered wetland plant (floating paspalum) and a state watch list wetland plant (halberd-leaved hibiscus) are located along the shoreline of Unnamed Island, which is characterized as part of the Potomac River riverine system**.** The entire shoreline of Unnamed Island and most of the shoreline west of the existing intake would be impacted during construction. Vegetation would be removed along the Potomac River shoreline for temporary construction features and staging of construction materials. Construction impacts on the wetland plants floating paspalum and halberd-leaved hibiscus would be adverse and are discussed in more detail in the EA for this project. The in-water construction phase of the proposed project is expected to take approximately 2 years.

Overall, there would be short-term adverse impacts on the riverine systems (Potomac River and C&O Canal) and wetland A from the installation and removal of the cofferdams, embankments, and construction access road. Areas affected by temporary features of alternative 2 would be restored to pre-existing conditions once the project is completed. Within the Potomac River and C&O Canal, SAV would be expected to recolonize in the area within a few years following removal of the temporary structures built during construction (cofferdam and embankment) since dense SAV exists within both riverine systems in adjacent areas that would not be disturbed by this project.

Impacts as a result of permanent construction features are associated with the construction of the boat ramp, intake structure, access road, and parking area. Similar to the discussion above, floating paspalum

and halberd-leaved hibiscus were observed along the shoreline of the Potomac River in the area of the proposed boat ramp. These plant species would be adversely affected as a result of excavation and removal during construction of the boat ramp. It is unlikely that impacts to the mosquito fern, a "Maryland Established Plant," would occur due to the floating nature of this plant and the fact that it is possibly a nonnative cultivar that is well established and no longer tracked by MDNR.

Computational fluid dynamics modeling was completed to determine the sizing, configuration and hydraulic characteristics of the proposed intake system alternatives (Black and Veatch 2013). Results of the preliminary model indicted that the intake structure, regardless of the alternative, would increase local flow velocities upstream of the structure and vortices (a whirling mass of water, especially one in which a force of suction operates, such as a whirlpool) may form downstream, potentially leading to scour of the structure and the surrounding riverbed. Between the intake and Unnamed Island downstream of the structure, the velocity would be slower and there is the potential for sedimentation. Impacts to the Potomac River bottom and removal of existing SAV would occur from the intake structure. Additionally, the computational fluid dynamics modeling has predicted that a small area of scour surrounding the intake structure is likely possible that would also affect existing SAV. One of the co-dominant species of SAV in the area proposed for the intake structure includes southern water nymph. This species is listed as a watch list species by MDNR. Watch list species are not officially listed as threatened or endangered by the State of Maryland, nor are they considered rare enough in Maryland to currently warrant reporting and tracking by the Maryland Natural Heritage Program database. They are however, considered uncommon species in Maryland and are often significant on a local level (MDNR 2010). During the SAV survey, southern water nymph was one of the co-dominant species that occurred in high densities in the Potomac River both within and beyond the boundaries of the project area. This SAV species is therefore not unique in the vicinity of the project. It is expected that SAV species in the areas beyond the intake structure and area of scouring would not be affected in the long-term, but would repopulate areas with adjacent SAV rooted plant stock when project disturbance has ceased.

A total of 0.020 acre of wetland A (PFO1B) would be impacted by project components associated with alternative 2. The construction access road would requre vegetation clearing and grading within wetland A, resulting in a loss of trees at this forested wetland. Wetland functions and values that would change as a result of tree loss include groundwater recharge/discharge, wildlife productivity and habitat, vegetation, water quality, and hydrology. Tree removal within forested wetland A would change functions and values by reducing the vegetation canopy over these wetlands, which would reduce the biomass and change the species composition of the wetland (Cutlip 1986). The reduction in biomass would potentially alter the vegetation and wildlife species that use that wetland. This shift in the vegetation type could lessen available resources for wildlife species that depend on the conditions currently found in the wetland. Therefore, measurable changes to the abundance and diversity of wetland vegetation would occur.

The construction of the construction access road both adjacent to and through Wetland A would remove portions of or fragment the wetlands, resulting in changes to hydrology and impeding water movement, ground-level wildlife movement, and the seed distribution of wetland plants. The access road would also reduce the ability of wetlands to perform functions such as groundwater discharge/recharge, sediment/toxicant retention, and nutrient removal may be temporarily decreased due to disturbance adjacent to the wetland. The access road would also cause the wetland's stormwater/nutrient assimilative capacity to be lost and construction vehicles along the roads could introduce toxic substances (oil and grease). During construction activities, siltation/runoff into wetland areas could occur but will be contained with approved BMPs as discussed under mitigation.

Following construction, all cleared areas within the construction area limit, including the construction access road, would be re-graded and re-planted to resemble the existing vegetation. Wetland A would be re-planted with wetland plants and monitored for invasive species; however, the clearing would be

considered permanent impact, as northern forested wetlands may take 50 years to reach maturity (Kusler 2006) and trees within wetland A would not recover during the life of the project (15 years) to become a fully functioning forested wetland.

Overall, 0.169 acre of riverine system (Potomac River [R2UBH] and C&O Canal [R2UBHx]) and 0.020 acre of wetland A (PFO1B) would be adversely impacted by project components associated with alternative 2.

PREFERRED ALTERNATIVE 2 FLOODPLAIN IMPACTS

Under alternative 2, the 100-year floodplain would be affected during construction of the project. It is anticipated that short-term adverse impacts would result from the construction and removal of the cofferdams and embankments. Long-term adverse impacts on the 100-year floodplain are anticipated from terrestrial vegetation clearing within the construction area limit (table 5) and for the construction and operation of permanent structures (table 6).

Table 5. Preferred Alternative 2 Floodplain Impacts – Temporary

Project Components	100-Year Floodplain (acres)
Cofferdams and Embankments	1.7
Terrestrial Vegetation Clearing	4.7
Construction Access Road[(a)]	0.61
TOTAL	**7.0**

Note: measurements in this table are approximate.
(a) Composed of pervious materials

Table 6. Preferred Alternative 2 Floodplain Impacts – Permanent

Project Components	100-Year Floodplain (acres)
Boat Ramp	0.030
Junction Vault	0.12
Intake Structure	0.14
Parking Area (and boat ramp road)[(a)]	0.24
TOTAL	**0.53**

Note: measurements in this table are approximate.
(a) Composed of pervious materials

Temporary Impacts – A total of 1.7 acres within the floodplain would be affected by temporary in-water construction project components (table 5). The installation and remvoal of temporary cofferdams for the construction of the intake, intake shaft, river embankments, and boat ramp would potentially result in changes to the hydrologial regime of the river as it may alter the natural flow regimes. The temporary cofferdams may alter the capacity of the channel to convey water and increase the height of surface water. Upstream flooding may increase due to narrowing the width of the channel and increasing the channel's resistence to flow, resulting in a higher stage as it flows past the obstruction. This impact is also expected from the construction of the embankments and placement of the culvert pipes into the channel of the Potomac River. One embankment needed within the C&O Canal for the construction access road to cross the canal is located within the 100-year floodplain. Within the embankments, culverts would be installed to maintain flow in the river and canal past the construction areas. Overall, there would be short-term,

adverse impacts to the 100-year floodplain from the installation and removal of the cofferdams and embankments. The in-water construction phase of the proposed project is expected to take approximately 2 years.

Upland construction activities are expected to have long-term adverse impacts on the 100-year floodplain as a result of vegetation clearing from temporary project components. Construction of project components would possibly require a maximum of 4.7 acres of vegetation to be cleared from the construction area limit within the floodplain resulting in a loss of trees. Approximately 0.61 acre within the floodplain would be for the temporary construction access road which is composed of pervious materials. All cleared areas within the construction area limit, including the construction access road would be re-graded and re-planted to resemble the existing vegetation after construction is complete; however, because northern forests may take 50 years to reach maturity (Kusler 2006) and because trees within the floodplain would not recover during the duration of this EA to become a fully functioning floodplain, a long-term impact would result. Floodplain functions and values would change as a result of tree loss including the ability to convey floodwaters, but this would be a localized event within the project area. In summary, the upland construction activities would result in short- and long-term adverse impacts on the 100-year floodplain. Even though the upland construction phase of the proposed project is expected to take approximately 4 years, long-term impacts to the floodplain would result from the removal of forest trees.

Permanent Impacts – A total of 0.53 acre within the floodplain would be adversely affected by permanent project components (table 6). Permanent structures including the boat ramp, parking area, boat ramp access road, and junction vault have the potential to impact the 100-year floodplain in the long-term since the proposed location of these structures is currently vegetated and would reequire conversion to either pervious or impervious cover. The parking area and assocated access road would be located within the floodplain (0.24 acre) but constructed of pervious paving to allow percolation or infiltration of rainwater and stormwater. The pervious materials are designed to be porous-permeable paving that allows rainwater to pass through the cross section and back to the groundwater supply. New impervious areas within the floodplain are associated with the boat ramp (0.030 acre) and junction vault (0.12 acre). As a result of these permanent structures, these previously vegetated areas would have less capacity to store rainfall; the replacement of those areas with impervious surfaces may result in a reduction of water storage, a reduction of infiltration of water into the ground, and the acceleration of runoff to ditches and streams. The intake is another permanent feature located within the floodplain (0.14 acre). Although these impacts are mostly to the riverbed, the placement of the intake may alter the capacity of the channel to convey water, increasing the height of the water surface and the chance of flooding. The impacts of the operation of the intake and associated conduits are expected to be long-term. The tunneled conduits would be located within the floodplain, but would be placed underground within the bedrock and would not affect hydrologic patterns at the surface.

Under alternative 2, the use of the Potomac WFP would remain the same; however, the operation of a submerged channel intake would require structures to be placed within the 100-year floodplain. The addition of new structures within the floodplain would create long-term adverse impacts on flooding characteristics such as conveyance of flood flows and flooding potential. In addition, the removal of soils and vegetation would result in long-term impacts on floodplain values. The long-term impacts would be site specific and would only affect a small portion of the floodplain. The design of the structures within the floodplain would incorporate methods for minimizing flood damage, as described in the National Flood Insurance Program “Floodplain Management Criteria for Flood-Prone Areas” (CFR 44 60.3) and in accordance with state and/or county requirements for flood-prone areas. Overall, operation of the permanent structures would result in long-term adverse impacts on the 100-year floodplain.

MITIGATION MEASURES

Wetland Mitigation

Implementation of the preferred alternative would involve impacting wetland areas. During the construction activities for the preferred alternative, BMPs would be employed to minimize impacts to hydrology, water quality, threatened and endangered species, and cultural resources as described in detail in the "Alternatives" chapter of the EA to comply with Procedural Manual 77-1: *Wetland Protection* and Procedural Manual 77-2: *Floodplain Management*. A sediment and erosion control plan would be prepared prior to construction and submitted to appropriate local and state agencies. Mitigation measures would be employed during construction, when appropriate, to minimize impacts on riverine systems and wetland areas, including the use of silt curtains that would be placed in the Potomac River and C&O Canal to prevent impacts on the aquatic environment from silt and sediment that may be stirred up during construction. Guidelines for waterway construction, published by the MDE (*Maryland's Waterway Construction Guidelines*, MDE 2000) would also be followed. The limits of the area disturbed by project components associated with preferred alternative 2 would be kept to as minimal as possible. Whenever feasible, construction activities, including heavy equipment use and stockpiling of materials, would be conducted outside of wetland areas.

For the purposes of implementing Executive Order 11990, the NPS has determined that any area classified as wetland habitat according to the USFWS *Classification of Wetlands and Deepwater Habitats of the United States* is subject to Director's Order 77-1: *Wetland Protection* and the implementation procedures outlined in the Procedural Manual77-1: *Wetland Protection*. Director's Order 77-1 states that for new actions where impacts to wetlands cannot be avoided, proposals must include plans for compensatory mitigation that restores wetlands on NPS lands at a minimum acreage ratio of 1 to 1. For this project, the estimated impact to NPS wetlands is 0.169 acre of the riverine systems (Potomac River, R2UBH and C&O Canal, R2UBHx) and 0.020 acre of wetland A (PFO1B), which totals 0.189 acre of impacts to wetland and riverine systems. The wetland impacts discussed in this document represent the most current approximations at this time; however, this impact and compensation acreage may increase or decrease after final design. The wetland mitigation plan in this SOF addresses impacts to wetlands on NPS property only. Impacts to wetlands on adjacent properties will be addressed during the permit application process. Additional mitigation measures, such as silt fencing and construction methods for waterways would be used, and the location and extent of any additional mitigation would be determined when permitting is completed.

In November 2014, NPS staff visited various areas on park property to determine wetland mitigation potential. During this effort one potential mitigation site was identified within the area of Lock 13 located at 38° 58' 16.14" north, 77° 10' 48.92" west, respectively. This Lock 13 site was chosen for wetland mitigation actions and is located within C&O Canal NHP, approximately 6 miles southeast of the project site. It is a 1.7 acre wetland between the Potomac River and C&O Canal, near the I-495 overpass. Figure 3 (attachment A) shows the wetland mitigation area and its proximity to the I-495 overpass.

A wetland delineation of the Lock 13 mitigation site was completed in December 2014. The site contains an emergent wetland dominated by the invasive reed canarygrass (*Phalaris arundinacea*) with several standing dead American sycamore trees. The presence of the dense coverage of reed canarygrass appears to prevent the establishment of sycamore saplings or new tree species. Several wetland hydrology indicators as well as hydric soil indicators were observed at the site. Two perennial stream channels were identified within the vicinity of the mitigation site, which were identified to the east and west of the mitigation area and convey flow to the Potomac River. Therefore, the Lock 13 wetland mitigation site is bound by three large perennial stream channels to the south, east, and west.

Since the proposed Lock 13 mitigation site consists of an existing wetland and no new wetlands are proposed to be created, the proposed wetland mitigation is considered to be enhancement. Enhancement at the Lock 13 wetland to improve the quality of the wetland would include removing the invasive reed canarygrass and planting native species before the reed canarygrass can re-establish itself. The wetland would be upgraded from an emergent wetland dominated by invasive species to a scrub-shrub/forested wetland composed of native species. Several tree, shrub, and herbaceous species have been selected for planting based on their hydrophytic status and shade tolerance (table 7). Trees would compose 70% of the re-planted vegetation and shrubs would compose 30% of the re-planted vegetation in order to outcompete invasive species. Herbaceous plants would act as groundcover beneath the trees and shrubs.

Due to these natural sources of hydrology and the concave structure of the wetland, no grading would be required during the proposed mitigation actions. The site has been examined by NPS staff, and it has been determined that there are no archeological resources present there that would prevent wetland mitigation from occurring. Enhancement efforts would have beneficial impacts to other wetlands within the Lock 13 area. The Lock 13 wetland mitigation site is 1.7 acres in size, and approximately 0.75 acre would be enhanced for mitigation. Only 0.189 acre of wetlands will be impacted as a result of construction activities at the Potomac WFP site. Therefore, wetland compensation for this project would occur at a ratio of nearly 4:1.

The loss of wetlands within the project site will lead to a loss of a variety of wetland functions, including sediment and toxicant retention, water quality function, and floodflow alteration. The enhancement of the Lock 13 site could provide functions that would be similar to those lost at the impact site. Therefore, the Lock 13 site compensation effort would be considered in-kind with the wetland functions being lost at the impact site. NPS would be required to obtain a Joint Permit for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland. Procedural Manual77-1: *Wetland Protection* states that compensating for the loss of wetlands using restored wetlands is appropriate but may require more than one acre of restoration for one acre of impact (NPS 2012). The regulatory agency may also require more compensation per acre of impact to satisfy their regulatory and permitting needs. The exact ratio would be determined by the regulatory agency and based on the results of a function and value assessment applied to the impact and compensation site.

Table 7. Wetland Enhancement Species and Planting Specifications

Common Name	Scientific Name	Quantity	Overall Average Spacing	Classification	Size
Total mitigation area is approximately 0.75 acres.					
American sycamore	*Platanus occidentalis*	89	8' O.C.	Canopy	1.5 - 2” caliper
Red maple	*Acer rubrum*	89	8' O.C.	Canopy	1.5 - 2” caliper
Silver maple	*Acer saccharinum*	89	8' O.C.	Canopy	1.5 - 2” caliper
Muscle wood	*Carpinus caroliniana*	89	8' O.C.	Understory Tree	1 - 1.5” caliper
Highbush blueberry	*Vaccinium corymbosum*	51	8' O.C.	Shrub	1 gallon container
Coastal sweet pepperbush	*Clethra alnifolia*	51	8' O.C.	Shrub	1 gallon container
Spicebush	*Lindera benzoin*	51	8' O.C.	Shrub	1 gallon container
Ernst seed mix #137[(a)]		15 lbs of seeds	N/A	Herbaceous	N/A

(a) Ernst seed mix #137 from Ernst Conservation Seeds, Inc. contains specialized herbaceous species for shaded wetlands. The seed mix is mostly comprised of Virginia wildrye (*Elymus virginicus*), fox sedge (*Carex vulpinoidea*), redtop panicgrass (*Panicum rigidulum*), and lurid sedge (*Carex lurida*), among other shade-tolerant wetland species.
O.C. = on center

FLOODPLAIN MITIGATION

Implementation of the preferred alternative would involve permanently impacting floodplain areas. During the construction activities for the preferred alternative, BMPs would be employed to minimize impacts to water quality, threatened and endangered species, and cultural resources to comply with Procedural Manual77-2: *Floodplain Management*. In addition, the design of structures within the floodplain would incorporate methods for minimizing flood damage, as contained in the National Flood Insurance Program "*Floodplain Management Criteria for Flood-Prone Areas"* (CFR 44, 60.3) and in accordance with any state or county requirements for flood-prone areas.

Activities associated with the preferred alternative would cause permanent alterations to 0.53 acre of the floodplain as a result of impervious construction associated with the boat ramp and parking area, the junction vault, and the intake and associated conduits. Appropriate stormwater management techniques, including approved BMPs, would be required to avoid indirect impacts to floodplains during construction of the access road. Areas adjacent to the permanent floodplain impacts would be revegetated with appropriate native vegetation within the floodplain after construction activities are completed. Facilities that are water-dependent structures, including the boat ramp and onshore shaft were placed in the floodplain because no other viable alternative was available.

SUMMARY

NPS prepared an EA to consider the environmental consequences related to the potential construction of a new offshore submerged channel intake and associated project components for water supply at the WSSC's Potomac WFP. The project is needed because the current Potomac River raw water intake structure is adversely affected by its location along the Potomac River shoreline.

A wetland delineation was conducted within the project area in accordance to the guidance in NPS Director's Order 77-1 and the 1987 *Corps of Engineers Wetland Delineation Manual* and in conjunction with USFWS's *Classification of Wetlands and Deepwater Habitats of the United States* (Report FWS/OBS-79/31). A total of two wetlands (wetland A and wetland B) and two riverine systems (Potomac River and C&O Canal) were identified during the survey. In general, the wetlands at the site are located along the floodplain of the Potomac River. In addition to the standard wetland delineation methods, PEER Consultants personnel performed a Function and Value Assessment of the wetlands delineated within the project area. The following long-term permanent adverse impacts are expected from preferred alternative 2:

- Riverine systems and wetland impacts – 0.189 acre
- Floodplain impacts – 0.53 acre

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Attachment A:

Figures

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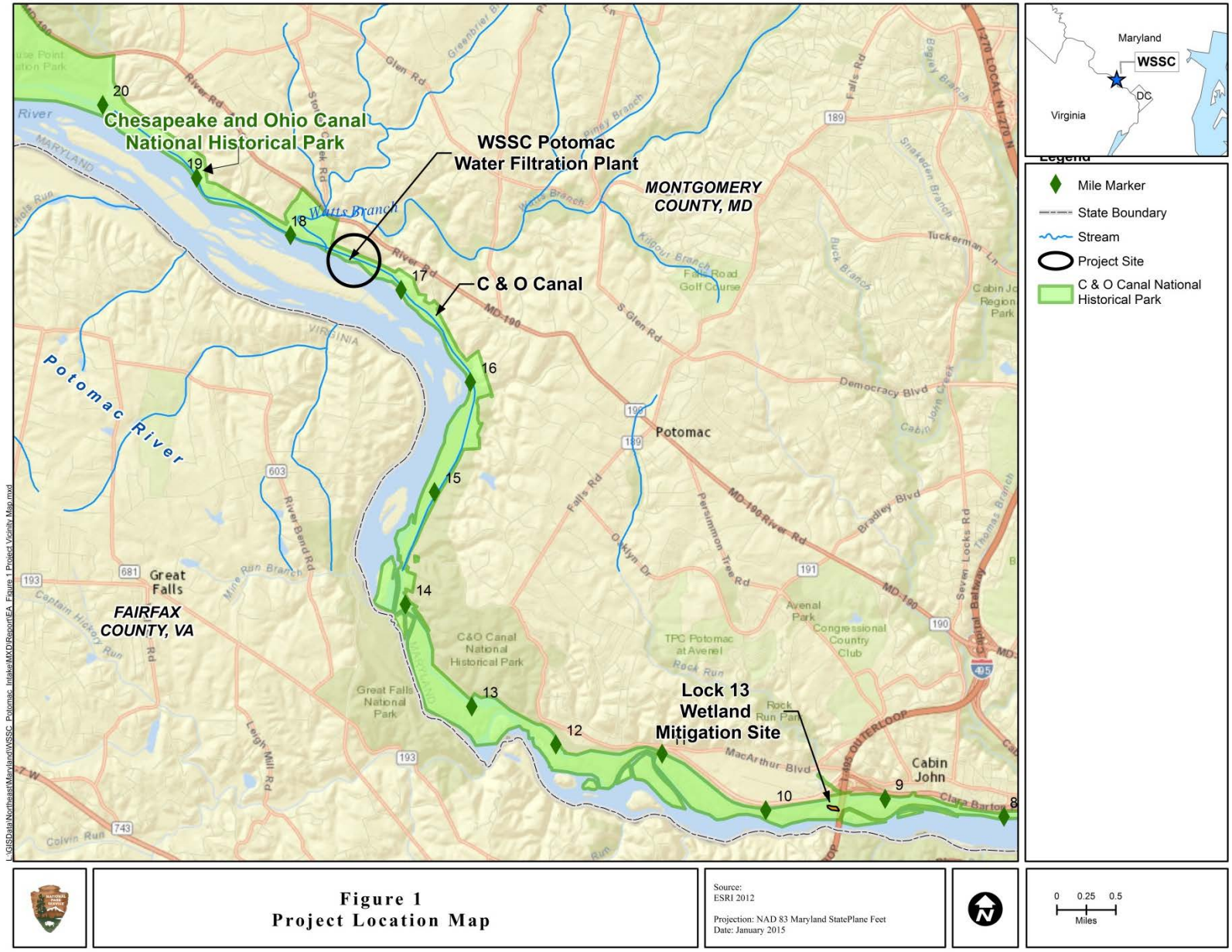

Figure 1
Project Location Map

Source:
ESRI 2012

Projection: NAD 83 Maryland StatePlane Feet
Date: January 2015

L:\GISData\Northeast\Maryland\WSSC_Potomac_Intake\MXD\ReportEA_Figure 1 Project Vicinity Map.mxd

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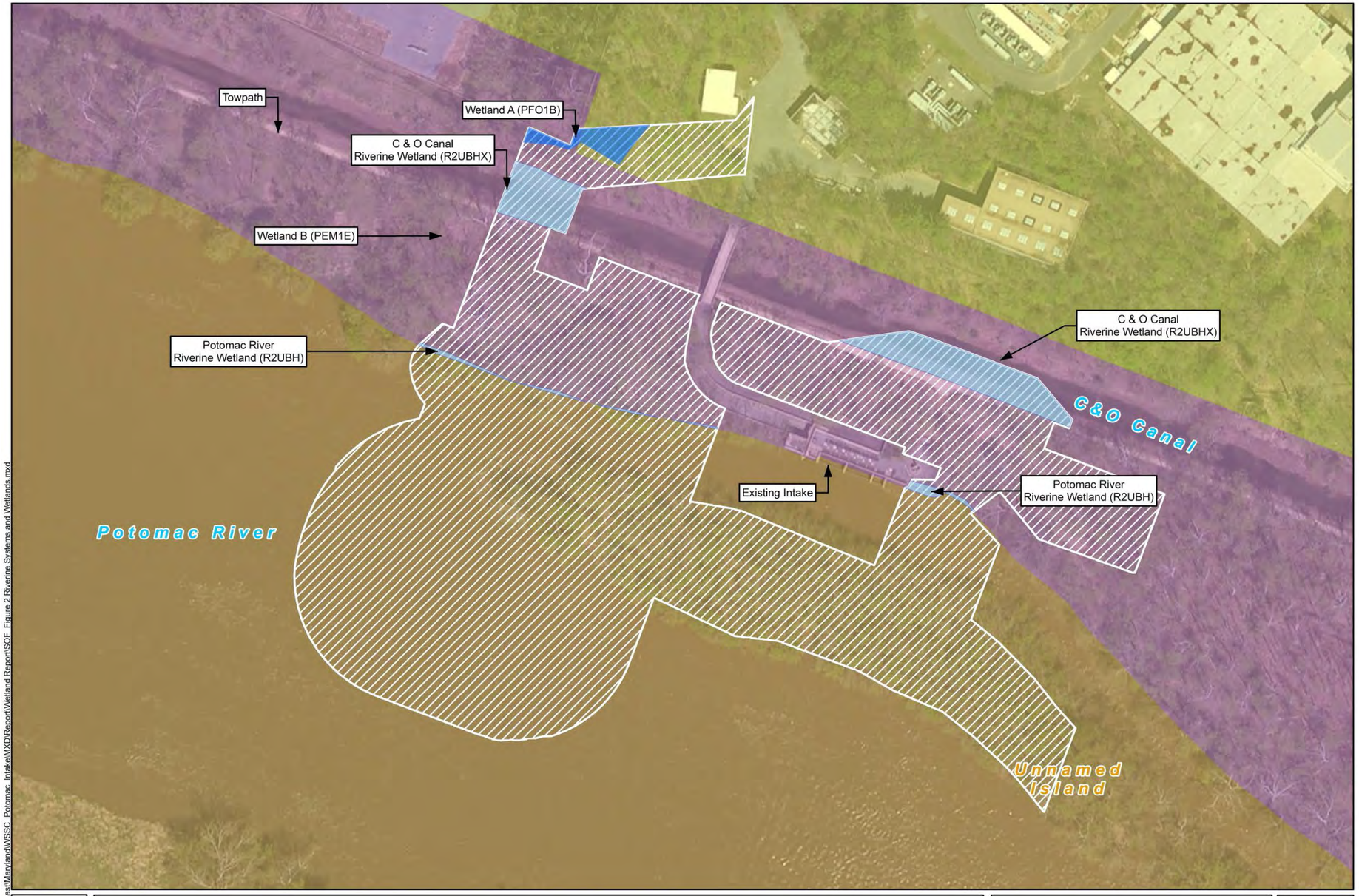

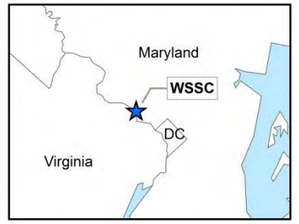

Legend

- Construction Area Limit (Limit of Disturbance)

Wetlands

- Riverine Wetland (NPS)
- Wetland

Land Parcels by Owner

- WSSC
- NPS
- State of Maryland

G:\State\and\Local\Northeast\Maryland\WSSC_Potomac_Intake\MXD\Report\Wetland Report\SOF_Figure 2 Riverine Systems and Wetlands.mxd

Figure 2
Wetlands Including Riverine Wetlands Delineated in the Project Area

Source:
Black & Veatch 2013, PEER 2013
ESRI 2012

Projection: NAD 83 Maryland StatePlane Feet
Date: June 2015

0 100 200
Feet

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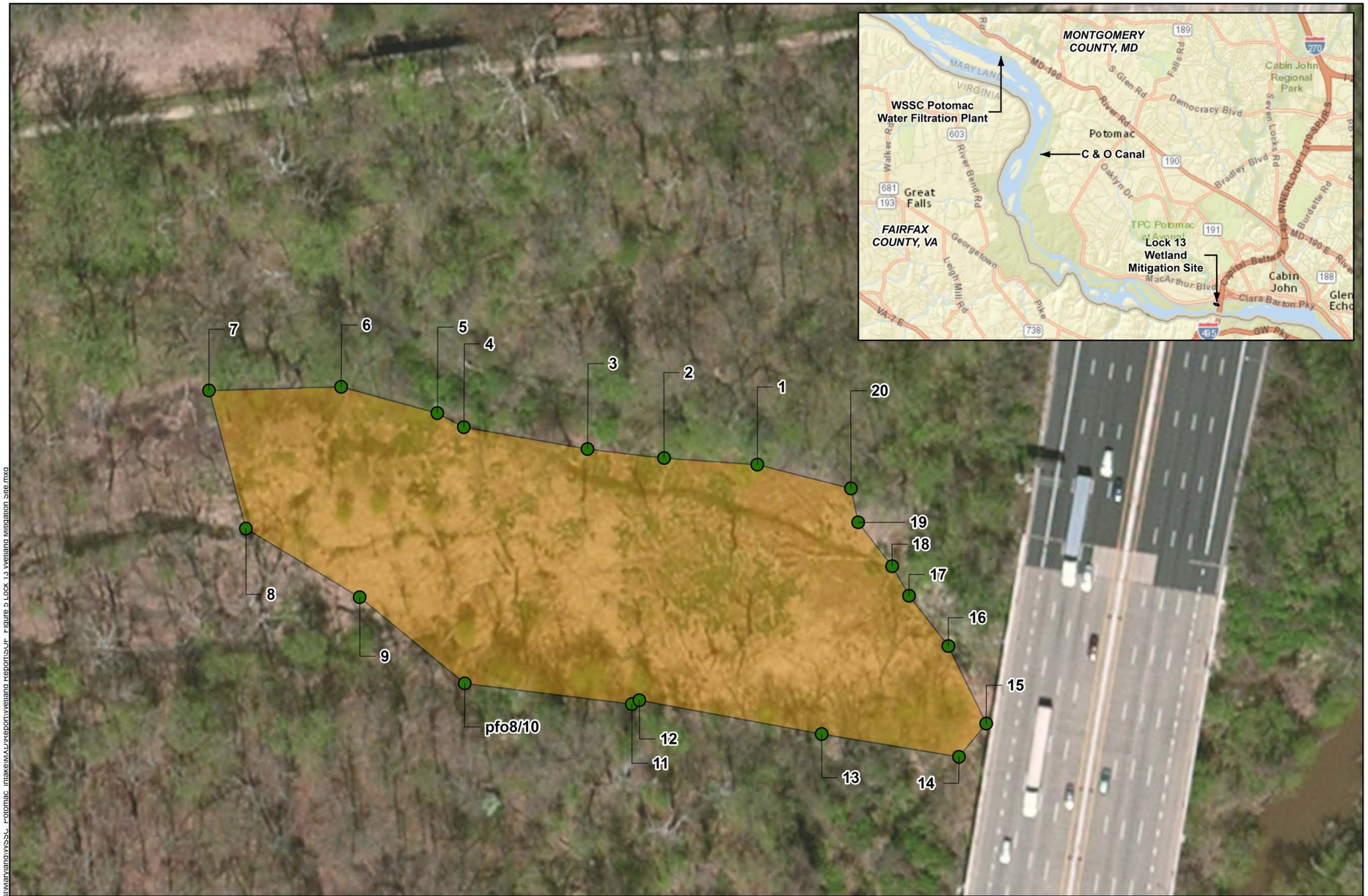

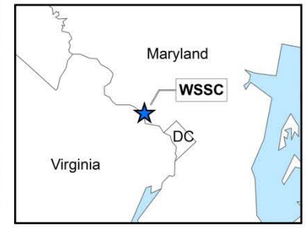

Legend

- Flag
- Mitigation Area

Figure 3
Lock 13 Wetland Mitigation Site

Source:
Black & Veatch 2013
ESRI 2012

Projection: NAD 83 Maryland StatePlane Feet
Date: January 2015

0 50 100
Feet

J:\Statewide\Local\Northeast\Maryland\MXD\Potomac_Intake\MXD\Report\Wetland Report\SUP_Figure 3 Lock 13 Wetland Mitigation Site.mxd

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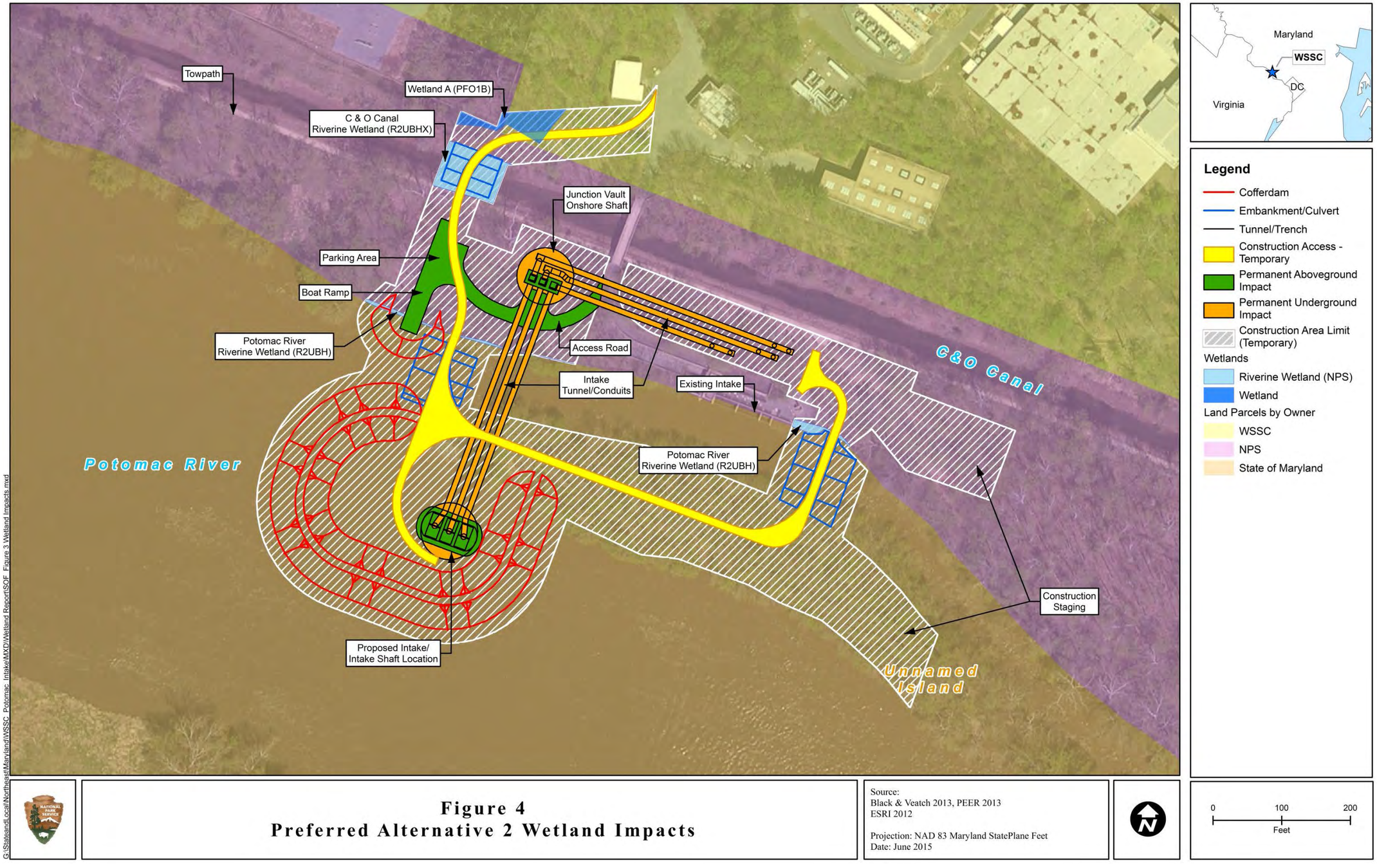

G:\Stateand\Local\Northeast\Maryland\WSSC_Potomac_Intake\MXD\Wetland Report\SOF_Figure 3 Wetland Impacts.mxd

Figure 4
Preferred Alternative 2 Wetland Impacts

Source:
Black & Veatch 2013, PEER 2013
ESRI 2012

Projection: NAD 83 Maryland StatePlane Feet
Date: June 2015

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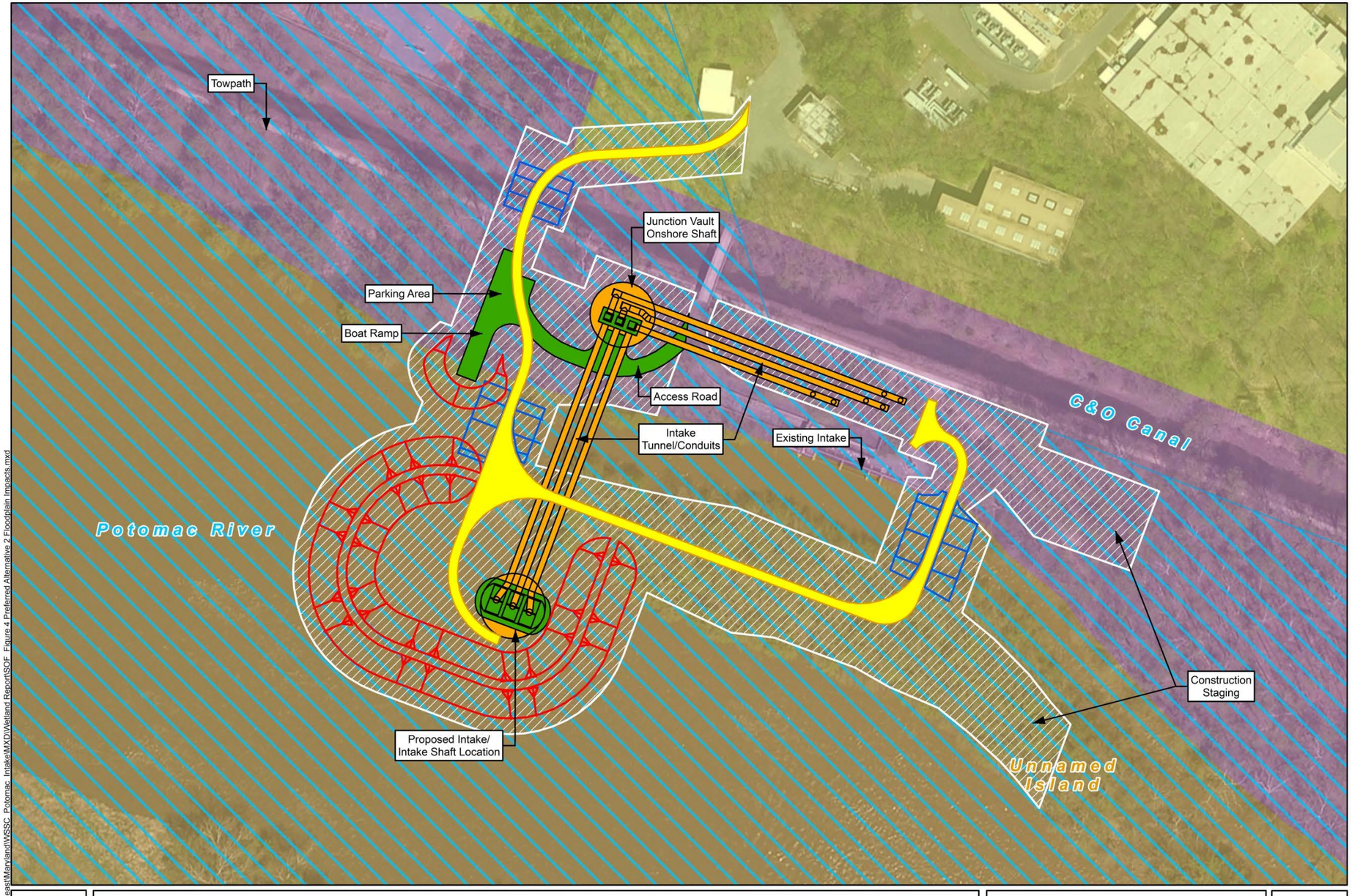

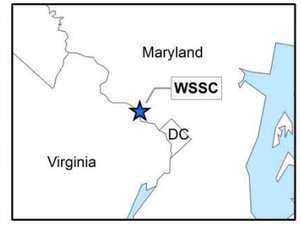

Legend

- Cofferdam
- Embankment/Culvert
- Tunnel/Trench
- 100 Year Flood Zone
- Construction Access - Temporary
- Permanent Aboveground Impact
- Permanent Underground Impact
- Construction Area Limit (Limit of Disturbance)

Land Parcels by Owner

- WSSC
- NPS
- State of Maryland

G:\StateandLocal\Northeast\Maryland\WSSC_Potomac_Intake\MXD\Welland Report\SOF_Figure 4 Preferred Alternative 2 Floodplain Impacts.mxd

Figure 5
Preferred Alternative 2 Floodplain Impacts

Source:
Black & Veatch 2013, PEER 2013
ESRI 2012

Projection: NAD 83 Maryland StatePlane Feet
Date: January 2015

0 100 200
Feet

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Appendix F:

Bird Species Identified in the Vicinity of the WSSC Potomac Water Filtration Plant

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BIRD SPECIES IDENTIFIED IN THE VICINITY OF THE WSSC POTOMAC WATER FILTRATION PLANT

SCIENTIFIC NAME	COMMON NAME
Chen caerulescens	Snow Goose
Branta canadensis	Canada Goose
Cygnus olor	Mute Swan
Cygnus columbianus	Tundra Swan
Aix sponsa	Wood Duck
Anas strepera	Gadwall
Anas americana	American Wigeon
Anas rubripes	American Black Duck
Anas platyrhynchos	Mallard
Anas clypeata	Northern Shoveler
Anas carolinensis	Green-winged Teal
Aythya collaris	Ring-necked Duck
Bucephala albeola	Bufflehead
Bucephala clangula	Common Goldeneye
Lophodytes cucullatus	Hooded Merganser
Mergus merganser	Common Merganser
Oxyura jamaicensis	Ruddy Duck
Meleagris gallopavo	Wild Turkey
Gavia immer	Common Loon
Podilymbus podiceps	Pied-billed Grebe
Phalacrocorax auritus	Double-crested Cormorant
Ardea herodias	Great Blue Heron
Coragyps atratus	Black Vulture
Cathartes aura	Turkey Vulture
Haliaeetus leucocephalus	Bald Eagle
Circus cyaneus	Northern Harrier
Accipiter striatus	Sharp-shinned Hawk
Accipiter cooperii	Cooper's Hawk
Goshawks species	Accipiter sp.
Buteo lineatus	**Red-shouldered Hawk**
Buteo jamaicensis	Red-tailed Hawk
Falco sparverius	American Kestrel
Falco columbarius	Merlin
Fulica americana	American Coot
Charadrius vociferus	Killdeer
Gallinago delicata	Wilson's Snipe

SCIENTIFIC NAME	COMMON NAME
Scolopax minor	American Woodcock
Larus delawarensis	Ring-billed Gull
Larus smithsonianus	Herring Gull
Larus species	gull sp.
Columba livia	Rock Pigeon
Zenaida macroura	Mourning Dove
Bubo virginianus	Great Horned Owl
Strix varia	**Barred Owl**
Megaceryle alcyon	Belted Kingfisher
Melanerpes erythrocephalus	Red-headed Woodpecker
Melanerpes carolinus	Red-bellied Woodpecker
Sphyrapicus varius	Yellow-bellied Sapsucker
Picoides pubescens	Downy Woodpecker
Picoides villosus	**Hairy Woodpecker**
Colaptes auratus	Northern Flicker
Dryocopus pileatus	**Pileated Woodpecker**
Sayornis phoebe	Eastern Phoebe
Cyanocitta cristata	Blue Jay
Corvus brachyrhynchos	American Crow
Corvus ossifragus	Fish Crow
Corvus corax	Common Raven
Eremophila alpestris	Horned Lark
Poecile carolinensis	Carolina Chickadee
Baeolophus bicolor	Tufted Titmouse
Sitta carolinensis	White-breasted Nuthatch
Certhia americana	**Brown Creeper**
Thryothorus ludovicianus	Carolina Wren
Troglodytes aedon	House Wren
Troglodytes hiemalis	Winter Wren
Regulus satrapa	Golden-crowned Kinglet
Regulus calendula	Ruby-crowned Kinglet
Sialia sialis	Eastern Bluebird
Catharus guttatus	Hermit Thrush
Turdus migratorius	American Robin
Dumetella carolinensis	Gray Catbird
Mimus polyglottos	Northern Mockingbird
Toxostoma rufum	Brown Thrasher
Sturnus vulgaris	European Starling
Anthus rubescens	American Pipit

SCIENTIFIC NAME	COMMON NAME
Bombycilla cedrorum	Cedar Waxwing
Setophaga coronata	Yellow-rumped Warbler
Setophaga pinus	Pine Warbler
Pipilo erythrophthalmus	Eastern Towhee
Spizella arborea	American Tree Sparrow
Spizella passerina	Chipping Sparrow
Spizella pusilla	Field Sparrow
Passerculus sandwichensis	Savannah Sparrow
Passerella iliaca	Fox Sparrow
Melospiza melodia	Song Sparrow
Melospiza georgiana	Swamp Sparrow
Zonotrichia albicollis	White-throated Sparrow
Zonotrichia leucophrys	White-crowned Sparrow
Junco hyemalis	Dark-eyed Junco
Cardinalis cardinalis	Northern Cardinal
Agelaius phoeniceus	Red-winged Blackbird
Sturnella magna	Eastern Meadowlark
Euphagus carolinus	Rusty Blackbird
Quiscalus quiscula	Common Grackle
Molothrus ater	Brown-headed Cowbird
Haemorhous purpureus	Purple Finch
Haemorhous mexicanus	House Finch
Carduelis tristis	American Goldfinch
Passer domesticus	House Sparrow

Source: National Audubon Society 2013, MDNR 2001b

Boldface type indicates Forest Interior Dwelling Species (FIDS) found within the vicinity of the Potomac WFT.

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Appendix G:

Special-Status Species Identified in the Vicinity of the WSSC Potomac Water Filtration Plant

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SPECIAL-STATUS SPECIES IDENTIFIED IN THE VICINITY OF THE WSSC POTOMAC WATER FILTRATION PLANT

COMMON NAME	SCIENTIFIC NAME	STATUS
PLANT SPECIES OF INTEREST		
Carolina Clubmoss	*Lycopodiella caroliniana*	State Endangered
Lobed Spleenwort	*Asplenium pinnatifidum*	State Endangered
Glade Fern	*Diplazium pycnocarpon*	State Threatened
Ostrich Fern	*Matteuccia struthiopteris*	State Rare
Climbing Fern	*Lygodium palmatum*	State Threatened
Smooth Cliffbrake	*Pellaea glabella*	State Endangered
Bog Fern	*Thelypteris simulata*	State Threatened
Upright Burhead	*Echinodorus cordifolius*	State Endangered
Engelmann's Arrowhead	*Sagittaria engelmanniana*	State Threatened
Sessile-fruited Arrowhead	*Sagittaria rigida*	State Endangered
Leafy Pondweed	*Potamogeton foliosus*	State Endangered
Spiral Pondweed	*Potamogeton spirillus*	State Rare
Flatstem Pondweed	*Potamogeton zosteriformis*	State Endangered
Buxbaum's Sedge	*Carex buxbaumii*	State Threatened
Carey's Sedge	*Carex careyana*	State Endangered
Davis' Sedge	*Carex davisii*	State Endangered
Cypress-knee Sedge	*Carex decomposita*	State Endangered
Hitchcock's Sedge	*Carex hitchcockiana*	State Endangered
Hop-like Sedge	*Carex lupuliformis*	State Rare
Mead's Sedge	*Carex meadii*	State Endangered
Woolly Sedge	*Carex pellita*	State Rare
A Sedge	*Carex planispicata*	State Rare
Necklace Sedge	*Carex projecta*	State Rare
Short's Sedge	*Carex shortiana*	State Endangered
Burr-reed Sedge	*Carex sparganioides*	State Rare
Reflexed Cyperus	*Cyperus refractus*	State Rare
Rough Cyperus	*Cyperus retrofractus*	State Rare
Small-flowered Hemicarpha	*Lipocarpha micrantha*	State Endangered
Reticulated Nutrush	*Scleria reticularis*	State Rare
Bashful Bulrush	*Trichophorum planifolium*	State Rare
Woolly Three-awn	*Aristida lanosa*	State Endangered
Side-oats Grama	*Bouteloua curtipendula*	State Rare
Broad-glumed Brome	*Bromus latiglumis*	State Endangered
Nottoway's Brome	*Bromus nottowayanus*	State Rare

COMMON NAME	SCIENTIFIC NAME	STATUS
Bristling Panicgrass	*Dichanthelium aciculare*	State Rare
Lax-flowered Witchgrass	*Dichanthelium laxiflorum*	State Rare
Few-flowered Panicgrass	*Dichanthelium oligosanthes*	State Watchlist
Tall Swamp Panicgrass	*Dichanthelium scabriusculum*	State Endangered
Narrow Melicgrass	*Melica mutica*	State Threatened
Long-awned Hairgrass	*Muhlenbergia capillaris*	State Endangered
Wiry Witch-grass	*Panicum flexile*	State Endangered
Floating Paspalum	*Paspalum fluitans*	State Endangered
Swamp-oats	*Sphenopholis pensylvanica*	State Threatened
Long-leaved Rushgrass	*Sporobolus asper*	State Rare
Rough Rushgrass	*Sporobolus clandestinus*	State Threatened
Long's Rush	*Juncus longii*	State Endangered
Crested Iris	*Iris cristata*	State Endangered
White Trout Lily	*Erythronium albidum*	State Threatened
Broad-leaved Bunchflower	*Melanthium latifolium*	State Endangered
Star-flowered False Solomon's-seal	*Smilacina stellata*	State Endangered
Featherbells	*Stenanthium gramineum*	State Threatened
Halberd-leaved Greenbrier	*Smilax pseudochina*	State Threatened
Wister's Coralroot	*Corallorhiza wisteriana*	State Endangered
Small Whorled Pogonia	*Isotria medeoloides*	Federally Threatened
Pale Green Orchid	*Platanthera flava*	State Rare
Purple Fringeless Orchid	*Platanthera peramoena*	State Threatened
Wide-leaved Ladys' Tresses	*Spiranthes lucida*	State Rare
Yellow Nodding Ladys' Tresses	*Spiranthes ochroleuca*	State Rare
Nodding Pogonia	*Triphora trianthophora*	State Endangered
Single-headed Pussytoes	*Antennaria solitaria*	State Threatened
Leopard's-bane	*Arnica acaulis*	State Endangered
Tall Tickseed	*Coreopsis tripteris*	State Endangered
Rough-leaved Aster	*Eurybia radula*	State Endangered
Sweet-scented Indian-plantain	*Hasteola suaveolens*	State Endangered
Mcdowell's Sunflower	*Helianthus occidentalis*	State Threatened
Potato Dandelion	*Krigia dandelion*	State Endangered
Riverbank Goldenrod	*Solidago simplex var. racemosa*	State Threatened
Showy Goldenrod	*Solidago speciosa*	State Threatened
Serpentine Aster	*Symphyotrichum depauperatum*	State Endangered
Drummond Aster	*Symphyotrichum drummondii*	State Rare
Narrow-leaved Horse-gentian	*Triosteum angustifolium*	State Endangered
Valerian	*Valeriana pauciflora*	State Endangered
Goose-foot Cornsalad	*Valerianella chenopodiifolia*	State Endangered

COMMON NAME	SCIENTIFIC NAME	STATUS
Red Milkweed	*Asclepias rubra*	State Endangered
Climbing Milkweed	*Matelea obliqua*	State Endangered
Climbing Dogbane	*Trachelospermum difforme*	State Endangered
Fringe-tip Closed Gentian	*Gentiana andrewsii*	State Threatened
Striped Gentian	*Gentiana villosa*	State Endangered
American Gromwell	*Lithospermum latifolium*	State Endangered
Virginia False-gromwell	*Onosmodium virginianum*	State Endangered
Coville's Phacelia	*Phacelia covillei*	State Endangered
Torrey's Mountain-mint	*Pycnanthemum torrei*	State Endangered
Whorled Mountain-mint	*Pycnanthemum verticillatum*	State Endangered
Virginia Mountain-mint	*Pycnanthemum virginianum*	State Rare
Common Skullcap	*Scutellaria galericulata*	State Rare
Leonard's Skullcap	*Scutellaria leonardii*	State Threatened
Veined Skullcap	*Scutellaria nervosa*	State Endangered
Rock Skullcap	*Scutellaria saxatilis*	State Endangered
Rough Hedge-nettle	*Stachys aspera*	State Endangered
Nuttall's Hedge-nettle	*Stachys nuttallii*	State Rare
Narrow-leaved Bluecurls	*Trichostema setaceum*	State Rare
Erect Water-hyssop	*Mecardonia acuminata*	State Endangered
Marsh Speedwell	*Veronica scutellata*	State Endangered
Slender-leaved Bluets	*Houstonia tenuifolia*	State Rare
Buttonweed	*Spermacoce glabra*	State Endangered
Hairy Wild-petunia	*Ruellia humilis*	State Endangered
Pursh's Ruellia	*Ruellia purshiana*	State Endangered
Rustling Wild-petunia	*Ruellia strepens*	State Endangered
Auricled Gerardia	*Agalinis auriculata*	State Endangered
Blunt-leaved Gerardia	*Agalinis obtusifolia*	State Endangered
Thread-leaved Gerardia	*Agalinis setacea*	State Endangered
Low Bindweed	*Calystegia spithamaea*	State Rare
Smartweed Dodder	*Cuscuta polygonorum*	State Endangered
Smooth Phlox	*Phlox glaberrima*	State Endangered
Downy Phlox	*Phlox pilosa*	State Endangered
Bloodleaf	*Iresine rhizomatosa*	State Endangered
Yellow Nailwort	*Paronychia virginica var. virginica*	State Endangered
Snowy Campion	*Silene nivea*	State Endangered
Fameflower	*Talinum teretifolium*	State Threatened
Tall Dock	*Rumex altissimus*	State Endangered
Missouri Rockcress	*Arabis missouriensis*	State Endangered
Cuckooflower	*Cardamine pratensis*	State Rare

COMMON NAME	SCIENTIFIC NAME	STATUS
Lake Cress	*Neobeckia aquatica*	State Endangered
Virginia Mallow	*Sida hermaphrodita*	State Endangered
Lowland Loosestrife	*Lysimachia hybrida*	State Threatened
Sandbar Willow	*Salix exigua*	State Endangered
Dwarf Prairie Willow	*Salix humilis var. tristis*	State Rare
American Chestnut	*Castanea dentata*	State Watchlist
Mossy-cup Oak	*Quercus macrocarpa*	State Rare
Shumard's Oak	*Quercus shumardii*	State Threatened
Big Shellbark Hickory	*Carya laciniosa*	State Endangered
Butternut	*Juglans cinerea*	State Watchlist
Prickly Hornwort	*Ceratophyllum echinatum*	State Endangered
American Lotus	*Nelumbo lutea*	State Rare
Yellow Water-crowfoot	*Ranunculus flabellaris*	State Endangered
Deciduous Holly	*Ilex decidua*	State Rare
Blunt-leaved Spurge	*Euphorbia obtusata*	State Endangered
Canada Milkvetch	*Astragalus canadensis*	State Endangered
Bent Milkvetch	*Astragalus distortus*	State Threatened
Wild False Indigo	*Baptisia australis*	State Threatened
Rigid Tick-trefoil	*Desmodium rigidum*	State Endangered
Vetchling	*Lathyrus palustris*	State Endangered
Winged Loosestrife	*Lythrum alatum*	State Endangered
Leatherwood	*Dirca palustris*	State Threatened
Racemed Milkwort	*Polygala polygama*	State Threatened
Seneca Snakeroot	*Polygala senega*	State Threatened
Sand Grape	*Vitis rupestris*	State Endangered
Nantucket Shadbush	*Amelanchier nantucketensis*	State Threatened
Running Juneberry	*Amelanchier stolonifera*	State Rare
Yellow Avens	*Geum aleppicum*	State Endangered
Canada Burnet	*Sanguisorba canadensis*	State Threatened
Northern Prickly-ash	*Zanthoxylum americanum*	State Endangered
MUSSEL SPECIES OF INTEREST		
Dwarf wedge mussel	*Alasmidonta heterodon*	State Endangered/ Federally Endangered
Triangle floater	*Alasmidonta undulata*	State Endangered
Brook floater	*Alasmidonta varicosa*	State Endangered
Green floater	*Lasmigona subviridis*	State Endangered
INSECT SPECIES OF INTEREST		
Six-banded longhorn beetle	*Dryobius sexnotalus*	State Endangered

COMMON NAME	SCIENTIFIC NAME	STATUS
REPTILE SPECIES OF INTEREST		
Rainbow snake	*Farancia erytrogramma*	State Endangered
AVIAN SPECIES OF INTEREST		
Upland sandpiper	*Bartramia longicauda*	State Endangered
Loggerhead shrike	*Lanius ludovicianus*	State Endangered
Sedge wren	*Cistothorus platensis*	State Endangered
Henslow's sparrow	*Ammodramus henslowii*	State Threatened
MAMMAL SPECIES OF INTEREST		
Allegheny woodrat	*Neotoma magister*	State Endangered
Eastern small-footed bat	*Myotis leibii*	State Endangered
Northern long-eared bat	*Myotis septentrionalis*	Federally Threatened

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