

**National Park Service**  
U.S. Department of the Interior



Chesapeake & Ohio Canal National Historical Park  
Maryland, West Virginia, District of Columbia

## **Restoration of Canal Operations at Hancock MP 122.12 to 124.59**

### **Environmental Assessment**



**May 2014**

*Page intentionally left blank*

## **PROJECT SUMMARY**

### **Introduction**

The National Park Service (NPS) proposes to rehabilitate and restore historic structures of the Chesapeake and Ohio Canal National Historical Park (C&O Canal NHP) at Hancock, Maryland. The project area begins at Mile 122.12 and ends at Mile 124.59 of the towpath, along the Potomac River. This area includes Locks 51 and 52, the Bowles (Little) Farm, the Tonoloway Creek Aqueduct, canal prism, canal boat basin, parking area at Little Tonoloway Picnic Area, the park's maintenance compound, and ruins of the Little Warehouse and stone wall. The project area is approximately 84 acres and follows the C&O Canal NHP towpath for approximately 2.5 miles. The proposed action would also include the expansion of opportunities for learning about canal operations in the 19th century near Hancock, Maryland. Restoration and rehabilitation of historic structures at the park and improvements to interpretive/educational opportunities would provide visitors a better understanding of canal operations and an improved appreciation for the history of the canal.

The National Environmental Policy Act (NEPA) of 1969 process is being conducted in accordance with NPS regulations for implementing NEPA, and it examined the consequences of this proposed project on the environment. This Environmental Assessment (EA) presents the alternatives considered during the NEPA process, the affected environment, the impacts associated with the proposed project, potential mitigation measures, and the agency consultation and coordination conducted to support this project.

### **Purpose and Need for the Action**

The purpose of the project is to expand visitor opportunities for learning about the C&O Canal NHP and canal operations in the late 19th century. Physical improvements to the canal's historic structures and development of more extensive interpretive/educational opportunities would help the visitor more fully understand, appreciate, and enjoy the canal and its heritage. The project addresses the potential for development and rehabilitation of several structures in and around the park's property, including the Bowles Property, Locks 51 and 52, the canal prism from Mile 122.12 to 124.59, the Tonoloway Aqueduct, and the parking area at Little Tonoloway Picnic Area.

Restoration and rehabilitation of structures at the park are needed to improve visitor experience and fully realize the potential of Hancock as an interpretive venue of C&O Canal NHP. This area of the park has had only basic preservation of historic structures and limited interpretive/educational opportunities. Mile 122.12 through 124.59 of the towpath and canal prism contains significant canal structures, including two locks and an aqueduct, all of which have fallen into disrepair. Interpretive and educational services were located outside of the park until the May 2010 opening of a new visitor center at the Bowles House.

The restoration and rehabilitation of historic structures would fulfill the objectives and vision of the park's 1976 General Plan that identified the Hancock location as a National Interpretive Center. This concept is further supported by the 1989 Hancock Development Concept Plan. Hancock contains historic restoration opportunities where visitors would be able to see demonstration of a functioning canal in an historic setting. Hancock could become a destination location for students and canal enthusiasts. Furthermore, Hancock could also be a venue for those interested in transportation, industrial, and agricultural heritage in the United States.

## Overview of the Alternatives

There are four alternatives analyzed in this EA, the no action alternative and three action alternatives.

**Alternative 1 (No Action Alternative):** Under the no action alternative, canal operations and Hancock would continue to be maintained in their current conditions. The Tonoloway Aqueduct would remain partially collapsed and Locks 51 and 52 would remain non-functioning. In addition, the canal would remain vegetated and unwatered between Lock 51 (Mile 122.12) and the existing rewatered section (Mile 124.10-124.59). Current conditions and operations at the Hancock Visitor Center, Bowles House, and maintenance compound would also remain the same.

**Elements Common to All Action Alternatives:** Under all action alternatives, the rehabilitation, improvement, or reconstruction of several buildings and sites would occur, including portions of the Bowles House, and the parking area at Little Tonoloway Picnic Area. The Bank Barn would be stabilized and preserved. Vegetation would be cleared to restore the ruins of the Little Warehouse and stone wall. The site would be restored to resemble a 1870s farm setting. The park maintenance facility would be relocated outside of the floodplain. This building would also house the law enforcement offices. Access roads and pedestrian access would be improved, and the visitor parking area at Bowles Farm would be expanded into the area where the maintenance facility was previously located. A picnic area would also be established in this area.

**Alternative 2 (Preferred Alternative):** The preferred alternative would include a complete rewatering of the canal prism in the Hancock area, and would provide the highest level of interpretation of the alternatives analyzed. The existing rewatered section of the canal would be extended to Lock 51. Existing locks, bypass flumes, waste weirs, and culverts would be made operational or new structures would be constructed depending on final water flow quality. Tonoloway Aqueduct would also be restored, and NPS would work with the Town of Hancock to improve the water intake and pump facility, if necessary, to supply sufficient water to the canal operations from the Potomac River. Visitor experience improvements would include the addition of a cross over pedestrian bridge, a walk-in campground, and an NPS or concession-run boat operation for interpretive programs, which would require the construction of a boat dock at the Bowles House. This alternative would also include the construction of a new maintenance access road downstream of Lock 51.

**Alternative 3:** Alternative 3 includes a partial rewatering of the canal, and a moderate level of visitor interpretation. An additional portion of the canal between Lock 51 and upstream of the Tonoloway Aqueduct would be rewatered, but the portion between the existing rewatered portion of the canal and the newly restored portion would remain unwatered and wooded. In the newly restored portion, locks, bypass flumes and waste weirs would be made operational, and a new water intake in the Potomac River would be installed for the Lock 51 and 52 portion of the canal. The Tonoloway Aqueduct would be restored under alternative 3. A cross over pedestrian bridge would be built at the Bowles House/Lock 52 Area, and a replica of a canal barge would be located in the Bowles House vicinity as an interpretive exhibit. To show the succession of natural resources over time, an interpretive wayside would be constructed, and a walk-in campground would be established. This alternative would also include the construction of a new maintenance access road downstream of Lock 51.

**Alternative 4:** Alternative 4 includes minimal preservation of canal features and minimal improvements to visitor interpretation. The existing canal prism between the Tonoloway Aqueduct and Lock 51 would remain unwatered and mowed. No additional rewatering of the canal would occur. Locks 51 and 52 would receive minimal preservation stabilization. No changes to visitor experience would occur, and no new access roads would be constructed.



## Summary of Impacts

Impacts of the proposed alternatives were assessed in accordance with NEPA, NPS Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision-making, which requires impacts to park resources to be analyzed in terms of their context, duration, and intensity. The no action alternative (alternative 1) would have long-term minor adverse impacts on floodplains and long-term negligible impacts on cultural resources from the continued management of resources. Alternative 2, the preferred alternative, would have long-term minor adverse impacts on soils, floodplains, special status species, and cultural resources following construction activities. Long-term moderate adverse impacts would be expected on wetlands, vegetation, and park operations. Long-term beneficial impacts on historic structures, cultural landscape, socioeconomics, transportation, and visitor use and experience would occur. The restoration efforts at the Canal Farm ditch would have long-term beneficial impacts on soils, floodplains, wetlands, and vegetation.

Impacts from alternatives 3 and 4 would be similar to those of the preferred alternative, except impacts on wetlands would be long-term and negligible (alternative 3), and impacts on vegetation would be long-term, negligible to minor, and adverse (alternative 3). Under alternative 4, no impacts on wetlands would occur, and impacts on park operations would be long-term and negligible. Additionally, there would be no impacts on special status species. No wetland restoration would be completed at the Canal Farm ditch under alternatives 3 and 4; therefore, no beneficial impacts on soils, floodplains, wetlands, and vegetation would occur at the site. NPS will continue Section 106 consultation under the terms of the programmatic agreement (PA) being developed for this project.

## How to Comment

Agencies and the public are encouraged to review and comment on the contents of this EA and the draft PA in appendix D during a 30-day public review period. We invite you to comment on this plan and you may do so by any one of several methods. The preferred method of comment is on the park's Planning, Environment, and Public Comment (PEPC) web site at <http://parkplanning.nps.gov/choh>. You may also submit written comments to:

Kevin Brandt, Superintendent  
Chesapeake & Ohio Canal National Historical Park  
1820 Dual Highway, Suite 100  
Hagerstown, MD 21740

Only written comments will be accepted. Please submit your comments within 30 days of the posting of the notice of availability on the PEPC web site. Please be aware that your entire comment will become part of the public record. If you wish to remain anonymous, please clearly state that within your correspondence, although we cannot guarantee that personal information, such as email address, phone number, etc. will be withheld.

*Page intentionally left blank*

<b>1.0</b>	<b>PURPOSE AND NEED .....</b>	<b>1-1</b>
1.1	Purpose and Need of the Project.....	1-1
1.2	Project Background.....	1-2
1.2.1	Purpose and Significance of the Park .....	1-2
1.2.2	Chesapeake and Ohio Canal .....	1-5
1.2.3	Hancock Area.....	1-5
1.3	Relationship to Laws, Executive Orders, Policies, and Other Plans.....	1-6
1.3.1	Federal and State Laws .....	1-6
1.3.2	Executive Orders and NPS Management Policies and Director's Orders .....	1-10
1.4	Scoping Process and Public Participation.....	1-11
1.4.1	Previous Planning .....	1-11
1.4.2	Scoping .....	1-12
1.5	Issues and Impact Topics .....	1-13
1.5.1	Derivation of Impact Topics .....	1-13
1.5.2	Impact Topics Included in this Document .....	1-13
1.5.3	Impact Topics Dismissed from Further Analysis .....	1-15
<b>2.0</b>	<b>PROPOSED ACTION AND ALTERNATIVES.....</b>	<b>2-1</b>
2.1	Alternative 1 – No Action Alternative.....	2-1
2.2	Project Components Common to All Action Alternatives (Alternatives 2, 3, and 4).....	2-1
2.3	Alternative 2, The Preferred Alternative – Total Rewatering of the Canal in the Hancock Area.....	2-4
2.3.1	Canal Operation .....	2-4
2.3.2	Visitor Experience .....	2-5
2.3.3	Access Roads .....	2-5
2.4	Alternative 3 - Partial Rewatering of Canal Prism .....	2-8
2.4.1	Canal Rewatering/Restoration .....	2-8
2.4.2	Visitor Experience .....	2-8
2.4.3	Access Roads .....	2-9
2.5	Alternative 4 – Cleared/Mowed Prism Improvements .....	2-9
2.5.1	Canal Operation .....	2-9
2.5.2	Visitor Experience .....	2-9
2.5.3	Access Roads .....	2-9
2.6	Mitigation Measures of the Action Alternatives.....	2-16
2.6.1	Soils .....	2-16
2.6.2	Submerged Aquatic Vegetation and Wetlands .....	2-16
2.6.3	Vegetation.....	2-17

2.6.4	Special status Species .....	2-17
2.6.5	Visitor Use .....	2-19
2.6.6	Cultural Resources .....	2-19
2.7	Alternatives Considered But Dismissed .....	2-20
2.8	Environmentally Preferable Alternative .....	2-20
2.9	Alternatives Comparison Table .....	2-21
2.10	Summary of Environmental Consequences/Impact Comparison Matrix.....	2-23
<b>3.0</b>	<b>AFFECTED ENVIRONMENT .....</b>	<b>3-1</b>
3.1	Overview.....	3-1
3.2	Natural Resources.....	3-1
3.2.1	Soils .....	3-1
3.2.2	Floodplains.....	3-1
3.2.3	Wetlands and Submerged Aquatic Vegetation .....	3-7
3.2.4	Vegetation.....	3-19
3.2.5	Special status Species .....	3-20
3.3	Cultural Resources .....	3-22
3.3.1	Historic Structures and Districts .....	3-22
3.3.2	Archeological Study and Resources .....	3-24
3.3.3	Cultural Landscape .....	3-25
3.4	Socioeconomics .....	3-25
3.5	Transportation.....	3-26
3.6	Visitor Use and Experience .....	3-26
3.7	Park Operations.....	3-27
<b>4.0</b>	<b>ENVIRONMENTAL CONSEQUENCES .....</b>	<b>4-1</b>
4.1	Overview.....	4-1
4.1.1	General Methodology for Establishing Impact Thresholds and Measuring Effects by Resource.....	4-1
4.1.2	General Analysis Methods .....	4-1
4.1.3	Assumptions.....	4-1
4.1.4	Impact Thresholds.....	4-2
4.1.5	Cumulative Impacts Analysis Method.....	4-2
4.2	Natural Resources.....	4-7
4.2.1	Soils .....	4-7
4.2.2	Floodplains.....	4-11
4.2.3	Wetlands and Submerged Aquatic Vegetation .....	4-14
4.2.4	Vegetation.....	4-24

4.2.5	Special status Species .....	4-27
4.3	Cultural Resources .....	4-31
4.3.1	Historic Structures and Districts .....	4-32
4.3.2	Archaeological Sites .....	4-36
4.3.3	Cultural landscape.....	4-40
4.4	Socioeconomics .....	4-44
4.5	Transportation .....	4-46
4.6	Visitor Use and Experience .....	4-48
4.7	Park Operations.....	4-51
<b>5.0</b>	<b>CONSULTATION AND COORDINATION .....</b>	<b>5-1</b>
5.1	Agency Consultation.....	5-1
5.1.1	Special status Species Consultation .....	5-1
5.1.2	Section 106 Consultation .....	5-1
5.2	Public Involvement .....	5-2
5.3	Compliance Needs .....	5-3
<b>6.0</b>	<b>LIST OF PREPARERS.....</b>	<b>6-1</b>
<b>7.0</b>	<b>GLOSSARY AND ACRONYMS .....</b>	<b>7-1</b>
7.1	Glossary .....	7-1
7.2	Acronyms.....	7-5
<b>8.0</b>	<b>REFERENCES.....</b>	<b>8-1</b>

## LIST OF APPENDICES

- Appendix A: Public Involvement
- Appendix B: Consultation and Coordination
- Appendix C: Wetlands Statement of Findings
- Appendix D: Programmatic Agreement



---

**LIST OF FIGURES**


---

Figure 1-1: Project Vicinity .....	1-3
Figure 1-2: Location of Project Area Features.....	1-4
Figure 2-1: Alternative 2 Preferred Alternative – Total Re-Watering of the Canal.....	2-7
Figure 2-2: Alternative 3 – Partial Re-Watering of the Canal Prism.....	2-11
Figure 2-3: Alternative 4 – Cleared/Mowed Prism Improvements.....	2-13
Figure 2-4: Canal Farm ditch Wetland Mitigation.....	2-19
Figure 3-1: Soil Map of Project Area.....	3-3
Figure 3-2: Floodplain Map of Project Area.....	3-4
Figure 3-3a: Project Area Wetlands Map 1 of 4 .....	3-9
Figure 3-3b: Project Area Wetlands Map 2 of 4 .....	3-11
Figure 3-3c: Project Area Wetlands Map 3 of 4 .....	3-13
Figure 3-3d: Project Area Wetlands Map 4 of 4 .....	3-15
Figure 4-1: Wetlands Impacted by Project for Alternative 2 .....	4-17
Figure 4-2: Canal Farm ditch Wetland Mitigation.....	4-22

---

**LIST OF TABLES**


---

Table 2-1: Project Components for Each Alternative .....	2-1
Table 2-2: Detailed Comparison of Alternatives .....	2-15
Table 2-3: Comparison of Alternatives.....	2-23
Table 2-4: Summary of Environmental Consequences/Impact Comparison Matrix .....	2-24
Table 3-1: Historic Flood Events for the Potomac River at Hancock.....	3-2
Table 3-2: Emergent and Forested Wetlands Delineated in the Project Area at Hancock, Maryland .....	3-17
Table 3-3: List of Classified Structures In or Adjacent to the Study Area` .....	3-23
Table 4-1: Cumulative Impact Scenario Table .....	4-4
Table 4-2: Wetland Impacts by Alternative.....	4-16
Table 4-3: Type and Number of Trees Estimated in Proposed Rewatering Area .....	4-19

## 1.0 PURPOSE AND NEED

### 1.1 Purpose and Need of the Project

The National Park Service (NPS) is proposing to rehabilitate and restore historic structures of the Chesapeake and Ohio Canal National Historical Park (C&O Canal NHP) at Hancock, Maryland (figure 1-1). The purpose of this project is to expand visitor opportunities for learning about the C&O Canal NHP and canal operations in the 19<sup>th</sup> century. Physical improvements to the canal's historic structures and development of more extensive interpretive/educational opportunities would help the visitor more fully understand, appreciate, and enjoy the canal and its heritage. The project addresses the potential for development and rehabilitation of the following structures in and around the park's property:

- Bowles Property
- Lock 51
- Lock 52
- Canal prism from mile post (Mile) 122.12 to 124.59
- Tonoloway Aqueduct
- Parking area at Little Tonoloway Picnic Area/Boat Ramp
- Park maintenance compound
- Little Warehouse and stone wall

These actions are needed to improve visitor experience and fully realize the potential of Hancock as an interpretive venue of C&O Canal NHP. This area of the park has had only basic preservation of historic structures, and limited interpretive/educational opportunities. Mile 122.12 through 124.59 contains significant canal structures, including two locks and an aqueduct, all of which are in disrepair. Interpretive and educational services were located outside of the park until the May 2010 opening of a new visitor center at the Bowles House. The restoration and rehabilitation of historic structures would fulfill the vision of the park's 1976 *General Plan* that identified the location as a "National Interpretive Center." This concept is further supported by the 1989 *Hancock Development Concept Plan* (NPS 1989). Hancock contains historic restoration opportunities where visitors would be able to see a functioning canal in an historic setting. Hancock could become a destination location for students and canal enthusiasts. Furthermore, Hancock could also be a venue for those interested in transportation, industrial, and agricultural heritage in the United States.

The project area consists of two sites, the Hancock site and the wetland mitigation site. The Hancock site begins at Mile 122.12 and ends at Mile 124.59 of the towpath, along the Potomac River (figure 1-2). This area includes Locks 51 and 52, the Bowles (Little) Farm, the Tonoloway Aqueduct, canal prism, canal boat basin, parking area at Little Tonoloway Picnic Area/Boat Ramp, and the park's maintenance compound. The project area is approximately 84 acres and follows the C&O Canal NHP towpath for approximately 2.5 miles. The area is bordered to the north by the town of Hancock and Main Street and to the south by the Potomac River. The project area is located within Washington County, Maryland. In addition, the project area includes an 11.42 acre site located at Mile 43 within the park. This site includes the Canal Farm ditch, an artificially drained wetland that will be used for wetland mitigation for this project.

This Environmental Assessment (EA) has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and implementing regulations, 40 Code of Federal Regulations (CFR) 1500-

1508, and the NPS Director's Order 12 and Handbook: *Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2001). Compliance with Section 106 of the National Historic Preservation Act and its implementing regulations (36 CFR 800) is being conducted separately, but concurrently with the NEPA process. The NEPA project area serves as the Area of Potential Effects (APE) for Section 106.

## 1.2 Project Background

### 1.2.1 Purpose and Significance of the Park

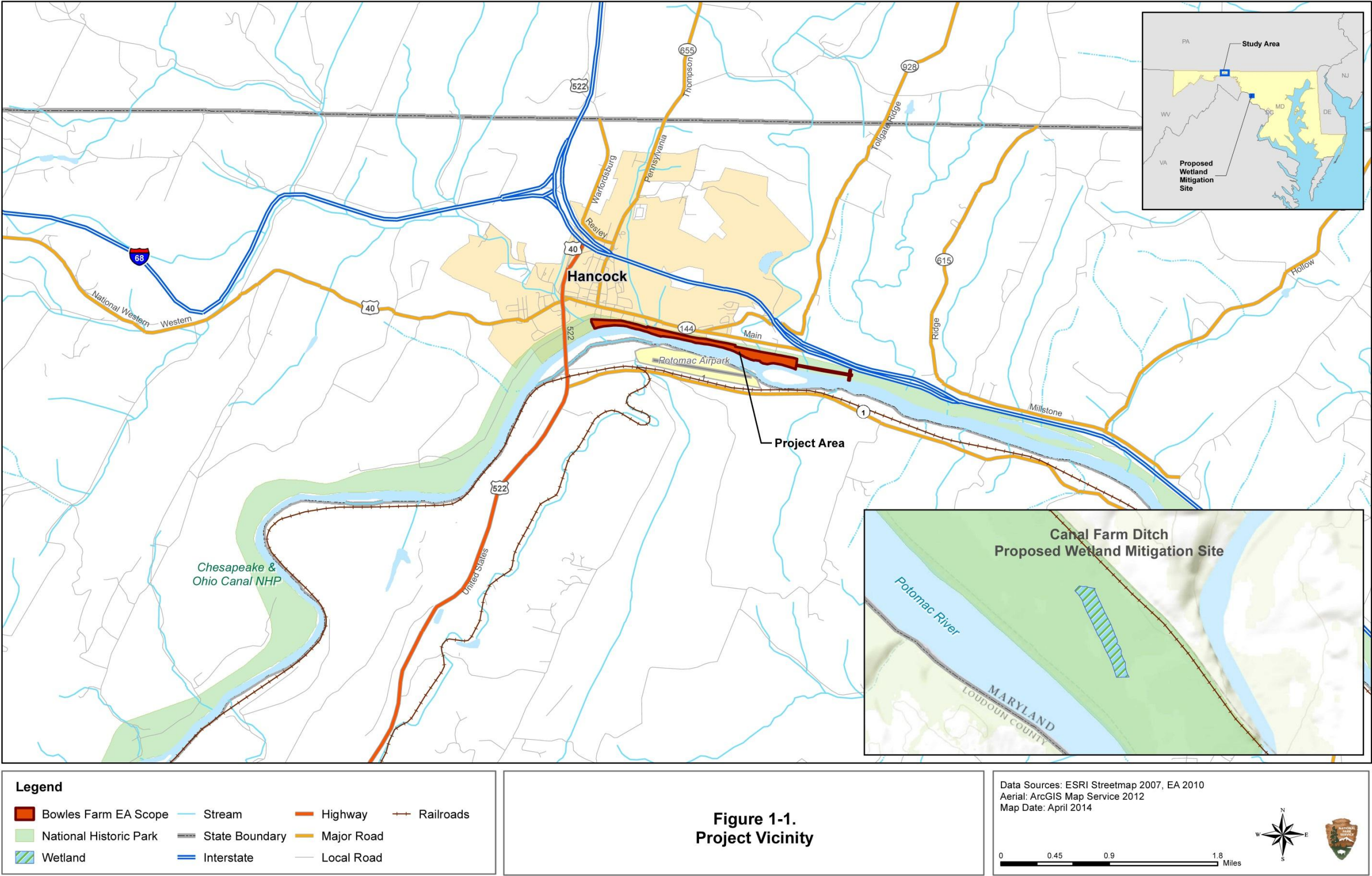
The C&O Canal NHP is the last towpath that remains fully intact from the mule-drawn barge transportation era in the United States. The NHP was established in 1971 and is located along 184.5 miles of the Potomac River's Maryland shoreline from the mouth of Rock Creek in Georgetown, Maryland to Cumberland, Maryland. The C&O Canal NHP is historically significant primarily because it embodies 19<sup>th</sup> century engineering and architectural technology. The canal operated from the 1820s to the 1920s as a route for transporting coal, lumber, and agricultural products such as grain, from western Maryland to the port of Georgetown and to the navigable lower reaches of the Potomac River. During this time, the C&O Canal provided jobs and opportunities for people throughout the Potomac River Valley. The canal included 74 lift locks, 11 stone aqueducts built to carry the canal prism over the Potomac River tributaries, and 241 historic culverts built to carry small streams and roads under the canal. Today the canal's remaining historical structures tell 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 C&O Canal NHP is to preserve and interpret the 19<sup>th</sup> century transportation canal from Washington D.C., to Cumberland, Maryland, and its associated scenic, natural, and cultural resources, and to provide opportunities for education and appropriate outdoor recreation (NPS 2013a). 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 opportunities to visitors, in addition to allowing them to experience the rich history, wildlife, and geologic resources of the canal.



Photo 1. Canal in Hancock, Maryland

The C&O Canal NHP *General Plan* (NPS 1976) defines the Hancock area as “desirable to re-create the mood of the canal, which passes near this historic town.” The *Hancock Development Concept Plan* (NPS 1989) states that development is “to impart to visitors an understanding and appreciation of a historic way of life blended into a natural setting of the Potomac Valley.” The alternatives analyzed in this EA allow the park to accomplish the goals set forth in the *General Plan* (1976) and the *Hancock Development Concept Plan* (1992). In conjunction with the increase in visitor understanding of the operation of the canal, the park would be able to preserve over a mile of historic canal prism, towpath, the Tonoloway Aqueduct, and Locks 51 and 52.



*Page intentionally left blank*



### 1.2.2 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 the migration of people heading west to settle beyond the original 13 colonies. 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. This canal would connect the Chesapeake Bay and the Ohio River. After 22 years and \$13 million in construction costs, the canal was completed in 1850, but only extended to Cumberland, Maryland. 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.

The C&O Canal remained in operation for 96 years, from 1828 to 1924. Mules pulled boats by walking along a 12-foot wide towpath. The boats floated 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. Seventy-four lift locks, which were typically 90 feet long and 15 feet wide, were placed in the canal to control the water. The locks raised and lowered boats approximately 8 feet, allowing them to travel both downstream and upstream. Most boats were generally a little less than 90 feet long and 14.5 feet wide and traveled at a speed of no more than 4 miles per hour. The canal was closed in 1924 after several floods made it impassable.

### 1.2.3 Hancock Area

The town of Hancock, Maryland, settled in 1749, relied heavily on transportation for its livelihood. Hancock served first as a stagecoach stop, then as a canal town, and currently as a rest stop for truck traffic on Interstates 68 and 70. Hancock is the northernmost large town along the Potomac River, located approximately 2 miles from the Pennsylvania border (figure 1-1). The canal reached Hancock, Maryland in 1839.



**Photo 2. Bowles Farm House**

The Bowles House and property are located at Mile 122.80 (figure 1-2). The Bowles Farm originally occupied 685 acres; however, over time the land was divided into smaller parcels. The Bowles House was originally built as a one story structure in the 1790s by William Yates. In 1875, during the height of canal operations, William Bowles acquired the property, which included a large Bank Barn, wagon shed, smokehouse, carriage house/steps, and outhouse. In 1905, the property was sold to William and Laura Little. Descendants of the Little family continued to reside in the house until the 1980s; the house was purchased by the NPS in 1982. Today the Bowles House, wash/smoke house, shed, and outhouse are the only intact structures remaining at Bowles Farm. Remnants of the foundation of the Bank Barn are also present; this is described in more detail in chapter 3.

The Tonoloway Aqueduct is located at Mile 122.96 (figure 1-2). Aqueducts along the canal acted as bridges for canal boats, allowing them to pass over streams and other tributaries of the Potomac River, while moving up and down the canal. This aqueduct carries the canal over Tonoloway Creek. It was built between 1835 and 1839 of limestone quarried upstream from the creek. Although the aqueduct today is partially stabilized by wooden supports, it is in disrepair. The dewatered canal that crosses over it currently serves as a footbridge.



**Photo 3. Tonoloway Aqueduct**

### **1.3 Relationship to Laws, Executive Orders, Policies, and Other Plans**

The NPS is governed by laws, regulations, and management plans before, during, and following any management action considered under any NEPA analysis. The following are those that are applicable to the proposed action.

#### **1.3.1 Federal and State Laws**

##### **National Park Service Organic Act of 1916**

By enacting the NPS Organic Act of 1916, Congress directed the U.S. Department of the Interior (DOI) and the NPS to manage units “to conserve the scenery and the natural and historic objects and wildlife therein and to provide for the enjoyment of the same in such a manner and by such a means as will leave them unimpaired for the enjoyment of future generations” (16 United States Code [USC] 1). Despite this mandate, the Organic Act and its amendments afford the NPS latitude when making resource decisions that balance resource preservation and visitor recreation.

##### **National Environmental Policy Act of 1969, as Amended**

NEPA (Public Law 91-90, 42 USC 4321-4347, July 1, 1970) requires federal agencies to consider the impact of proposed federal actions on the natural and human environment, and ensure that the public has an opportunity to be informed of, and comment on, those actions. NEPA also established the Council on Environmental Quality (CEQ), which has the goals of recommending national policies ensuring that the federal government promotes the improvement of the quality of the environment.

The NPS is required by NEPA to perform environmental analyses of the potential impacts on resources within its jurisdiction. The DOI produced NEPA regulations in Part 516 of the Departmental Manual, and the NPS Director’s Order 12 and Handbook: *Conservation Planning, Environmental Impact Analysis, and Decision Making* established requirements and procedures for DOI and NPS NEPA evaluations.

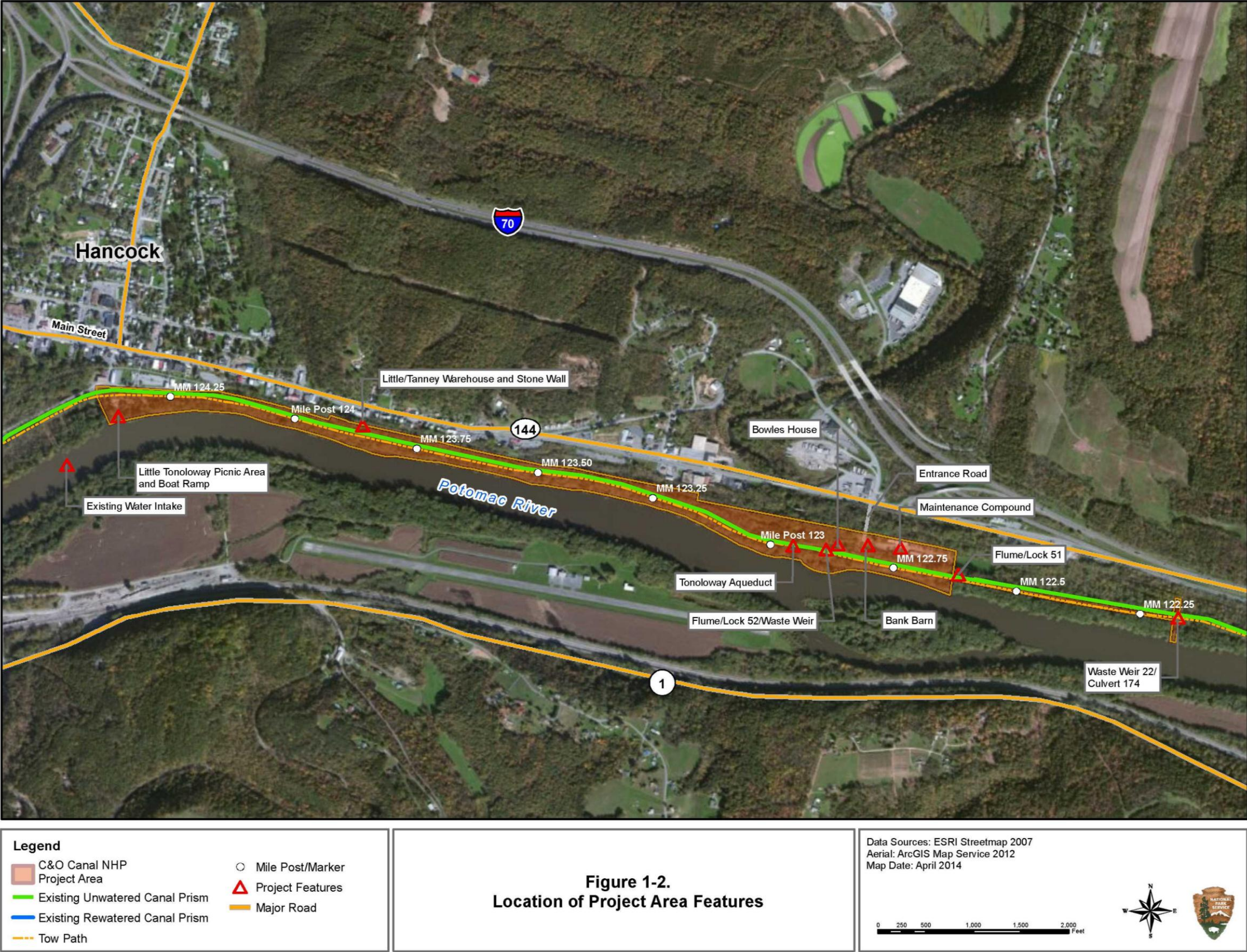
##### **National Historic Preservation Act of 1966, as Amended through 2000 (16 USC 470)**

The National Historic Preservation Act (NHPA) requires federal agencies to consider effects of their proposals on historic properties, and to provide state historic preservation officers, tribal historic preservation officers, and as necessary, the Advisory Council on Historic Preservation a reasonable opportunity to review and comment on these actions. Section 106 review and NEPA are two separate, distinct processes. The Director’s Order 12 Handbook (NPS 2001) indicates they can and should occur simultaneously, and documents can be combined, but one is not a substitute for the other. They should, however, be coordinated to avoid duplication of public involvement and other requirements. The information and mitigation gathered as part of the 106 review must be included in the NEPA document, and the 106 process must be completed before a Finding of No Significant Impact or a Record of Decision can be signed on a proposal that affects historic properties.

##### **Archeological Resources Protection Act**

The Archeological Resources Protection Act was enacted in 1979. The act prohibits unauthorized excavation on federal and Indian lands, establishes standards for permissible excavation, prescribes civil and criminal penalties, requires agencies to identify archeological sites, and encourages cooperation between federal agencies and private individuals.







*Page intentionally left blank*

## **Clean Water Act**

Section 404 of the Clean Water Act (CWA) regulates the placement of dredged and fill material into waters of the United States. The Act authorizes the issuance of permits from the U.S. Army Corps of Engineers (USACE) for such discharges as long as the proposed activity complies with environmental requirements specified in Section 404(b) (1) of the CWA. To grant a permit, the USACE must weigh the need to protect aquatic resources against the benefits of the proposed development. The USACE policy requires applicants to avoid impacts to waters of the United States and wetlands to the extent practicable, then minimize the remaining impacts, and take measures to compensate for unavoidable impacts. Section 401 of the CWA requires that any applicant for a Section 404 permit also obtain a Water Quality Certification from the state. The purpose of the certification is to confirm that the discharge of fill materials will be in compliance with the state's applicable water quality standards. A joint federal/state application for the alteration of any floodplain, waterway, tidal or nontidal wetland in Maryland will be submitted and applicable permits obtained from the Maryland Department of the Environment (MDE) and the USACE prior to initiating work. All regulated activities within waters of the United States and waters of the State, including the 100-year floodplain and jurisdictional wetlands, will be conducted in accordance with permit conditions and *Maryland's Waterway Construction Guidelines* (MDE 2000).

The National Pollutant Discharge Elimination System (NPDES) permit program was authorized under Section 402 of the CWA for the purpose of regulating point sources of pollution for the protection of waters of the United States. NPDES permits are issued by states that have obtained U.S. Environmental Protection Agency (USEPA) approval to issue permits. Maryland administers NPDES permitting through the MDE. Erosion and sediment control plans are to be prepared and implemented in accordance with *Maryland Erosion and Sediment Control Guidelines for State and Federal Projects* (MDE 2004).

## **Maryland's Erosion and Sediment Control Guidelines**

An erosion and sediment control plan would be prepared and implemented in accordance with *Maryland Erosion and Sediment Control Guidelines for State and Federal Projects* (MDE 2004). The plan would include resource protection measures that conform to *Maryland Standards and Specifications for Erosion and Sediment Control* (MDE 1994) and would be submitted to the MDE Water Management Administration for approval. Coverage under Maryland's General Permit for Construction Activity would be obtained by submitting a Notice of Intent to the MDE.

## **Maryland Waterway Construction Guidelines**

The *Maryland Waterway Construction Guidelines* (MDE 2000) provide a set of recommended details for approaches frequently encountered in the waterway construction process. These guidelines cover processes for the stabilization, modification, or rehabilitation of streams and rivers due to urbanization or previous channel construction.

## **Americans with Disabilities and Architectural Barriers Act Guidelines**

Pursuant to the Americans with Disabilities Act of 1990 and the Architectural Barriers Act of 1968, all public buildings, structures, and facilities must comply with specific requirements related to architectural standards, policies, practices, and procedures that accommodate people with hearing, vision, or other disability; and other access requirements. Public facilities and places must remove barriers in existing buildings and landscapes, as necessary and where appropriate. The NPS must comply with the Architectural Barriers Act Accessibility Standard as well as the Americans with Disabilities Act standards for this project.



## **Migratory Bird Treaty Act of 1918**

The Migratory Bird Treaty Act of 1918 makes it unlawful to kill, capture, buy, sell, import, or export migratory birds, eggs, feathers, or other parts. Executive Order 13186, “Responsibilities of Federal Agencies to Protect Migratory Birds,” issued in January 2001, restated the value of migratory birds, and directed agencies to develop and implement memoranda of understanding with the U.S. Fish and Wildlife Service (USFWS) to protect them. The NPS memorandum of understanding with the USFWS was signed April 12, 2010 and establishes how both agencies will jointly promote the conservation of migratory birds by incorporating bird conservation measures into agency actions and planning processes. It also identifies NPS actions that could result in the unintentional take of migratory birds or impacts on their habitats, so that strategies can be developed to avoid, minimize, or mitigate the effects of those actions.

### **1.3.2 Executive Orders and NPS Management Policies and Director’s Orders**

#### **Director’s Order 6: *Interpretation and Education***

Director’s Order 6: *Interpretation and Education* (NPS 2005) aims to supplement the *NPS Management Policies 2006* (NPS 2006b) with operational policies and procedures necessary to maintain effective, high-quality interpretive and educational programs. The order is intended to improve the internal management of the NPS and to provide memorable and meaningful learning and recreational experiences, foster development of a personal stewardship ethic, and broaden public support for preserving park resources.

#### **Director’s Order 28: *Cultural Resource Management***

Director’s Order 28: *Cultural Resource Management* (NPS 1998a) calls for the NPS to protect and manage cultural resources in its custody through effective research, planning, and stewardship and in accordance with the policies and principles contained in the *NPS Management Policies 2006* (NPS 2006b). This order also directs the NPS to comply with the substantive and procedural requirements described in the *Secretary of the Interior’s Standards and Guidelines for Archeology and Historic Preservation*, the *Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for Treatment of Cultural Landscapes*, and the *Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings*. Additionally, the NPS would comply with the NPS Programmatic Agreement (PA) with the Advisory Council on Historic Preservation and the National Conference of State Historic Preservation Officers (SHPOs) (NPS 2008b). The accompanying handbook to this order addressed standards and requirements for research, planning, and stewardship of cultural resources as well as the management of archeological resources, cultural landscapes, historic and prehistoric structures, museum objects, and ethnographic resources.

#### **Director’s Order 42: *Accessibility for Park Visitors***

Director’s Order 42: *Accessibility for Park Visitors* (NPS 2000) approaches the issue of accessibility in a comprehensive, organized way, rather than on a project-by-project basis. The primary goal of the program is to develop and coordinate a system-wide, comprehensive approach to achieving the highest level of accessibility that is reasonable, while ensuring consistency with the other legal mandates of conservation and protection of the resources the NPS manages. Since 1980, the NPS has worked with accessibility coordinators in each regional office and in parks and program offices to (1) assess the level of accessibility of various parks; (2) identify the barriers to accessibility; (3) develop policies and guidelines regarding appropriate methods and techniques for improving access; and (4) provide technical assistance and in-service training on effective approaches and program implementation. The NPS employs the principles of universal design in providing facilities for everyone, rather than for only a portion of the

population, including those persons with invisible disabilities, such as cardiac and respiratory problems; those who have temporary disabilities such as broken arms or legs; and parents using strollers or other wheeled devices.

#### **Director's Order 77-1: *Wetland Protection* and Executive Order 11990, "Protection of Wetlands"**

Executive Order 11990, "Protection of Wetlands", issued in May 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. NPS Director's Order 77-1: *Wetland Protection* and associated Procedural Manual 77-1 provide NPS policies and procedures for complying with Executive Order 11990.

#### **Director's Order 77-2: *Floodplain Management* and Executive Order 11988, "Floodplain Management"**

Executive Order 11988, "Floodplain Management" directs all federal agencies to evaluate the likely impacts of actions in floodplains. The objective of Executive Order 11988 is to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. NPS Director's Order 77-2: *Floodplain Management* and associated Procedural Manual 77-2 provide NPS policies and procedures for complying with Executive Order 11988.

#### **Executive Order 13508, "Chesapeake Bay Protection and Restoration"**

Executive Order 13508, "Chesapeake Bay Protection and Restoration" established a Federal Leadership Committee that oversees the development and coordination of reporting, data management, and other activities by federal agencies involved in Chesapeake Bay restoration. Executive Order 13508 required the Department of the Interior to assess impacts of climate change on the Bay; expand public access to the Bay and its rivers; expand environmental research, monitoring, and observation to strengthen scientific support for decision-making on Bay restoration issues; and develop focused and coordinated habitat and research activities that protect and restore living resources and water quality.

#### **National Park Service Management Policies**

The NPS *Management Policies* 2006 (NPS 2006b) is the basic NPS-wide policy document, adherence to which is required unless specifically waived or modified by the NPS Director or certain departmental officials, including the U.S. Secretary of the Interior. Actions under this EA would comply with these policies.

### **1.4 Scoping Process and Public Participation**

#### **1.4.1 Previous Planning**

In 1976 NPS published the *General Plan* for the park. Within the plan the Hancock area was identified as a Cultural Interpretive Zone (Zone B). This zone identifies sections of the park containing a high density of historic resources that are not necessarily accessible by road or do not have adequate parkland surrounding them. The *General Plan* stated that rewatering of this section of the canal is desirable to recreate the historic scene as it passes near the historic town of Hancock, Maryland (NPS 1976). The *General Plan* also called for better access to the site and removal of the maintenance facility from the historic scene.

These concepts were further supported by the 1980 *Seneca to Cumberland Interpretive Prospectus* and the 1989 *Hancock Development Concept Plan* (NPS 1989). Both of these plans called for the development of a visitor contact station at Hancock as well as better visitor parking facilities, better access to the park by widening the entrance road, and improved picnic and camping facilities. The Development Concept Plan also called for development within and adjacent to the park to be compatible with the natural and historic environment, for the Hancock area to impart an understanding of historic ways of life along the canal, and to develop recreational opportunities in such a way that they were compatible with the cultural and natural resource objectives, while protecting the towpath experience from overuse.

In May 2010, the park opened the historic Bowles House as the new Hancock Visitor Center. The park's previous visitor center was located on East Main Street and was in a General Service Administration leased building. The contract for the lease was due to expire in April 2010, leaving the park the decision to either renew the lease agreement or relocate the visitor center. The decision was made to not renew the lease. The Bowles House, also referred to as the Little House or the William Yates House, an historic park structure, which had been vacant for a number of years, was evaluated for the potential to become the new visitor center for the Hancock area. In order to bring the building up to acceptable standards as a visitor contact station, minimal work was planned and evaluated through the NPS's compliance process. It was determined that only the first floor and some external components of the structure would receive initial work. Temporary interpretive exhibits were developed until the more permanent rehabilitation/exhibits for the building could be addressed through the EA process for the canal restoration and rewatering project. By relocating the Hancock Visitor Center from East Main Street to the Bowles House, the park has been able to contact not only the visitors arriving by vehicle, but also the thousands of visitors who travel along the towpath or Western Maryland Rail Trail (WMRT). The law enforcement staff also moved, and is in a temporary trailer in the maintenance compound parking lot.

This EA will evaluate actions to implement more fully the concepts developed by these previous planning efforts.

#### **1.4.2 Scoping**

Internal scoping defines issues, alternatives, and data needs for the potential action. On May 18, 2010 the park initiated a formal project kick off meeting and site visit with the interdisciplinary team (identified in chapter 6). At this meeting, the team visited Bowles House, Locks 51 and 52, Tonoloway Aqueduct, and the Tonoloway Picnic Area and Boat Ramp. On June 23, 2010 the interdisciplinary team met to develop potential alternatives for the proposed project. The alternatives were further developed by the team in November 2010.

External scoping, the process used to gather public input, was conducted in accordance with NPS guidelines for implementing NEPA and NHPA. NPS released a project scoping newsletter on August 13, 2010 describing the proposed project and preliminary alternatives (appendix A). Additionally, a public scoping meeting was held on August 25, 2010 to give the public the opportunity to join project staff to learn about the proposed enhancements to the Hancock area of the park. The public scoping period lasted a total of 30 days. During this time, the public was invited to identify any issues or concerns with the proposed project they may have had so the NPS could appropriately consider them in this EA (appendix A). A total of 51 correspondences were received during this period. The majority of comments received supported the proposed project. Commenters suggested the types of visitor services and interpretive opportunities they would like to see available at the park. In addition, commenters noted the level of preservation or rehabilitation to the canal and Bowles property that they found appropriate. During the public scoping period, two letters were received from the Hancock Historical Society. The Hancock Historical Society was in support of the project, as the project would benefit the C&O Canal NHP as well

as the local economy. In addition, the society provided suggestions on how to prioritize the projects based on funding. Copies of the letters from the Hancock Historical Society are located in appendix A. As part of the NEPA and NHPA process, this EA is being made available to the public and resource agencies for 30 days to solicit questions and comments.

Scoping includes consultation with any interested agency, or any agency with jurisdiction by law or expert to obtain early input. Consultation letters were mailed to local and federal agencies on April 23, 2013 requesting consultation and comments regarding the proposed project at the park. A copy of the Phase I archeology report was also sent to the Maryland Historical Trust (MHT) for review on September 21, 2011. A response was received suggesting some changes to the document on October 19, 2011. Copies of the consultation letters are located in appendix B.

## **1.5 Issues and Impact Topics**

Issues can be defined as the relationships between the proposed action and the human, physical, and natural environment (NPS 2001). Issues are used to determine which environmental resources may experience either negative or beneficial consequences from an action. They do not predict the degree or intensity of potential consequences that might result from an action. Issues are usually problems caused by the no action alternative or other alternatives, but may be other questions, concerns, or problems. Concerns for potential impacts on wetlands and protected species were identified through internal scoping. Concern was also expressed about maintenance activities and materials present within the floodplain in the existing maintenance building. After receiving information from the public, outside agencies, and other sources, no additional issues were identified for this project.

### **1.5.1 Derivation of Impact Topics**

Impact topics were used to define and focus the discussion of resources that could be affected by the alternatives, and are the focus in the evaluation of the potential environmental consequences of the alternatives. Potential impact topics were identified based on legislative requirements, executive orders, topics in Director's Order 12 and Handbook: *Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2001), NPS *Management Policies* (NPS 2006), guidance from NPS, input from other agencies, public concerns, and resource information specific to the park. The interdisciplinary team discussed each resource topic and how the proposed project would either benefit or adversely impact the resource. In general, if negligible or minor impacts would result from the proposed project, the impact topic was dismissed from further analysis. A summary of impact topics analyzed is provided below, along with the rationale for their inclusion or dismissal.

### **1.5.2 Impact Topics Included in this Document**

The following impact topics have the potential to be affected by the proposed action and are evaluated in detail in this EA.

**Soils** – Construction activities, including the installation of a new parking area, would include the disruption and compaction of soils.

**Floodplains** – The proposed project lies within the 100-year floodplain. NPS Director's Order 77-2: *Floodplain Management and Procedural Manual* 77-2 provide NPS policies and procedures for complying with Executive Order 11988. The Director's Order applies to all NPS proposed actions, including the direct and indirect support of floodplain development that could adversely affect the natural resources and functions of floodplains, including coastal floodplains, or increase flood risks. If the preferred alternative in an EA would result in adverse impacts on a regulatory floodplain, a Statement of

Findings (SOF) documenting compliance with this Director's Order and its implementation procedures is required to be completed. However, historic or archaeological structures, sites, or artifacts whose location is integral to their significance and facilities, such as picnic facilities and small parking areas, proposed in the preferred alternative are considered excepted actions and Procedural Manual #77-2 does not apply. Consequently, a SOF for floodplains was not required for this EA.

**Wetlands** – Wetland delineation surveys conducted in July 2010 identified 11 wetlands or stream channels within the project area. Wetlands would be impacted from rewatering sections of the canal prism. Construction activities associated with the project could impact wetlands or deepwater habitats, including the Potomac River.

Executive Order 11990, "Protection of Wetlands" directs all federal agencies to avoid to the maximum extent possible 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. Based on NPS Director's Order 77-1: *Wetland Protection and Procedural Manual #77-1*, if a preferred alternative would have adverse impacts on wetlands, a SOF must be prepared that documents the rationale for choosing an alternative that would have adverse impacts on wetlands. A required SOF for wetlands has been prepared and is included in appendix C.

**Vegetation** – Limited/localized vegetation clearing would also be associated with the construction of various facilities. Impacts to the vegetative community would result during the construction activities, from the removal of selected trees and as a result of rewatering activities.

**Special status Species** – Special status species are those that have been identified by the USFWS or the Maryland Department of Natural Resources (MDNR) as needing special protection. Rare, threatened, and endangered plant surveys conducted in the spring, summer, and fall of 2010 identified four special status species (three plants and one reptile) within the proposed project area: the common hoptree (*Ptelea trifoliata*), short's sedge (*Carex shortiana*), basal bee-balm (*Monarda clinopodia*), and wood turtle (*Clemmys insculpta*).

**Archeological Resources** – There is a potential for adverse impacts to occur on archeological resources. During archeological surveys, two previously unidentified sites were discovered within the project area. Additional surveys would be necessary to determine the sites' significance and extent so that the sites can be avoided if necessary. An additional survey may be needed at the Canal Farm wetland mitigation site depending upon the design of the mitigation work. These surveys would be done in accordance with the PA being developed for this project (see appendix D for the draft PA).

**Historic Structures and Districts** – Proposed activities would impact known historic structures at C&O Canal NHP including the canal and associated structures. Some of the historic structures within the project area include the Bowles House, Lock 52, Tonoloway Aqueduct, towpath, canal prism, and the bridge over the canal at Hancock. There is also a potential for temporary visual and auditory impacts during construction.

**Cultural Landscapes** – The proposed construction would add permanent features to the existing landscape and remove others (primarily trees). Some of the new structures would include a water intake structure upstream of the Tonoloway Aqueduct and an expanded parking lot at the existing picnic area near Little Tonoloway Creek. Tree removal would take place within the canal prism and its banks and at the existing picnic area. The project would therefore have impacts on the



**Photo 4. Cleared Bank Barn ruins**



cultural landscape. There is also a potential for temporary visual and auditory impacts during construction.

**Socioeconomics** – Benefits to the local economy would occur during the construction and operation of the proposed project. The maintenance division would be moved to a commercially available building in Hancock. The likely increased visitation at the C&O Canal NHP would have a positive benefit on the economy of Hancock.

**Transportation** – The project would upgrade the access road and is likely to increase traffic on Route 144 due to construction activities associated with the project. An increase in visitation would result in an increase in traffic in the Hancock area. A traffic survey may need to be completed.

**Visitor Use and Experience** – The enhancements to the Hancock area would improve the visitor experience and would potentially increase visitation. The project would expand visitor opportunities for learning about the C&O Canal and its operations in the early 19th century.

**Park Operations** – Park operations would be affected during construction and operation of the proposed project. Changes to the maintenance compound would occur and could create a temporary disruption in maintenance and law enforcement services.

### **1.5.3 Impact Topics Dismissed from Further Analysis**

A summary of impact topics dismissed from analysis is provided below, along with the rationale for the dismissal.

**Air Quality** – Washington County is currently in attainment for all criteria air pollutants (USEPA 2010). The proposed project would contribute trace amounts of criteria air pollutants during construction activities, resulting in overall negligible impacts. Issues relating to air quality within or near the project area are associated with nearby roadways, the airport, and railroad line. This topic was dismissed since air pollutants would not contribute to the nonattainment of criteria air pollutants.

**Noise** – Noise from construction equipment would result during the construction activities; however, noise levels would be negligible. Primary sources of noise within the project area would continue to be generated from traffic along the highway and the active railroad line across the Potomac River. This topic was dismissed since the noise generated from construction equipment would not create a perceptible change from current conditions.

**Geology, Geologic Hazards, and Topography** – Based on NPS surveys for karst features within the park, none were identified in the Hancock area. Although some grading would be needed for the parking area, the topography of the area would not be altered, as it is relatively flat. In addition, excavation required for the parking lot or other construction activities would not extend past the soil layer. This topic was dismissed since changes to topography would not be measureable and no excavation of the underlying geologic resources would occur.

**Hydrology and Water Quality** – The rewatering of the canal may slightly alter the water quantity and flow of the Potomac River. The potential for temporary changes in water quality could occur during construction activities. During a storm event, construction areas within the floodplain and drainages would be susceptible to inundation and for erosion of disturbed areas to occur. These risks would be reduced by implementing best management practices (BMPs) to control soil erosion and sedimentation. The NPS would adhere to an erosion and sediment control plan completed in accordance with the *Maryland Erosion and Sediment Control Guidelines for State and Federal Projects*. Prior to construction,

the NPS would obtain a NPDES permit from the MDE. NPDES permits place limits on chemical pollutants, microbial pollutants, and other parameters such as temperature.

Changes to water quality piped into the canal are expected to be minor. Some addition of non-point source pollution, such as organics, sediments, or chemicals, may occur. BMPs to control sedimentation and potential sources of chemical pollution from canal boat operation would be implemented. Organics from wildlife or plant matter may affect water quality such as dissolved oxygen within the canal. Water flowing through the canal would be discharged into a downstream drainage and back into the Potomac River. Thus water entering the rewatered canal would be continuously flowing through the canal, which may increase aeration and limit stagnation and water quality effects on dissolved oxygen. Should the canal need to be drained for maintenance, the inlet source would be closed and the water allowed to drain and be discharged back into the Potomac River as noted above. Should a breach in the rewatered canal occur, protocol would include shutting off the inlet source, and the normal downstream drainage outflow would be supplemented by opening all other available waste weirs and outlets. The breach would then be isolated using sand bags and isolation bags to minimize overflow and erosion. Overall, the quantity of the water that would be diverted through the canal would be relatively small when compared to the size of the Potomac River and any change in water quality parameters to water flowing through the canal are expected to be minor and have little effect on the water quality of the Potomac River. The NPS would obtain applicable permits for the intake from and discharge into the Potomac River.



**Photo 5. Waste weir**

Proposed in-water construction within the Potomac River would be limited to replacement of an existing water intake structure within the existing footprint and would disturb less than 0.1 acre of river bottom. Construction in the Potomac River would employ mitigation, such as the use of a portable dewatering device and silt curtain, to protect the downstream waterways from sediment and silt impacts. *Maryland's Waterway Construction Guidelines* (MDE 2000) would be followed as applicable to avoid and minimize impacts to water quality.

This topic was dismissed since changes to hydrology and water quality would be minor.

**Aquatic Resources** – During construction activities aquatic organisms, including fish and benthic invertebrates, may be disturbed by noise and construction within the Potomac River from a new intake structure. In-water construction would temporarily impact less than 0.1 acre, a relatively small localized area of the river bottom. The park would keep the limits of the area disturbed by the intake as minimal as possible. Installation of silt curtains immediately downstream of the project area would minimize offsite sedimentation impacts. A portable dewatering system may also be needed during construction for a small area of the Potomac River. Any in-water work would be done in accordance with review and approval from federal and state review agencies. It is likely that most mobile species would move from the project area during construction activities. Disturbed submerged aquatic vegetation is expected to reestablish naturally in the area except where the permanent pipe structure and filter is placed, which is a very small area. This topic was dismissed because no measurable or perceptible changes would occur to the amount, distribution, connectivity, or integrity of aquatic resource habitat or populations.

**Wildlife** – Wildlife within the project area, which may include common species such as deer, squirrel, and various birds, may be accustomed to noise and human presence since the project area includes the current visitor center and is located adjacent to a developed area (Hancock) and highway. If wildlife are temporarily disturbed from construction activities, it is likely that species would move out of the area and

return following the construction process. Vegetation clearing would be conducted outside the breeding season for migratory birds, if possible. If vegetation clearing is scheduled within the nesting season for migratory birds, generally April through August, pre-construction surveys would be conducted for nests. No vegetation clearing would be conducted in identified nesting areas until the young have fledged. Impacts to wetland habitats are included in the discussion of impacts to wetlands. This topic was dismissed since no measurable or perceptible changes would occur to the amount, distribution, connectivity, or integrity of resource habitat or of wildlife populations.

**Special Status Freshwater Mussel Species** – Except for transient individuals, no federally proposed or listed endangered or threatened species are known to exist within the project impact area (see USFWS letter appendix B). Therefore no effect to federally proposed or listed endangered or threatened species is expected.

The area of the Potomac River at the confluence of Tonoloway Creek supports an occurrence of the Atlantic spike (*Ellipito product*), a freshwater mussel species with In Need of Conservation status in Maryland. There are also records of the Atlantic spike and the state listed brookfloater (*Alasmidonta varicosa*) in the area of Little Pool, which is located about 1 mile downstream of the project area (see MDNR letter appendix B). Freshwater mussels are filter feeders and require fish hosts for part of their life cycle; therefore, protection of water quality is important to maintaining mussel and host populations.

No in-water construction would occur near the confluence of Tonoloway Creek and the Potomac River under any of the alternatives. The proposed restoration of the Tonoloway Aqueduct in the vicinity of the confluence would be done in accordance with standard practices for working on bridges, which includes using nets to shield the waterways from falling grout or paint.

Under the preferred alternative the NPS would work with the Town of Hancock to upgrade the town's existing Potomac River water intake and pump facility within the existing footprint if needed to supply sufficient water to a proposed expanded canal operation. The location of the intake structure is approximately 1.5 miles upstream of the Tonoloway Creek and Potomac River confluence. The in-water work to replace the intake structure would affect a very limited area, less than 0.1 acre. To minimize impacts on the water quality of the river from sediment and silt during construction, a portable dewatering device would be used to allow dry construction, and a silt curtain would be deployed downstream of the work area to trap sediment. Additional sediment and erosion control BMPs, such as silt fencing, would be required for all upland ground disturbance to prevent and control soil erosion and sedimentation during construction. *Maryland's Waterway Construction Guidelines* (MDE 2000) would be incorporated into the design and construction as applicable.

With the avoidance of known occurrences of Atlantic spike and brookfloater, and protection of water quality, no effect on these species is expected. However, as an additional mitigation measure, preconstruction surveys for presence of special status mussel species would be completed. If special status mussel species are located within the project area the potential impacts and any additional mitigation measures would be evaluated in consultation with state and federal regulatory agencies.

**Ethnographic Resources** – Ethnographic resources typically refer to traditional use of places by specific tribal or other cultural groups. NPS consultation with federally recognized Native American tribes has not identified any Native American properties of traditional religious and cultural importance in the project area; therefore this topic was dismissed.

**Museum Collections** – A small museum collection is housed within Bowles Farm. The collection would not be moved or harmed by the project, but artifacts may be added to the collection as a result of additional archeological survey. The Phase 1 survey located approximately 300 small artifacts. Additional

archeological survey would be conducted in compliance with the programmatic agreement for this project. Fewer than 10 storage boxes of artifacts are expected to be added to the collection. This topic was dismissed because, although there is the potential to add additional artifacts to the collection, the numbers should be easily cataloged and housed within current facilities and are not expected to require additional space or strain existing resources. As a result, the impacts to museum collections would be minor or less.

**Wild and Scenic River** – The Potomac River is not designated as a wild and scenic river as defined in the Wild and Scenic Rivers Act (16 USC 1271-1287). Additionally, the Potomac River is not designated as a study river. Study rivers are defined as “designated for potential addition to the national wild and scenic river system” (NWSRS 2008).

The Nationwide Rivers Inventory (NRI) is a listing of more than 3,400 free-flowing river segments in the United States that are believed to possess one or more “outstandingly remarkable” natural or cultural values judged to be of more than local or regional significance by the NPS (NPS 2007). Under 1979 President Directive and related CEQ Procedures, all federal agencies must seek to avoid or mitigate actions that would adversely affect one or more NRI segments. A total of seven segments of the Potomac River are included in the NRI, however none of these segments include the project location (NPS 2007). The closest NRI segment begins on the Potomac River at the edge of Hancock and continues 52 miles southwest to Oldtown, Maryland (NPS 2007). This topic was dismissed since the project area lies outside of the designated reach on the Potomac River.

**Environmental Justice** – Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” requires federal agencies to make achieving environmental justice part of its mission. Specifically, each agency must identify and address “disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations.” The intent is to prevent minority and low-income populations from being disproportionately affected by adverse human health and environmental impacts of federal actions. The minority population is defined as the non-white and multiracial population of a given area, and includes African-American, Asian, American Indian, Native Alaskan, Native Hawaiian, Pacific Islander, persons reporting some other race, and persons reporting two or more races. None of the alternatives (including the no action alternative) would result in disproportionate impacts on minority populations; therefore, this topic was dismissed.

**Land Use** – The proposed project includes the maintenance division occupying a commercially available site outside of the C&O Canal NHP. Land use along Main Street in Hancock is zoned as Commercial/Retail. Land use adjacent to C& O Canal NHP is zoned as Forest/Agriculture (Planning Commission 2010). This topic was dismissed since the proposed project is consistent with the current zoning regulations for Hancock, Maryland.

**Scenic Resources and Viewsheds** – The proposed project includes changes to the scenic resources and viewsheds to reflect the 1870s. The cultural landscape impact topic discussed under Cultural Resources addresses a variety of features contributing to the historic scene, including views and viewsheds. This topic was not analyzed as a separate topic, because it is covered under the heading of cultural landscapes.

**Public Health and Safety** – During construction activities, visitors of the park would be detoured around the construction area. Improvements to the area would also decrease the risk for future injuries to occur. This topic was dismissed since measures would be taken to ensure public health and safety.

## 2.0 PROPOSED ACTION AND ALTERNATIVES

This section provides a detailed description of the alternatives that have been considered for the proposed action. All three action alternatives build on previous park planning document visions for the Hancock area, as developed over the past four decades (NPS 1976, 1980, 1989). The alternatives take into account recommendations for making Hancock a center for introducing visitors to the park and towpath through enhancing the canal setting and increasing access and parking from Route 144. Existing recreational facilities would be upgraded, including picnic areas and the visitor center, and appropriate recreational and interpretive activities would be developed to concentrate access and use in developed areas and relieve pressure from other more natural zones along the towpath.

### 2.1 Alternative 1 – No Action Alternative

The no action alternative is required for the NEPA/NHPA process to review and compare feasible alternatives to the existing conditions. Under the no action alternative, the canal facilities at Hancock would continue to be maintained in their current conditions. The Tonoloway Aqueduct would remain partially collapsed and Locks 51 and 52 would remain non-functioning. In addition, the canal would remain vegetated and unwatered or unimproved between Lock 51 (Mile 122.12) and the existing rewatered section (Mile 124.10-124.59). The Hancock Visitor Center would continue to operate within the first level of the Bowles House, using temporary exhibits. The Bowles Property would continue to offer limited visitor services. The maintenance compound would remain in the current location at Bowles Farm. No changes would be made to the Tonoloway Picnic Area and Boat Ramp (figure 1-2).

### 2.2 Project Components Common to All Action Alternatives (Alternatives 2, 3, and 4)

Many of the potential actions are common to all alternatives. These actions have been proposed by various planning documents to increase access to and understanding of the canal and its resources. The following actions and project components would be undertaken in a phased approach regardless of the action alternative chosen. Table 2-1 lists the phase according to park priorities.

**Table 2-1. Project Components for Each Alternative**

	Alternative 1 (No action)	Alternative 2 (Preferred)	Alternative 3	Alternative 4
<b>Canal Operations</b>				
Rewater Canal Mile 123 - 124.10 (Phase 2)		X		
Rewater Canal Mile 122.12 - 123 (Phase 2)		X	X	
Restore Operation of Locks 51 and 52 (Phase 1)		X	X	
Minimal Preservation of Locks 51 and 52 (Phase 1)				X
Restore Bypass Flume and Waste Weirs (Phase 1)		X	X	
Restore Canal Prism and Install Clay Liner (Phase 2)		X	X	
Install New Water Intake (Phase 2)			X	
Restore and Harden Tonoloway Aqueduct (Phase 2)		X	X	
Restore Existing Waste Weir #22 and Culvert #174 (Phase 2)		X	X	
Work on Historic Structures and Canal Prism will		X	X	X

	Alternative 1 (No action)	Alternative 2 (Preferred)	Alternative 3	Alternative 4
meet Secretary of Interior's Standards for the Treatment of Historic Properties (Phase 2)				
Remove Trees within Canal Prism and adjacent Towpath (Phase 1)		X		
Update Town's Existing Water Intake and Pump Facility (Phase 2)		X		
<b>Visitor Experience</b>				
Preserve and Stabilize Bank Barn Ruins		X	X	X
Rehabilitate and Create/Install Permanent Exhibits at Bowles House for Visitor Center (Phase 1)		X	X	X
Cultural Landscape to Reflect the 1870s (Phase 2)		X	X	X
Formalize Pedestrian Access along Existing Roadways from Parking Lots (Phase 1)		X	X	X
Establish Walk-In Campground within Existing Maintenance Compound (Phase 2)		X	X	
Establish a Picnic Area within Existing Maintenance Compound (Phase 2)				X
Improve Parking Area for the Little Tonoloway Picnic Area/Boat Ramp (Phase 1)		X	X	X
Install boat dock at Bowles House and Little Tonoloway Picnic Area for operation of launch boats (Phase 2)		X		
Install New Pedestrian Bridge (Phase 2)		X	X	
Improve Natural Resources Interpretation (Phase 1)			X	
Clear Vegetation and Stabilize the Ruins of the Little Warehouse and Stone Wall (Phase 1)		X	X	X
<b>Maintenance</b>				
Move Existing Maintenance Compound (Phase 2)		X	X	X
Expanded Visitor Parking (Phase 2)		X	X	X
<b>Access Roads</b>				
Widen Access Road from Route 144 to Two Lanes (Phase 1)		X	X	X
Construct New Maintenance Access Road (Phase 2)		X	X	

### 2.2.1. Canal Operations

- There are no project components regarding canal operations that are common to all alternatives.

### 2.2.2. Visitor Experience

- The Bank Barn ruins would be stabilized and preserved as ruins as a short- or long-term preservation strategy.
- The basement and second floor of the Bowles House and associated outbuildings would be rehabilitated and continue to house the Hancock Visitor Center. Permanent exhibits would be created and installed.
- The final preservation treatments to both the interior and exterior of the Bowles House, beyond the temporary work completed in 2010, would be completed. Rehabilitation of the Bowles House would mostly involve interior work and restoration of the smokehouse/wash house.
- The Bowles Farm cultural landscape would be reflective of the 1870s through opening views to the canal and maintaining grassy meadows. These changes would result in a more appropriate setting for the house and farm buildings.
- The visitor parking area at Bowles Farm would be expanded into the current maintenance compound area. The substrate used for the parking lot addition would include a permeable surface treatment.
- Improvements to the parking area for the Little Tonoloway Picnic Area/Boat Ramp would include formalizing an area currently used for parking for approximately five boat trailers. The surface of the boat parking lot would remain permeable.
- Work with the town of Hancock to identify pedestrian access routes and possible improvement by the town, such as signing or striping of existing pavement along existing roadways from municipal parking lots.
- The ruins of the Little Warehouse and stone wall would be cleared of vegetation and stabilized.

### 2.2.3. Access Roads

- To improve visitor access to the Bowles Property, the existing single lane road from Route 144 into the park would be widened to two lanes along an approximate 0.1 mile section of the existing road.

### 2.2.4. Maintenance

- The existing park maintenance compound, which occupies approximately 2 acres, is currently located within the 100-year floodplain on the former Bowles Farm Property. The park maintenance operations would be relocated to an area outside the floodplain, most likely within the town of Hancock. The park will evaluate possible future maintenance facility locations at such time as funding for the project becomes available. Park law enforcement offices would move from a temporary office



**Photo 6. Maintenance compound**

trailer in the maintenance parking lot and co-locate within the new maintenance compound. The existing maintenance compound would be removed from Bowles Farm after an appropriate site is located and compliance, if needed, is complete.

### 2.3 Alternative 2, The Preferred Alternative – Total Rewatering of the Canal in the Hancock Area

Alternative 2, the preferred alternative, takes into account the recommendation of previous planning documents to rewater as much of the canal as possible and includes a complete rewatering of the canal prism in the Hancock area. It would provide the highest access to and interpretation of the canal of the alternatives analyzed. Figure 2-1 shows the location of the project components for alternative 2. Under alternative 2 the following actions would occur:

#### 2.3.1 Canal Operation

- The existing rewatered section (Mile 124.10 – 124.59) would be extended downstream to Lock 51 (Mile 122.12).
- Locks 51 and 52 would be made functional with repointing, selective repairs, and installation of gates.
- Bypass flumes and waste weirs would be made operational.
- Existing waste weir #22 and culvert #174 would be restored to allow for natural outfall to occur and canal operations.
- All work on the historic structures and canal prism would meet the *Secretary of the Interior's Standards for the Treatment of Historic Properties*.
- All trees within the canal prism and on the towpath embankment abutting the canal prism would be removed. No clearing would occur along the river-side embankment. A geotechnical investigation would be completed as part of the design process to evaluate the structural capability of the existing embankment to adequately retain water and the degree of stabilization required, if needed.
- If needed, the NPS would work with the town of Hancock to upgrade the town's existing water intake and pump facility on the Potomac River within the existing footprint to supply sufficient water to the expanded canal operations. Although it is expected that the quantity of water needed to rewater the proposed section of the canal at Hancock would be comparable to the proposed diversion at Williamsport of approximately several cubic feet per second (cfs), the actual diversion requirements at Hancock would be determined based on final design for the rewatered section of the canal. Any in-stream work would be in accordance with review and approval from federal and state review agencies. A portable dewatering system may need to be employed during construction for a small area of the Potomac River, less than 0.1 acre. An overflow pipe would be constructed through an above grade earthen dike in the canal prism below Lock 51 to allow water to be returned to the river 0.5 mile downstream of Lock 51, at historic waste weir #22/culvert 174 (Mile 122.12). Untreated water would be discharged, as it was historically, into an existing drainage that leads to the Potomac River.



**Photo 7. Current rewatered section of the C&O Canal**



- The canal prism would be restored to historic specifications, and a clay liner would be installed to provide a waterproof lining.
- The Tonoloway Aqueduct would be restored to carry the canal across the Tonoloway Creek. The towpath and parapet walls, as well as the barrel vault, would be preserved to provide sound stability. Restoration of the aqueduct would resemble the 1870s time period; however, global climate change is expected to increase rainfall intensity and duration leading to increased runoff. This increase would increase flooding within the watershed above the aqueduct. Because the aqueduct is historic, increasing the available open waterway is not an option; therefore, backwater would be increased as well as possible debris loads from the watershed. The replacement spandrel and parapet walls would require strengthening beyond what was historically constructed. The historic parapets were constructed of stone with a relatively weak lime based mortar. Typically the inner and outer parapet walls were constructed simultaneously, with the space between them filled with a low bonding material of puddling clay, sand, and a weak lime mortar. The replacement parapet would contain reinforced concrete with a wood cladding or similar materials that would be many times stronger than the original construction thereby limiting the risk of structural failure.

### **2.3.2 Visitor Experience**

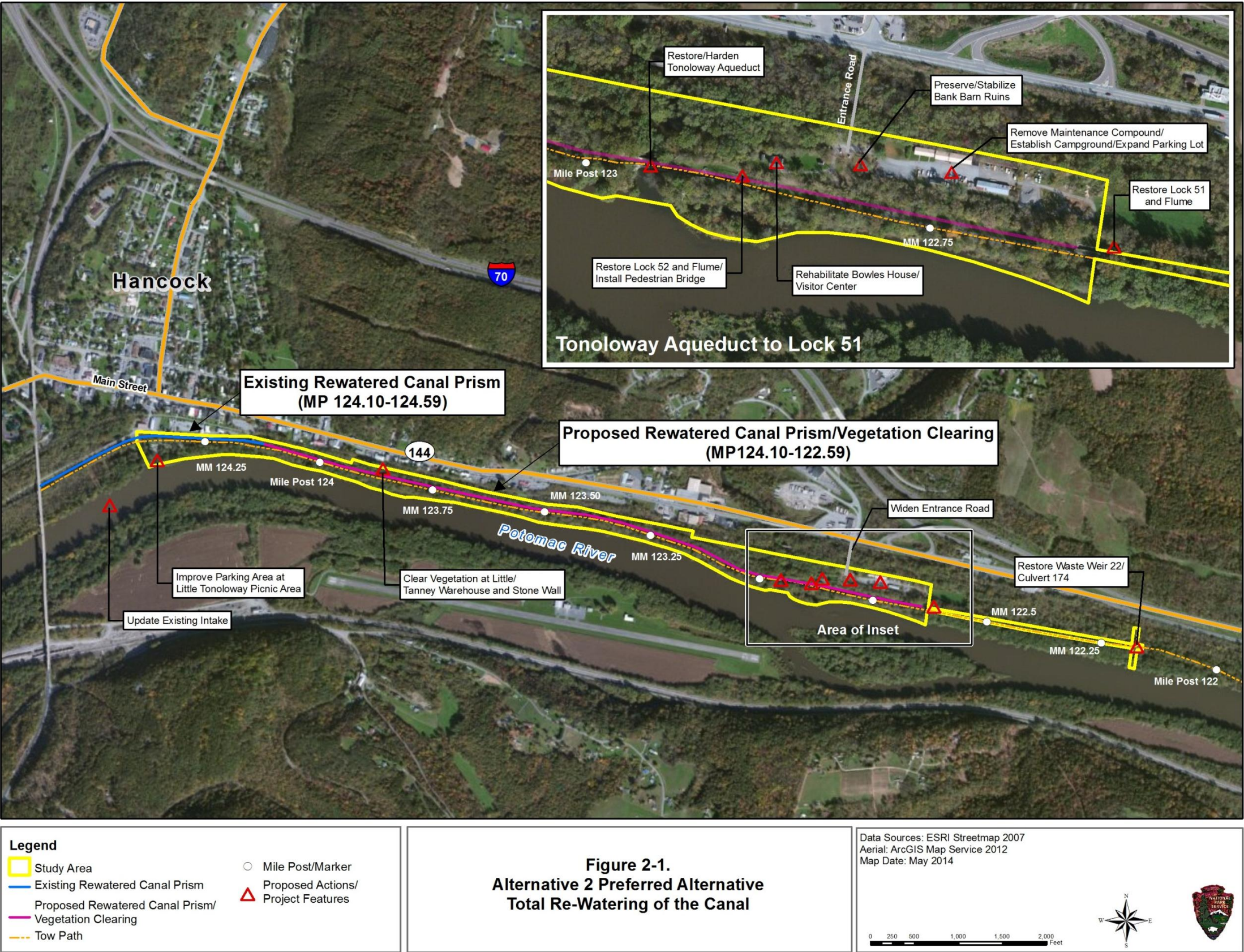
- A new cross over pedestrian bridge would be located at the Bowles House/Lock 52 area to connect the towpath to the Visitor Center. The bridge would also be designed to accommodate boat operations.
- NPS or concession operated launch boats would provide interpretive programs and connect the Bowles House to the Little Tonoloway area. Boat docks located at the Bowles House and Little Tonoloway would be constructed to accommodate operation. The boats would cross the Aqueduct and “lock through” Lock 52. A kiosk/operational booth would be constructed at Little Tonoloway.
- A walk-in campground with approximately 15 campsites would be established on approximately 2 acres within the existing maintenance compound. Limited utilities (water and sewer) would tie into lines that currently serve the maintenance compound.

### **2.3.3 Access Roads**

- A new single lane maintenance access road would be constructed to replace the existing access road. The new access road would be relocated downstream of Lock 51, through existing woodlands. The access road would cross the canal prism on a dike with through pipes that would carry canal discharge water downstream to the outfall.

The preferred alternative includes a full rewatering of the historic canal between the Bowles Farm and the Tonoloway Boat Ramp area of the park (Miles 122.12-124.59). The project area incorporates the existing 0.5 mile of existing rewatered canal at the boat ramp area. The rewatering of the canal would enable replica canal boat interpretive programming, which would demonstrate the relationship between the Bowles Farm, the town of Hancock, and the C & O Canal to the visiting public.







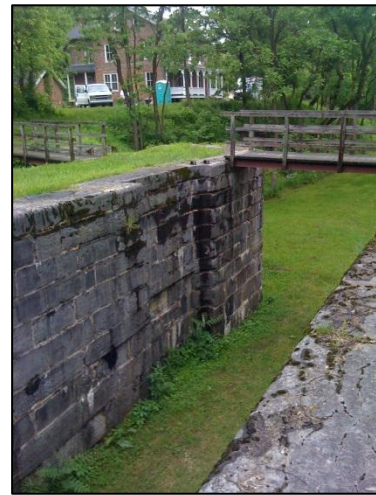
*Page intentionally left blank*

## 2.4 Alternative 3 - Partial Rewatering of Canal Prism

Alternative 3 includes a partial rewatering of the canal prism in the Hancock area, and would include a moderate level of visitor interpretation and a high level of access to the canal through the addition of a campground as recommended by several previous planning documents (NPS 1976, 1989). Figure 2-2 shows the location of the project components for alternative 3. Under alternative 3 the following actions would occur.

### 2.4.1 Canal Rewatering/Restoration

- The existing rewatered section of the canal (Mile 124.10 – 124.59) would remain unchanged and an additional portion of the canal between Lock 51 and upstream of the Tonoloway Aqueduct (Mile 122.12 – 123) would be rewatered. The area between the existing rewatered portion and the newly rewatered portion would remain wooded (Mile 123-124.10).
- Locks 51 and 52 would be made functional with repointing, selective repairs, and installation of working gates.
- Bypass flumes and waste weirs would be made operational.
- Existing waste weir #22 and culvert #174 would be restored to allow for natural outfall to occur and for canal operations.
- The canal prism between mile 122.12 and 123 would be restored to historic conditions and a clay liner would be installed to provide a waterproof lining within the prism.
- A new water intake would be installed for the Lock 51 to Lock 52 portion of the canal. The existing water intake would remain operational as a supply for the existing rewatered portion of the canal (Mile 124.10 – 124.59).
- The Tonoloway Aqueduct would be restored to carry the canal across the Tonoloway Creek. The towpath and parapet walls, as well as, the barrel vault would be preserved to provide sound stability. Restoration of the aqueduct would resemble the 1870s time period; however, global climate change is expected to increase rainfall intensity and duration leading to increase runoff. This increase would increase flooding within the watershed above the aqueduct. Because the aqueduct is historic, increasing the available open waterway is not an option; therefore, backwater would be increased as well as possible debris loads from the watershed. The replacement spandrel and parapet walls would require strengthening beyond what was historically constructed. The historic parapets were constructed of stone with a relatively weak lime based mortar. Typically the inner and outer parapet walls were constructed simultaneously, with the space between them filled with a low bonding material of puddling clay, sand, and a weak lime mortar. The replacement parapet would contain reinforced concrete with a wood cladding or similar materials that would be many times stronger than the original construction, thereby limiting the risk of structural failure.



**Photo 8. View from Lock 52 looking downstream**

### 2.4.2 Visitor Experience

- A new cross over pedestrian bridge would be located in the Bowles House/Lock 52 area to connect the towpath to the visitor center.

- A replica of a canal barge would be located in the Bowles House vicinity as an interpretive exhibit for visitors.
- An interpretive wayside would be constructed to show the succession of the natural resources from the time of the canal operations to present condition.
- A walk-in campground with approximately 15 campsites would be established on approximately 2 acres within the existing maintenance compound. Limited utilities (water and sewer) would tie into lines that currently serve the maintenance compound.

### 2.4.3 Access Roads

- A new maintenance access road would be constructed to replace the existing access road. The new access road would be located downstream of Lock 51, through existing woodlands. The access road would cross the canal prism on a dike with through pipes that would carry canal discharge water downstream to the outfall.

## 2.5 Alternative 4 – Cleared/Mowed Prism Improvements

Alternative 4 includes minimal preservation of canal features and minimal improvements to visitor interpretation, but would still be in keeping with previous planning documents for the Hancock area. Figure 2-3 shows the location of the project components for alternative 4. Under alternative 4 the following actions would occur.

### 2.5.1 Canal Operation

- The existing mowed canal prism between the Tonoloway Aqueduct and Lock 51 would remain mowed. The existing rewatered section of the canal (Mile 124.10 – 124.59) would remain. No additional rewatering would occur.
- Locks 51 and 52 would receive minimal preservation stabilization.

### 2.5.2 Visitor Experience

- A picnic area would be established within the existing maintenance compound.

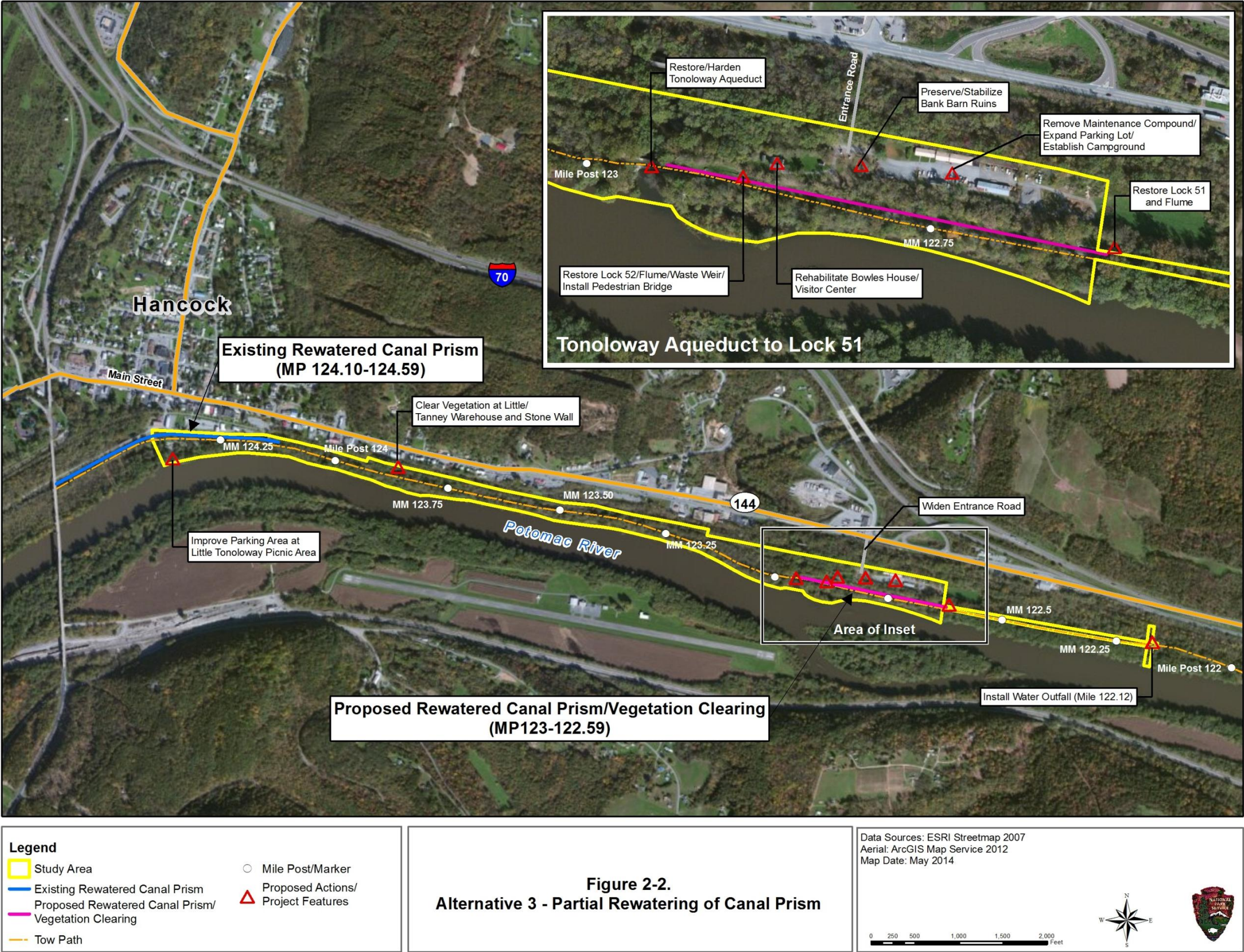
### 2.5.3 Access Roads

- No change to the maintenance access road would occur.



**Photo 9. Mowed canal**

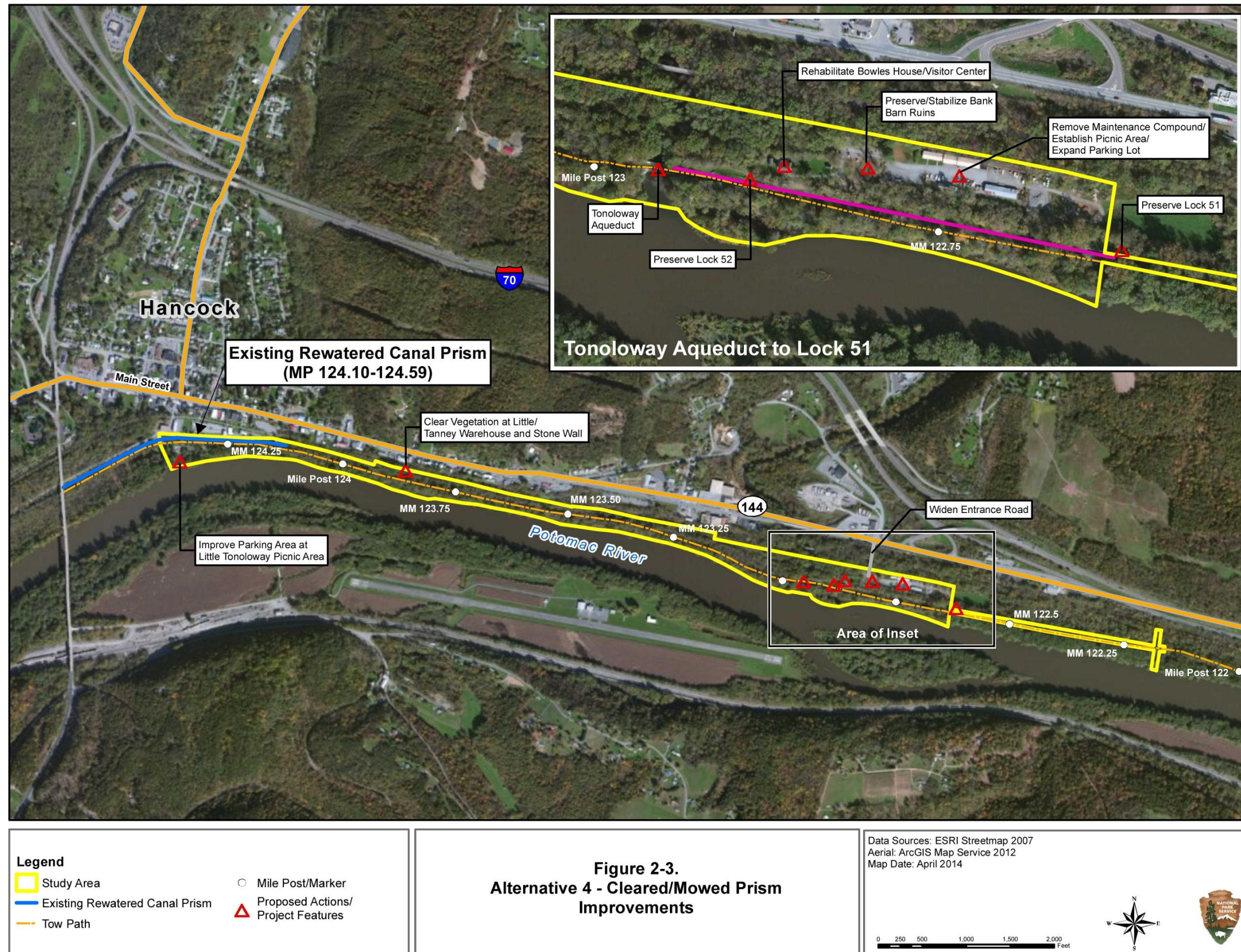






*Page intentionally left blank*







*Page intentionally left blank*

Table 2-2. Detailed Comparison of Alternatives

	Alternative 1 - No Action	Alternative 2 - Preferred Alternative	Alternative 3	Alternative 4
<b>Canal Operations</b>				
Rewater Canal	<ul style="list-style-type: none"> <li>Maintain currently rewatered section of the canal Mile 124.10 to 124.59</li> </ul>	<ul style="list-style-type: none"> <li>Rewater canal Mile 122.12 – 124.59</li> </ul>	<ul style="list-style-type: none"> <li>Rewater canal Mile 122.12-123.0</li> </ul>	<ul style="list-style-type: none"> <li>Maintain currently rewatered section canal Mile 124.10 to 124.59</li> </ul>
Locks 51 and 52	<ul style="list-style-type: none"> <li>Remain non-functional</li> </ul>	<ul style="list-style-type: none"> <li>Restore operation of Locks 51 and 52</li> </ul>	<ul style="list-style-type: none"> <li>Restore operation of Locks 51 and 52</li> </ul>	<ul style="list-style-type: none"> <li>Minimal preservation of Locks 51 and 52</li> </ul>
Bypass Flume and Waste Weirs	<ul style="list-style-type: none"> <li>Bypass flumes and waste weirs would remain non-operational</li> </ul>	<ul style="list-style-type: none"> <li>Repair bypass flume and waste weir</li> </ul>	<ul style="list-style-type: none"> <li>Repair bypass flume and waste weir</li> </ul>	<ul style="list-style-type: none"> <li>Bypass flumes and waste weirs would remain non-operational</li> </ul>
Water Intake and Outfall	<ul style="list-style-type: none"> <li>Intake structures would remain as is</li> </ul>	<ul style="list-style-type: none"> <li>Replace intake structure at Mile 124.4</li> <li>Upgrade town's existing water intake and pump facility within existing footprint</li> <li>Restore culvert #174 and waste weir #22 to allow for natural outfall to occur</li> </ul>	<ul style="list-style-type: none"> <li>Install a new intake at Lock 51, west of the Tonoloway Aqueduct</li> <li>Restore culvert #174 and waste weir #22 to allow for natural outfall to occur</li> </ul>	<ul style="list-style-type: none"> <li>Intake structures would remain as is</li> </ul>
Canal Prism	<ul style="list-style-type: none"> <li>No change to routine maintenance to the canal prism.</li> </ul>	<ul style="list-style-type: none"> <li>Remove trees within canal prism</li> <li>Restore canal prism from Mile 122.12 – 124.10</li> <li>Install clay liner</li> </ul>	<ul style="list-style-type: none"> <li>Restore canal prism from Mile 122.12 – 123.0</li> <li>Install clay liner</li> </ul>	<ul style="list-style-type: none"> <li>No change to routine maintenance to the canal prism.</li> </ul>
Tonoloway Aqueduct	<ul style="list-style-type: none"> <li>Remain partially collapsed</li> </ul>	<ul style="list-style-type: none"> <li>Restore and harden Tonoloway Aqueduct to be operational</li> <li>Tonoloway Aqueduct would resemble 1870s time period</li> </ul>	<ul style="list-style-type: none"> <li>Restore and harden Tonoloway Aqueduct to be operational</li> <li>Tonoloway Aqueduct would resemble 1870s time period</li> </ul>	<ul style="list-style-type: none"> <li>Remain partially collapsed</li> </ul>
<b>Visitor Experience</b>				
Bowles House and Barn	<ul style="list-style-type: none"> <li>Visitor center would continue to operate in 1<sup>st</sup> level of Bowles House</li> <li>Temporary exhibits</li> </ul>	<ul style="list-style-type: none"> <li>Preserve and stabilize Bank Barn ruins</li> <li>Create and install permanent exhibits</li> <li>Rehabilitate second floor, basement, and outbuilding of Bowles House</li> <li>Complete final preservation specifications</li> </ul>	<ul style="list-style-type: none"> <li>Preserve and stabilize Bank Barn ruins</li> <li>Create and install permanent exhibits</li> <li>Rehabilitate second floor, basement, and outbuilding of Bowles House</li> <li>Complete final preservation specifications</li> </ul>	<ul style="list-style-type: none"> <li>Preserve and stabilize Bank Barn ruins</li> <li>Create and install permanent exhibits</li> <li>Rehabilitate second floor, basement, and outbuilding of Bowles House</li> <li>Complete final preservation specifications</li> </ul>
Cultural Landscape	<ul style="list-style-type: none"> <li>Distinct landscape would remain as is</li> </ul>	<ul style="list-style-type: none"> <li>Reflective of 1870s</li> </ul>	<ul style="list-style-type: none"> <li>Reflective of 1870s</li> </ul>	<ul style="list-style-type: none"> <li>Reflective of 1870s</li> </ul>
Pedestrian Access	<ul style="list-style-type: none"> <li>No pedestrian access would be available from existing roadways to municipal parking areas</li> <li>Existing parking areas would remain in place</li> </ul>	<ul style="list-style-type: none"> <li>Formalize access along existing roadways and municipal parking area</li> <li>Expand parking to current maintenance compound</li> </ul>	<ul style="list-style-type: none"> <li>Formalize access along existing roadways and municipal parking area</li> <li>Expand parking to current maintenance compound</li> </ul>	<ul style="list-style-type: none"> <li>Provide access along existing roadways and municipal parking area</li> <li>Expand parking to current maintenance compound</li> </ul>
Parking Area at Little Tonoloway Picnic Area/Boat Ramp	<ul style="list-style-type: none"> <li>No additional parking spaces for boat trailers would be available</li> </ul>	<ul style="list-style-type: none"> <li>Addition of boat trailer parking spaces</li> </ul>	<ul style="list-style-type: none"> <li>Addition of boat trailer parking spaces</li> </ul>	<ul style="list-style-type: none"> <li>Addition of boat trailer parking spaces</li> </ul>
Install New Pedestrian Bridge	<ul style="list-style-type: none"> <li>A pedestrian bridge would not be built to connect the towpath to the visitor center</li> </ul>	<ul style="list-style-type: none"> <li>Install bridge at Lock 52 to connect the towpath to visitor center</li> </ul>	<ul style="list-style-type: none"> <li>Install bridge at Lock 52 to connect the towpath to the visitor center</li> </ul>	<ul style="list-style-type: none"> <li>A pedestrian bridge would not be built to connect the towpath to the visitor center</li> </ul>
Improve Visitor Interpretation	<ul style="list-style-type: none"> <li>No change to improve visitor interpretation</li> </ul>	<ul style="list-style-type: none"> <li>Install NPS or concession operated launch boats</li> <li>Construct boat docks at Bowles House</li> </ul>	<ul style="list-style-type: none"> <li>Interpretive material including replica of barge</li> </ul>	<ul style="list-style-type: none"> <li>No change to improve visitor interpretation</li> </ul>
Picnic Area	<ul style="list-style-type: none"> <li>Existing picnic areas would remain in place</li> </ul>	<ul style="list-style-type: none"> <li>No additional picnic areas would be added</li> </ul>	<ul style="list-style-type: none"> <li>No additional picnic areas would be added</li> </ul>	<ul style="list-style-type: none"> <li>Create new picnic area at existing maintenance compound</li> </ul>
Park Campground	<ul style="list-style-type: none"> <li>No camping would be available</li> </ul>	<ul style="list-style-type: none"> <li>A campground with walk-in sites would be constructed in a portion of the footprint of the existing maintenance</li> </ul>	<ul style="list-style-type: none"> <li>A campground with walk-in sites would be constructed in a portion of the footprint of the existing maintenance compound</li> </ul>	<ul style="list-style-type: none"> <li>No camping would be available</li> </ul>

	Alternative 1 - No Action	Alternative 2 - Preferred Alternative	Alternative 3	Alternative 4
		compound		
Ruins of Little Warehouse and Stone Wall	<ul style="list-style-type: none"><li>• No stabilization would occur</li></ul>	<ul style="list-style-type: none"><li>• Stabilize ruins and stone wall and clear vegetation</li></ul>	<ul style="list-style-type: none"><li>• Stabilize ruins and stone wall and clear vegetation</li></ul>	<ul style="list-style-type: none"><li>• Stabilize ruins and stone wall and clear vegetation</li></ul>
<b>Maintenance</b>				
Maintenance Compound	<ul style="list-style-type: none"><li>• Remain on the Bowles property</li></ul>	<ul style="list-style-type: none"><li>• Move existing maintenance compound</li><li>• Restore maintenance era to resemble 1870s landscape</li><li>• Include a campground with walk-in sites, located within a portion of the footprint of the existing maintenance compound</li><li>• Law enforcement would co-locate with maintenance staff</li></ul>	<ul style="list-style-type: none"><li>• Move existing maintenance compound</li><li>• Restore maintenance era to resemble 1870s landscape</li><li>• Include a campground with walk-in sites, located within a portion of the footprint of the existing maintenance compound</li><li>• Law enforcement would co-locate with maintenance staff</li></ul>	<ul style="list-style-type: none"><li>• Move existing maintenance compound</li><li>• Restore maintenance era to resemble 1870s landscape</li><li>• Law enforcement would co-locate with maintenance staff</li></ul>
<b>Access Roads</b>				
Park Access	<ul style="list-style-type: none"><li>• Access road from Route 144 would remain as is</li></ul>	<ul style="list-style-type: none"><li>• Widen access road from Route 144 to two lanes</li></ul>	<ul style="list-style-type: none"><li>• Widen access road from Route 144 to two lanes</li></ul>	<ul style="list-style-type: none"><li>• Widen access road from Route 144 to two lanes</li></ul>
Maintenance Access Road	<ul style="list-style-type: none"><li>• Existing maintenance access road would remain</li></ul>	<ul style="list-style-type: none"><li>• Construct new maintenance access road downstream of Lock 51</li></ul>	<ul style="list-style-type: none"><li>• Construct new maintenance access road downstream of Lock 51</li></ul>	<ul style="list-style-type: none"><li>• Existing maintenance access road will remain</li></ul>

## 2.6 Mitigation Measures of the Action Alternatives

The NPS places a strong emphasis on avoiding, minimizing, and mitigating potentially adverse environmental impacts. To help ensure the protection of natural and cultural resources and the quality of the visitor experience, the following protective measures would be implemented as part of the selected action alternative. The NPS would implement an appropriate level of monitoring throughout the construction process to help ensure that protective measures are being properly implemented and are achieving their intended results. Mitigation, according to NEPA regulations (40 CFR 1508.20) includes:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree of magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing or providing substitute resources or environments.

The following are mitigation measures that would be implemented to minimize impacts on specific resources:

### 2.6.1 Soils

- Permeable surfaces would be used for parking lots to reduce stormwater runoff.
- BMPs, such as silt fencing, would be used to prevent and control soil erosion and sedimentation during construction of the proposed enhancements.
- Soils disturbed within the proposed construction areas would be actively reseeded to stabilize the soil, repair compaction, and/or improve soil productivity.
- Silt would be removed from the canal prism and used at the wetland compensation site, within the park, or disposed of at an approved site.
- Construction activities would adhere to an approved erosion and sediment control plan.
- The NPS would adhere to an erosion and sediment control plan completed in accordance with the *Maryland Erosion and Sediment Control Guidelines for State and Federal Projects*.

### 2.6.2 Submerged Aquatic Vegetation and Wetlands

- Water intake construction in the Potomac River would employ the use of a portable dewatering device to protect the downstream waterways from sediment and silt impacts.
- The river bottom would be restored to its preexisting contours following removal of the dewatering device.
- A silt curtain would be installed downstream of the work area to trap sediment.
- *Maryland's Waterway Construction Guidelines* (MDE 2000) would be followed as applicable.
- Work on the aqueduct structure would be done in accordance with standard practices for working on bridges, which includes using nets to shield the waterways from falling grout or paint, and preparing and following a plan consistent with *Maryland's Waterway Construction Guidelines* (MDE 2000).

- Wetlands would be avoided, or if avoidance is not possible new wetlands would be created or existing wetlands would be restored, enhanced, or preserved in accordance with Section 404 of the CWA.
- Compensation for the loss of 3.05 acres of wetlands under alternative 2 would include the restoration of approximately 4.6 acres of a former forested wetland habitat at the park's Canal Farm, located within the park in the approximate vicinity of mile marker 43, Frederick County, Maryland near the confluence of the Monocacy and Potomac Rivers. Restoration to reestablish the original hydrologic condition of a wetland bisected by a drainage ditch would include filling the existing ditch to its natural elevation, possibly incorporating check dams, and armoring the downstream edge of the ditch to prevent head cutting. The area would then be revegetated with native wetland plant species (figure 2-4, appendix C). The other alternatives do not require wetland mitigation.
- Based on a function and value assessment for the impacted and compensation sites, a wetland functional replacement ratio of 1:1 was determined to be appropriate for meeting NPS Director's Order 77-1 and the implementing procedures described in NPS Procedural Manual 77-1: *Wetland Protection*. Following the decision document, the NPS would obtain a MDE and the USACE joint permit for the alteration of any floodplain, waterway, tidal, or nontidal wetland. Wetland mitigation required to meet permit requirements would be determined during the permitting process, and prior to initiating work.

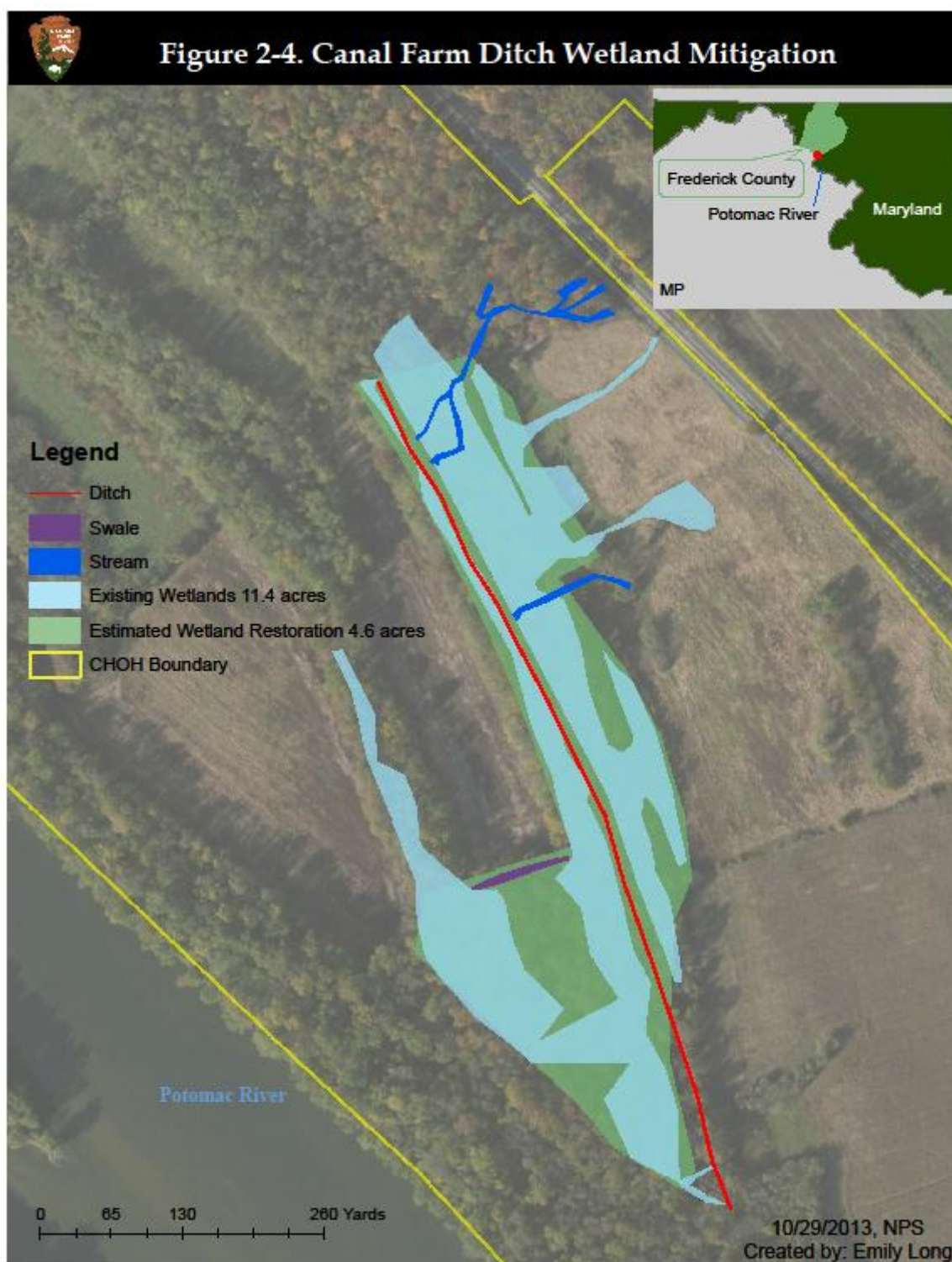
### 2.6.3 Vegetation

- BMPs, such as silt fencing, would be used to prevent and control soil erosion and sedimentation during construction of the proposed enhancements.
- Construction activities would adhere to an approved erosion and sediment control plan.
- Disturbed areas would be reseeded to stabilize soil, initiate new vegetation growth, and prevent the spread of invasive plant species.
- Pending funding and/or manpower, compensation for loss of trees removed by construction would include the planting of trees on 10 acres of riparian forest buffer within the park, along the Potomac River, with the intent of achieving a no net tree loss in the park.

### 2.6.4 Special status Species

- Construction activities would be limited to times when nesting and breeding of wood turtle are not occurring.
- If wood turtles are identified during the preconstruction surveys, it is possible that wood turtles may be collected and relocated prior to or during construction activities if this was found to be beneficial or appropriate for the species present at the site. The use of barrier fencing along streams and the canal could also be implemented during construction activities to avoid/reduce impacts on special status wildlife species.
- Special status plant species would be avoided if possible during construction and vegetation removal activities.





- Preconstruction surveys would be conducted for presence of special status species including terrestrial plants, terrestrial wildlife, and aquatic mussels. Surveys would also document the presence of special status species' habitats and nests. This is particularly important because construction would not occur for some time following the completion of the NEPA process and special status species could begin using habitats. If special status species, nests, or habitats are found, then consultation would be initiated and conservation and protection actions and mitigation would be developed.
- Although no effect on the Atlantic spike and brookfloater is expected, as an additional mitigation measure, preconstruction surveys for presence of special status mussel species would be completed. If special status mussel species are located within the project area, the potential impacts and additional mitigation measures would be evaluated in consultation with state and federal regulatory agencies.
- If special status plant or wildlife populations cannot be avoided, consultations with appropriate federal and state agencies would be required prior to construction. These consultations would determine if appropriate mitigation measures for any populations affected by the proposed project could be found. For special status plant populations, appropriate measures could include the creation of offsite populations through seed collection or transplanting, preservation, and enhancement of existing populations, or restoration or creation of suitable habitat in sufficient quantities to compensate for the impact. Translocation includes digging up plants and moving them to appropriate portions of the corridor that would not be affected by the proposed construction activities. For special status wildlife species, appropriate measures would include translocation of individuals to appropriate habitat.

#### 2.6.5 Visitor Use

- All construction activities would be conducted during daylight hours to avoid noise impacts on park neighbors.
- Construction would be avoided during peak visitor use periods (i.e., weekends, holidays).
- A safety plan would be developed prior to initiation of construction to ensure the safety of park visitors, workers, and park personnel.

#### 2.6.6 Cultural Resources

- Additional archaeological surveys would be performed as necessary to inform project design. Phase II surveys would be conducted on Sites 18WA 590 and 18WA591 to evaluate the extent and National Register eligibility of these sites, so that they could be avoided during construction. An additional survey would be conducted at the Canal Farm wetland mitigation area should it be determined necessary after consultation with the Maryland SHPO.
- All work on historic structures and landscapes would be designed to meet the *Secretary of the Interior's Standards for Historic Preservation* (36 CFR 68 as amended by the NPS).
- The park would meet the provisions of the PA developed for this project to avoid, minimize, or mitigate adverse effects to cultural resources.
- Construction and staging areas would be evaluated for archeological sites prior to implementing the project. Construction matting, fencing, or other appropriate means to protect archeological sites within the work area will be implemented.
- If during construction previously unidentified archeological resources are discovered, all work in the immediate vicinity of the discovery would be halted and the NPS would address the discovery

and unanticipated effects in accordance with 36 CFR §800.13(b) and the programmatic agreement for this project.

- NPS shall ensure that all construction contracts contain a stipulation that requires that construction or excavation activities stop in the event that archeological deposits are encountered during any construction or excavation the appropriate NPS official be notified immediately.
- If human remains or items subject to the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) are discovered during this project, NPS will proceed in accordance with Federal policy concerning the treatment of human remains, NAGPRA, and 36 CFR §800.13(b), as applicable.

## 2.7 Alternatives Considered But Dismissed

Several alternatives or alternative elements were identified during the design and scoping processes. Some of these were determined to be unreasonable, or much less desirable than similar options included in the analysis, and were therefore not carried forward for analysis in this EA. Justification for eliminating alternatives from further analysis was based on factors relating to:

- Conflicts with already-established park uses
- Duplication with other less environmentally damaging alternatives
- Conflicts with the statement of purpose and need, or other policies
- Impact on environmental or historic resources

The following suggestions of interpretive opportunities received during the public scoping period were considered but dismissed from further analysis:

- Mule pulled boat rides with mules being housed at Bowles Farm
- Off road vehicle trail
- Dog park
- Children's playground
- Swimming area
- Petting zoo
- Animal hospital

## 2.8 Environmentally Preferable Alternative

The NPS is required to identify the environmentally preferable alternative in its NEPA documents for public review and comment. The NPS, in accordance with the DOI policies contained in the *Departmental Manual* (516 Departmental Manual 4.10) and the CEQ *NEPA's Forty Most Asked Questions*, defines the environmentally preferable alternative (or alternatives) as the alternative that best promotes the national environmental policy expressed in NEPA (Section 101(b) (516 Departmental Manual 4.10). In their *Forty Most Asked Questions*, CEQ states that the environmentally preferable alternative is "the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources" (CEQ 1981).

After completing the environmental analysis, the NPS identified alternative 3 as the environmentally preferable alternative in this EA because it best meets the definition established by the CEQ. Alternative 3 best protects and enhances the historic and cultural resources of the Hancock area while minimizing disruption to the natural environment to meet the project purpose and need. Alternative 3 provides cultural resource benefits and includes only negligible to minor adverse impacts on the natural environment by minimizing areas of disturbance and applying appropriate mitigation where needed. Specifically, even though alternative 3 only proposes to partially rewater the canal, it does not disturb a special status plant species in the canal (while alternative 2 does impact that plant) and it only minimally impacts wetlands (less than 0.10 acre of impacts) while still providing benefits to enhance the important historic and cultural context of the area. In addition, alternative 3 only has 0.4 miles of impacts associated with canal excavation while alternative 2 has 1.5 miles of impacts associated with canal excavation. Alternative 4 and the no action alternative do not include as much construction nor as many impacts on soils, wetlands, and special status species but they also do not but provide the most benefits to enhance the important historic and cultural context of the area.

## **2.9 Alternatives Comparison Table**

Table 2-3 compares and contrasts each alternative, including the degree to which each alternative accomplishes the purpose and fulfills the need for the project. The purpose of this project is to improve the visitor experience and fully realize the potential of Hancock as an interpretive venue along the park.

Table 2-3. Comparison of Alternatives

Alternative	Project Objectives			
	Rehabilitate Lock 51, Lock 52, Tonoloway Aqueduct, and Canal Prism	Expand and Improve Parking Area and Access to Picnic Area	Improve Visitor Interpretation	Improve the Visitor Viewshed from the Bowles House
<b><u>Alternative 1</u></b> <b>No Action Alternative</b>	Does not meet project objective. The canal prism and associated structures would remain non-functioning.	Does not meet project objective. Parking areas and Little Tonoloway Picnic Area would remain the same.	Does not meet project objective. Visitor services at Bowles Farm would remain limited.	Does not meet project objective. Canal would remain wooded, unwatered, and unimproved.
<b><u>Alternative 2</u></b> <b>Preferred Alternative</b> <b>Total Rewatering</b>	Best meets project objective. The canal prism and associated structures would be rehabilitated into working condition.	Fully meets project objective. Visitor parking would be expanded to the maintenance compound, and Little Tonoloway Picnic Area would be improved and would provide pedestrian access.	Fully meets project objective. NPS/concession operated launch boats would provide interpretive programs and connect the Bowles House and Little Tonoloway.	Best meets project objective. Canal and associated structures would be rehabilitated. Bowles property cultural landscape would reflect the 1870s.
<b><u>Alternative 3</u></b> <b>Partial Rewatering</b>	Moderately meets the project objective. A portion of the canal and associated structures would be rehabilitated into working condition. The middle section of the canal would remain wooded.	Fully meets project objective. Visitor parking would be expanded to the maintenance compound and Little Tonoloway Picnic Area would be improved and would provide pedestrian access.	Fully meets the project objective. Interpretive materials, including a replica of a canal barge, may be constructed to show the succession of the natural resources from the time of the canal to present condition.	Moderately meets the project objective. A portion of the canal and associated structures would be rehabilitated. Bowles property cultural landscape would reflect the 1870s.
<b><u>Alternative 4</u></b> <b>Cleared/Mowed Prism Improvements</b>	Least meets the project objective. The canal's existing conditions would remain and minimal stabilization would be made to Locks 51 and 52.	Fully meets project objective. Visitor parking would be expanded to the maintenance compound and Little Tonoloway Picnic Area would be improved and would provide pedestrian access.	Least meets the project objectives. There would be some upgrades to the visitor center and the park visitors would be able to see the canal swath more clearly.	Least meets the project objective. Minimal stabilization to Locks 51 and 52 would occur. Bowles property cultural landscape would reflect the 1870s.

## 2.10 Summary of Environmental Consequences/Impact Comparison Matrix

Table 2-4 includes a summary of each alternative's potential effects by impact topic.

**Table 2-4. Summary of Environmental Consequences/Impact Comparison Matrix**

<b>Resource</b>	<b><u>Alternative 1</u> No Action Alternative</b>	<b><u>Alternative 2</u> Preferred Alternative Total Rewatering</b>	<b><u>Alternative 3</u> Partial Rewatering</b>	<b><u>Alternative 4</u> Cleared/Mowed Prism Improvements</b>
<b>Soils</b>	<b>No impacts</b> on soils as construction would not occur	<b>Short-term minor adverse impacts</b> during construction; <b>long-term minor adverse impacts</b> on soils; <b>beneficial impacts</b> from restoration of the Canal Farm ditch	<b>Short-term minor adverse impacts</b> during construction and <b>long-term minor adverse impacts</b> on soils	<b>Short-term minor adverse impacts</b> during construction and <b>long-term negligible to minor adverse impacts</b> on soils
<b>Floodplains</b>	<b>Long-term minor adverse impacts</b> from issues relating to presence of maintenance compound in floodplain	<b>Short-term minor adverse impacts</b> during construction; <b>long-term beneficial impacts</b> from movement of maintenance compound out of floodplain; <b>long-term beneficial impacts</b> from restoration of the Canal Farm ditch	<b>Short-term minor adverse impacts</b> during construction; <b>long-term beneficial impacts</b> from movement of maintenance compound out of floodplain	<b>Short-term minor adverse impacts</b> during construction; <b>long-term beneficial impacts</b> from movement of maintenance compound out of floodplain
<b>Wetlands</b>	<b>No impacts</b> on wetlands as no construction would occur	<b>Long-term moderate adverse impacts</b> from conversion of palustrine wetlands to open water; <b>beneficial impacts</b> from restoration of wetlands in the Canal Farm ditch area	<b>Long-term negligible impacts</b> from some project components	<b>No impacts</b> on wetlands from project components
<b>Vegetation</b>	<b>No impacts</b> on vegetation as no ground disturbing activities would occur	<b>Long-term moderate adverse impacts</b> from vegetation removal during ground disturbance activities; <b>beneficial impacts</b> from addition of native wetland species at Canal Farm ditch	<b>Long-term minor adverse impacts</b> from vegetation removal during ground disturbance activities	<b>Long-term negligible impacts</b> from vegetation removal during ground disturbance activities



Resource	<u>Alternative 1</u> No Action Alternative	<u>Alternative 2</u> Preferred Alternative Total Rewatering	<u>Alternative 3</u> Partial Rewatering	<u>Alternative 4</u> Cleared/Mowed Prism Improvements
<b>Special status Species</b>	<b>No impacts</b> on special status species as no ground disturbance would occur	<b>Long-term minor adverse impacts</b> on Short's sedge, common hoptree, and the wood turtle from canal rewatering activities	<b>No impacts</b> on Short's sedge, common hoptree, and the wood turtle from canal rewatering activities	<b>No impacts</b> on Short's sedge, common hoptree, and the wood turtle
<b>Historic Structures and Districts</b>	<b>Long-term negligible impacts</b> from continued management of resources	<b>Long-term beneficial impacts</b> from stabilization of historic structures; <b>Long-term minor adverse impacts</b> from culvert and boat dock installation; <b>short-term minor adverse impacts</b> during construction;	<b>Long-term negligible to beneficial impacts</b> from stabilization of historic features; <b>short-term negligible to minor adverse impacts</b> during construction; <b>long-term minor adverse impacts</b> from culvert installation	<b>Long-term beneficial impacts</b> from stabilization of historic features; <b>short-term negligible to minor adverse impacts</b> during construction
<b>Archaeological Resources</b>	<b>Long-term negligible impacts</b> on known archaeological resources	<b>Long-term negligible to minor adverse impact</b> from the potential damage to archeological resources	<b>Long-term negligible to minor adverse impact</b> from the potential damage to archeological resources	<b>Long-term negligible impact</b> from the potential damage to archeological resources
<b>Cultural Landscapes</b>	<b>Long-term negligible impacts</b> due to regular groundskeeping	<b>Long-term beneficial impacts</b> from the enhancement of the historic character of the cultural landscape; <b>long-term negligible to minor adverse impacts</b> from infrastructure improvements; <b>short-term minor adverse impacts</b> during construction	<b>Long-term beneficial impacts</b> from the enhancement of the historic character of the cultural landscape; <b>long-term negligible to minor adverse impacts</b> from infrastructure improvements; <b>short-term minor adverse impacts</b> during construction	<b>Long-term beneficial impacts</b> from the enhancement of the historic character of the cultural landscape; <b>long-term negligible to minor adverse impacts</b> from mowing the canal and infrastructure improvements; <b>short-term minor adverse impacts</b> during construction
<b>Socioeconomics</b>	<b>No impacts</b> on socioeconomics as no construction activities would occur	<b>Short-term beneficial impacts</b> from temporary job creation; <b>long-term beneficial impacts</b> on the local economy if park visitation increased	<b>Short-term beneficial impacts</b> from temporary job creation; <b>long-term beneficial impacts</b> on the local economy if park visitation increased	<b>Short-term beneficial impacts</b> from temporary job creation; <b>long-term beneficial impacts</b> on the local economy if park visitation increased

<b>Resource</b>	<b><u>Alternative 1</u> No Action Alternative</b>	<b><u>Alternative 2</u> Preferred Alternative Total Rewatering</b>	<b><u>Alternative 3</u> Partial Rewatering</b>	<b><u>Alternative 4</u> Cleared/Mowed Prism Improvements</b>
<b>Transportation</b>	<b>No impacts</b> on transportation as no construction activities would occur	<b>Short-term minor adverse impacts</b> from construction; <b>long-term beneficial impacts</b> from access road improvements	<b>Short-term minor adverse impacts</b> from construction; <b>long-term beneficial impacts</b> from access road improvements	<b>Short-term minor adverse impacts</b> from construction; <b>long-term beneficial impacts</b> from road improvements
<b>Visitor Use and Experience</b>	<b>No impacts</b> on visitor use and experience as there would be no change to resources in the park	<b>Short-term minor adverse impacts</b> from restrictions in recreation during construction; <b>long-term beneficial impacts</b> from improvements in resources and interpretive landscapes	<b>Short-term minor adverse impacts</b> from restrictions in recreation during construction; <b>long-term beneficial impacts</b> from improvements in resources and interpretive landscapes	<b>Short-term negligible to minor adverse impacts</b> from restrictions in recreation during construction; <b>long-term beneficial impacts</b> from improvements in resources and interpretive landscapes
<b>Park Operations</b>	<b>No impacts</b> on park operations as no changes would occur	<b>Short-term minor adverse impacts</b> from increased responsibilities during construction; <b>long-term moderate adverse impacts</b> from increase of staffing	<b>Short-term minor adverse impacts</b> from increased responsibilities during construction; <b>long-term moderate adverse impacts</b> from increase of staffing	<b>Short-term minor adverse impacts</b> from increased responsibilities during construction; <b>long-term negligible impacts</b> from minor shifts in personnel duties

*This page intentionally left blank*

### **3.0 AFFECTED ENVIRONMENT**

#### **3.1 Overview**

This section describes the existing environment at the canal between Mile 122.12 and 124.59 that would be affected if the proposed action were implemented. In accordance with NEPA, CEQ guidelines, 32 CFR Part 989, and the NHPA, the description of the affected environment focuses on those resources and conditions likely subject to impacts. This includes physical resources (soils), water resources (floodplains), natural resources (wetlands, vegetation, and special status species), cultural resources (historical structures and districts, archeological resources, and cultural landscapes), the human environment (socioeconomics and transportation), visitor use and experience, and park operations.

#### **3.2 Natural Resources**

##### **3.2.1 Soils**

The park lies adjacent to the Potomac River for 184.5 miles between Georgetown, Washington D.C. and Cumberland, Maryland. It spans four physiographic provinces: the Coastal Plain, the Piedmont, the Blue Ridge, and the Ridge and Valley (NPS 2004). The project area is located within the Valley and Ridge geologic province, west of the North Mountain thrust fault (Southworth et al. 2008). The Valley and Ridge geologic province contains strongly folded and faulted sedimentary rocks. The area is composed of clay and clay loams, as well as sandy and stony loams. The soils are often shallow, and shale barrens may be found. The eastern portion of this province contains a wide, open valley called the Great Valley. This valley was formed on Cambrian and Ordovician limestone and dolomite (MGS 2007).

The soils in the project area are predominately Bigpool silt loam and Monongahela silt loam, but other soils found include Atkins silt loam, Klinesville-Calvin channery loams, Linside silt loam, Philo gravelly sandy loam, and Pope gravelly loam (figure 3-1). Bigpool silt loam consists of very deep, moderately well drained soils with a slope of 0 to 3%. The soils were formed in alluvium derived from limestone, sandstone, and shale. Monongahela silt loam consists of very deep, moderately drained soils with a slope of 8 to 15%. The soil was formed in old alluvium derived largely from sandstone and shale (NRCS 2010).

Atkins silt loam is a deep, poorly drained soil with a slope from 0 to 3%. Atkins silt loam generally formed from loamy alluvium derived from sandstone, siltstone, and shale. Klinesville-Calvin channery loams are deep, well-drained soils with a slope of 25 to 65%. These soils were formed from gravelly residuum from the weathering of shale-siltstone. Linside silt loam consists of very deep, moderately well drained, moderately permeable soils with a slope of 0 to 3%. The soils were derived from limestone, sandstone, and shale. Philo gravelly sandy loam consists of moderately well drained soils formed in recent alluvium derived mainly from sandstone, siltstone, and shale. This soil has a slope of 0 to 3%. Pope gravelly loam is a very deep, well-drained soil with a slope of 0 to 3%. It is derived from sandstone, siltstone, and shale (NRCS 2010).

##### **3.2.2 Floodplains**

Floodplain Management, Executive Order 11988 issued May 24, 1977, directs all federal agencies to avoid both long- and short-term adverse effects associated with occupancy, modification, and development in the 100-year floodplain, when possible. Floodplains are defined in this order 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 1% greater chance of flooding in any given year.” Flooding in the 100-year zone is expected to occur once every 100 years, on average.

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 are to 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.

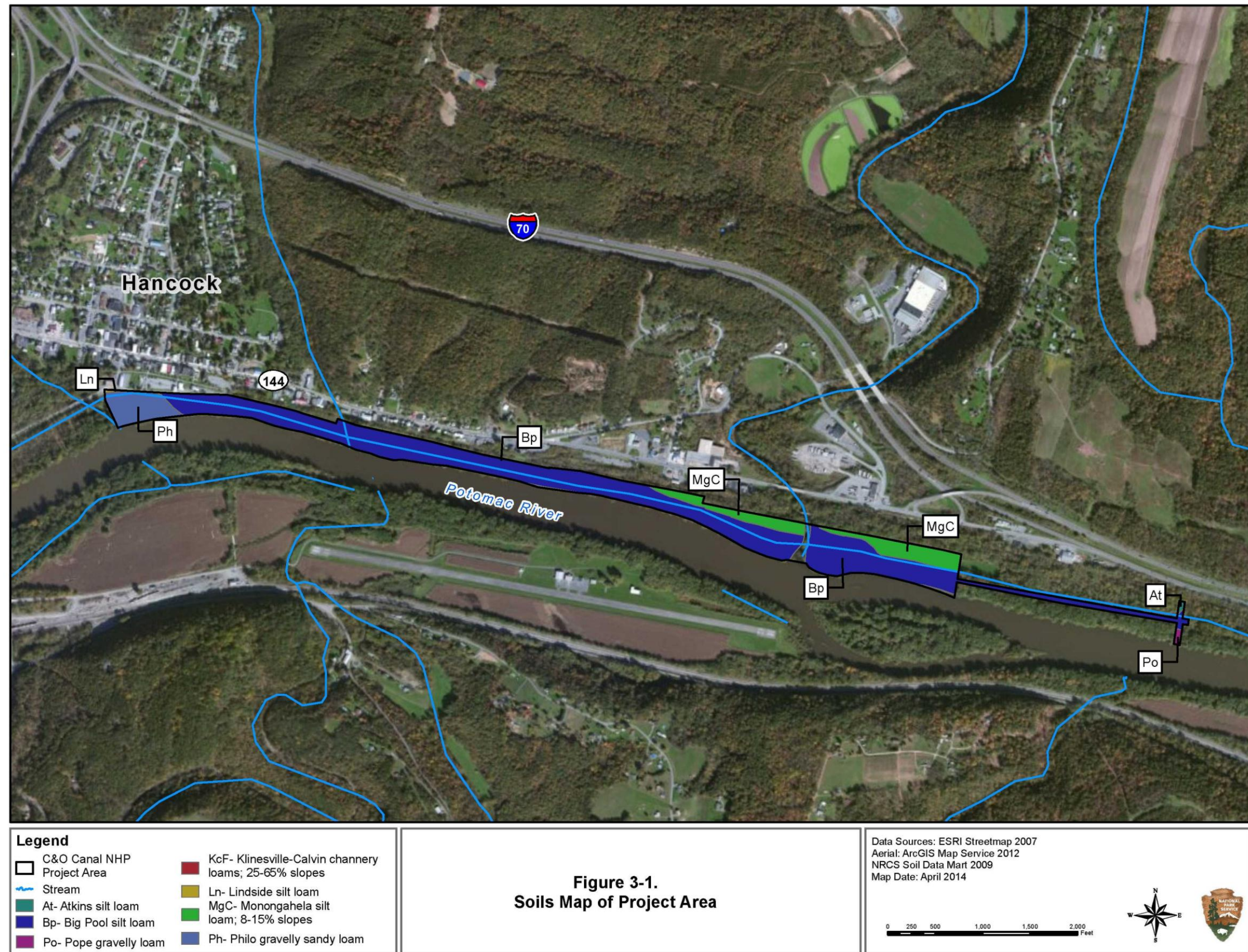
The majority of the project area is located within the 100-year floodplain for the Potomac River (figure 3-2) and is described as Zone A, where base flood elevations and flood hazard factors have not been determined (FEMA 1987). A U.S. Geological Survey (USGS) gauge station is located on the Potomac River in Hancock 0.2 mile downstream of Little Tonoloway Creek and 0.5 mile downstream from the bridge of Highway 522 at Hancock (figure 3-2). The station has recorded gauge height and river discharge (in cfs) since 1932 (USGS 2013). When the river reaches 24 feet in depth, minor flooding of low lying areas occurs. At river depths of 30 feet or a river flow of 10,600 cfs, water covers the road to the NPS maintenance shop and begins to inundate homes and businesses in Hancock. Moderate flooding occurs when river depth reaches 33 feet or when river flow reaches 12,700 cfs. Major flooding occurs when the river depth reaches 35 feet or river flow reaches 14,200 cfs (NOAA 2013). The historic crests for flood events on the Potomac River at Hancock as reported by the National Weather Service are presented in table 3-1. From January 1, 2008 through January 1, 2012, the average daily discharge reading for the Potomac River Hancock gauge was greater than 10,600 cfs on 288 days, creating the potential for flooding to occur (USGS 2013). The three highest river flows were recorded on March 14, 2010 (75,800 cfs), May 19, 2011 (69,500 cfs), and May 5, 2009 (58,200 cfs) (USGS 2013).

**Table 3-1. Historic Flood Events for the Potomac River at Hancock**

Date	Water Depth (feet)	Flooding Level
05/01/1889	34.00	Moderate
06/01/1889	40.00	Major
3/30/1924	32.40	Minor
5/13/1924	35.00	Major
4/17/1929	30.30	Minor
3/18/1936	47.60	Major
4/27/1937	35.70	Major
10/29/1937	31.80	Minor
10/16/1942	36.63	Major
8/19/1955	32.40	Minor
6/23/1972	30.79	Minor
11/6/1985	41.20	Major
1/20/1996	36.26	Major
9/8/1996	35.81	Major
5/19/2011	25.41	Minor

Source: NOAA 2013

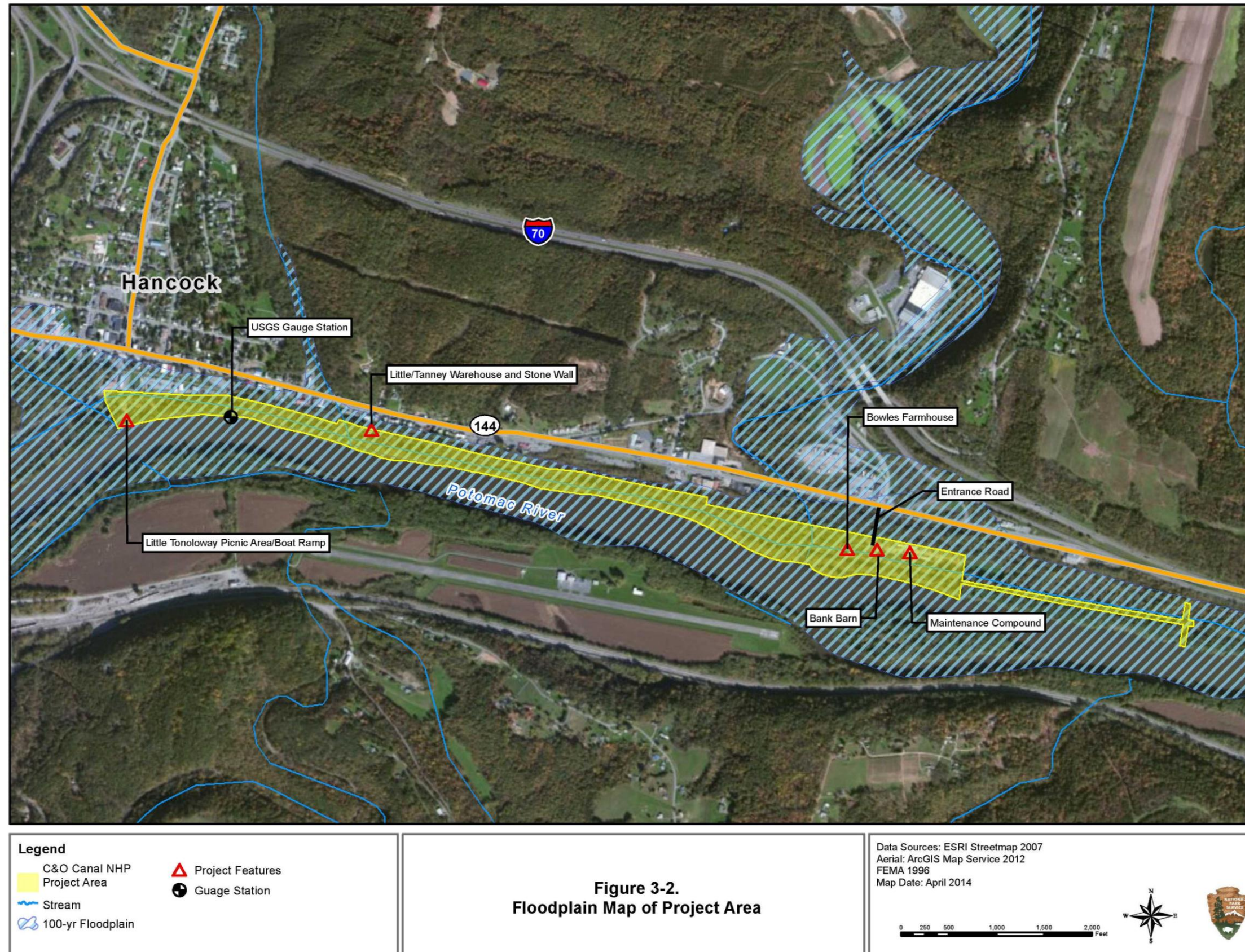






*Page intentionally left blank*







*Page intentionally left blank*

Natural floodplain values are attributes of floodplains, which contribute to ecosystem quality, including, but not limited to, soils, vegetation, wildlife habitat, dissipation of flood energy, sedimentation processes, and ground water (including riparian ground water) recharge. Periodic disturbance of natural floodplain soils and geomorphic and vegetation attributes by floods also contribute to ecosystem quality. Existing development and use has had localized impacts to these natural floodplain values. Those values not associated with flood hazards, the condition of flood flows, or characteristics of flooding (e.g., soils, vegetation, wildlife habitat and wetlands) are not included under the floodplain impact topic but are discussed under the other individual impact topics evaluated in this document and impact topics dismissed from further analysis.

### **3.2.3 Wetlands and Submerged Aquatic Vegetation**

Section 404 of CWA and a number of state laws and provisions regulate activities in wetlands. Executive Order 11990, “Wetland Protection”, directs all federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the 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. Consistent with Executive Order 11990 and Director’s Order 77-1, NPS adopted a goal of “no net loss of wetlands.” Director’s Order 77-1 states that for new actions where impacts on wetlands cannot be avoided, proposals must include plans for compensatory mitigation that restores wetlands on NPS lands, where possible, at a minimum acreage ratio of 1:1.

In Maryland wetlands are protected under the following regulations: the CWA (Section 404), Maryland Nontidal Wetlands Protection Act, and the Maryland Tidal Wetlands Act. The Nontidal Wetlands Protection Act, enforced by the MDE, seeks to protect nontidal wetlands by regulating and restricting all activities that could impact nontidal wetlands or waters of the state. The Act also helps to render “no net loss” in wetlands, by requiring mitigation or compensation for any wetland loss. All activities within a nontidal wetland or its 25-foot buffer require a nontidal wetland permit or a letter of exemption. MDE regulates activities within nontidal wetlands including grading or filling, excavating or dredging, changing existing drainage patterns, disturbing the water level or water table, and destroying or removing vegetation.

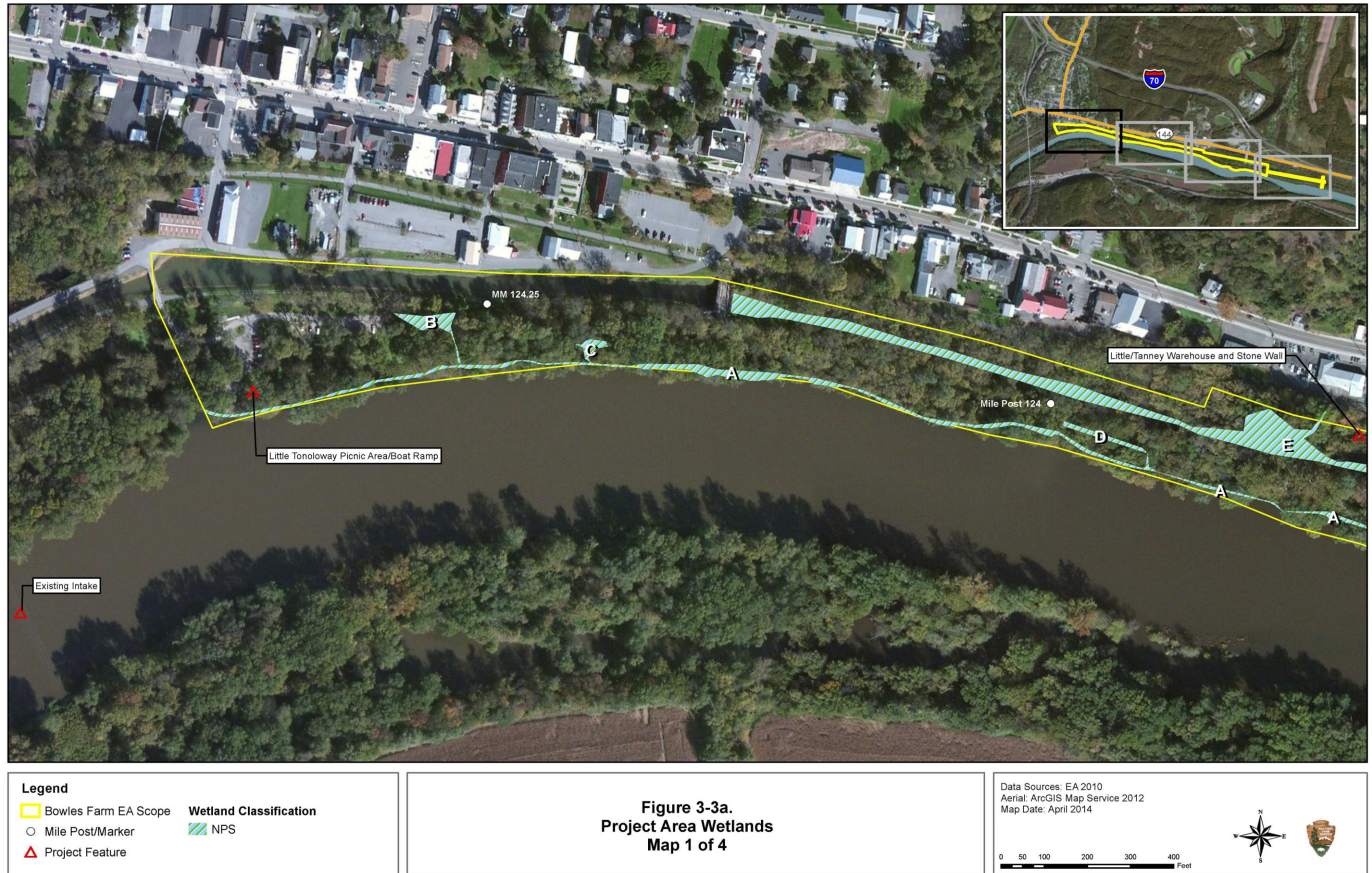
For the purpose of implementing Executive Order 11990, an area in a national park system unit that is classified as a wetland according to the USFWS “Classification of Wetlands and Deepwater Habitats of the United States” is subject to Director’s Order 77-1 (with the exception of deepwater habitats, which are not subject to Director’s Order 77-1) (Cowardin et al. 1979). 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 CWA. The 1987 “U.S. Army Corps of Engineers Wetlands Delineation Manual” requires that three parameters (hydrophytic vegetation, hydric soil, wetland hydrology) must all be present in order for an area to be considered a wetland. 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, and rocky shores). This document presents wetlands as defined by Cowardin et al. (1979) and consistent with 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.

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 2010). 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 maps identify three NWI wetlands in the vicinity of but not within the project area, with the exception of the Potomac River. In the vicinity of Hancock, Maryland, the Cowardin Classification on the NWI maps for the Potomac River is a riverine, unknown perennial, unconsolidated bottom, permanently flooded (R5UBH) wetland (USFWS/NWI 2010).

In addition to reviewing the NWI maps, a wetland delineation was also conducted at the project area. In July 2010, EA Engineering, Science, and Technology, Inc., delineated all natural and artificial wetlands in the project area according to the guidance in NPS Director's Order 77-1 without regard to regulatory jurisdiction (EA Engineering 2010). Wetlands were identified in accordance with the 1987 *Corps of Engineers Wetland Delineation Manual* (USACE 1987) and in conjunction with USFWS *Classification of Wetlands and Deepwater Habitats of the United States* (Report FWS/OBS-79/31); (Cowardin et al. 1979). The area that was surveyed for wetlands included the canal prism on both sides of the canal from Mile 122.12 to 124.59 (approximately a 100-foot wide corridor), which included the shoreline of the Potomac River, the Tonoloway Boat Ramp and Picnic Area east to the Old 522 Bridge, and the canal prism on both sides of the canal from Lock 51 east to culvert 174. A total of 10 wetlands (wetlands A through L) were identified and flagged during the survey. In general, wetlands at the site are located along the Potomac River, along tributaries to the Potomac River, and within the historic C&O Canal. Two small stream channels were also mapped that did not have associated wetlands beyond the channels. No impacts are expected to these two riverine wetlands F or I, and these stream channels are therefore not discussed further in this document. The majority of the wetlands at the site are forested wetlands with a mature tree canopy. Wetlands A through L are described briefly in the paragraphs that follow, in table 3-2 below, and in figures 3-3 a-d. Wetlands shown on figure 3-3 a-d meet the NPS definition of a wetland described above. Some of these wetland areas may also meet the definition of the USACE wetlands/waters of the U.S. A. USACE jurisdictional determination would be completed during the project design phase. For a more detailed description of wetlands A through L, see the SOF in appendix C.

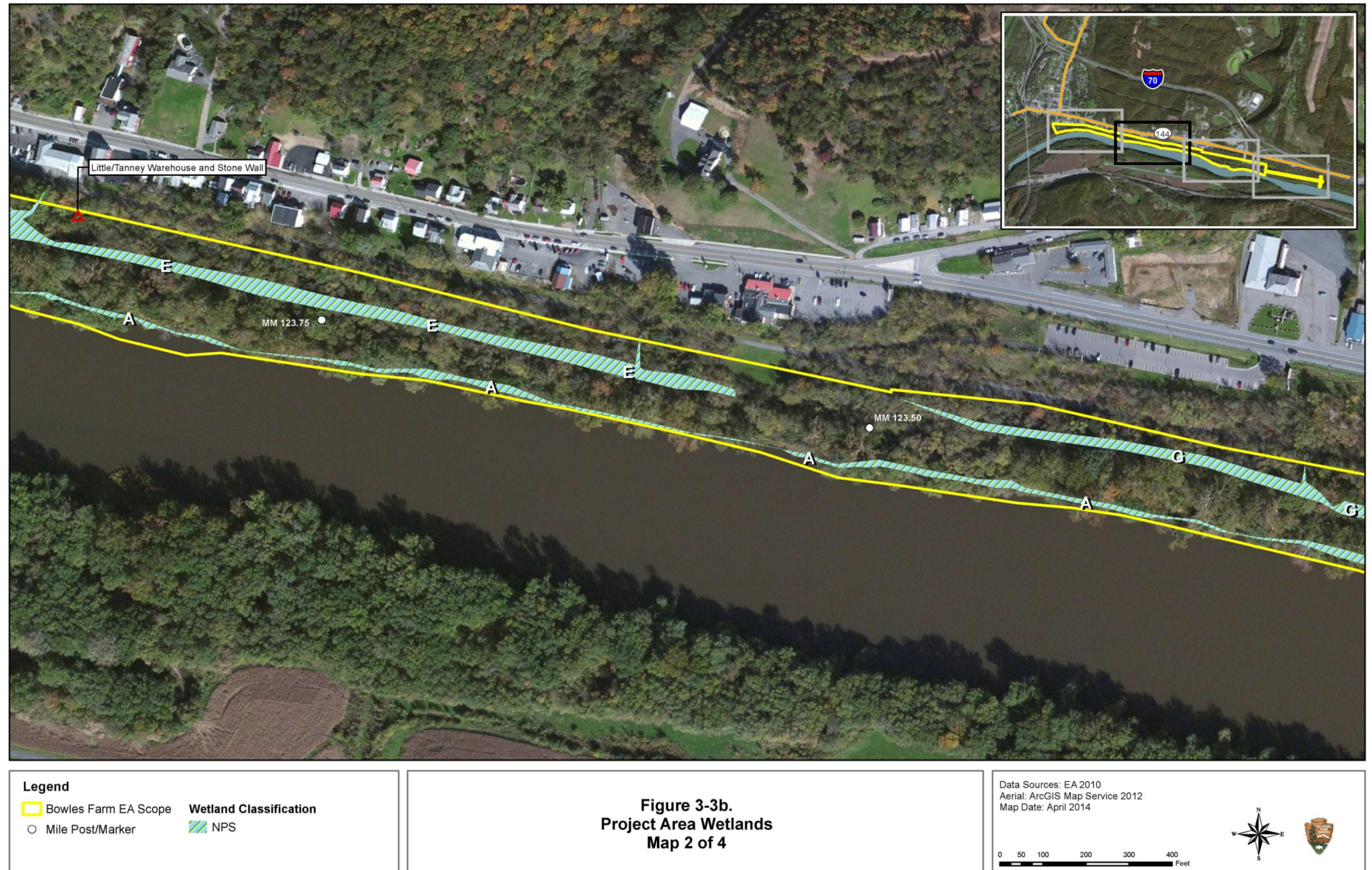






*Page intentionally left blank*

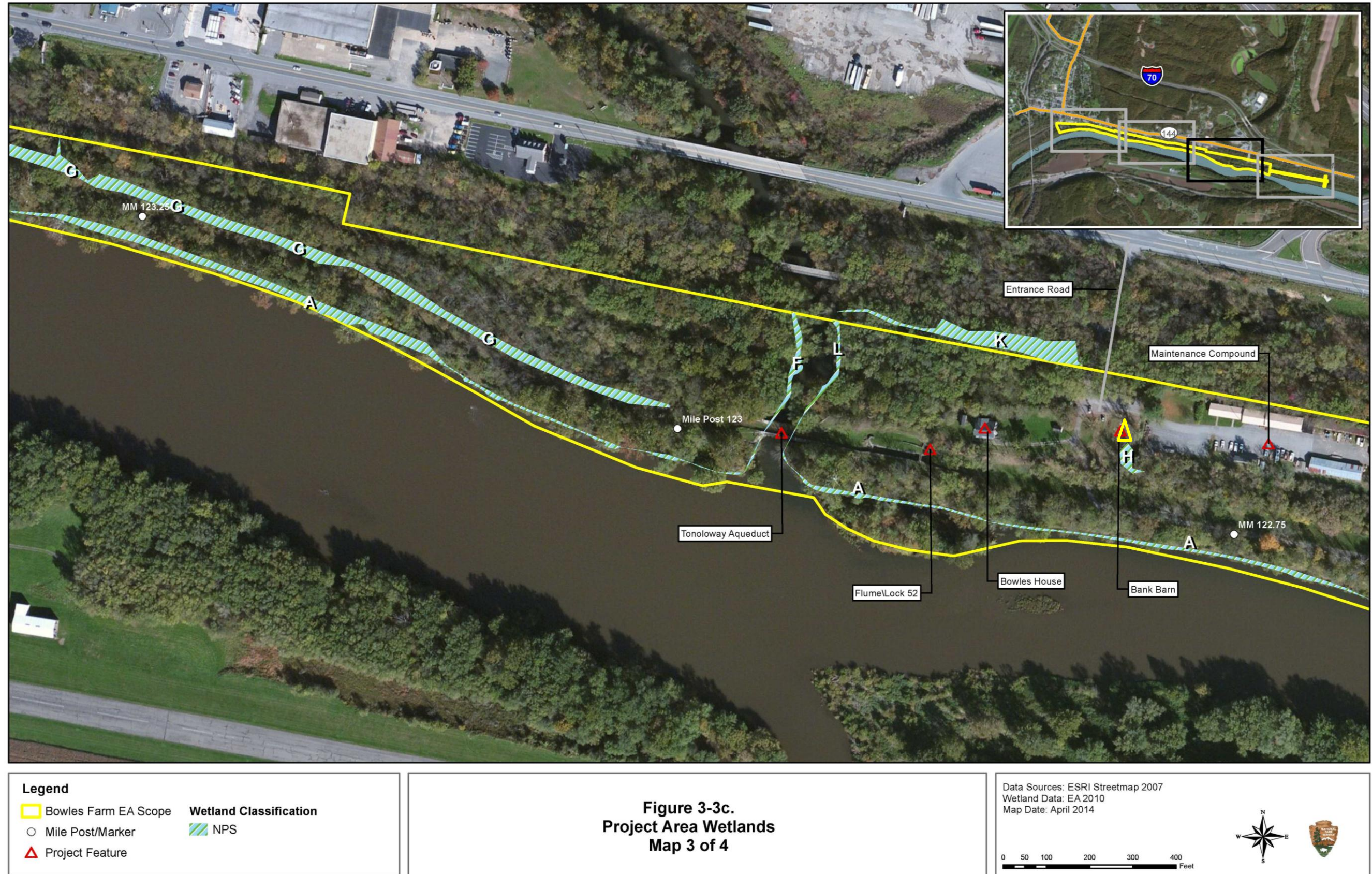






*Page intentionally left blank*

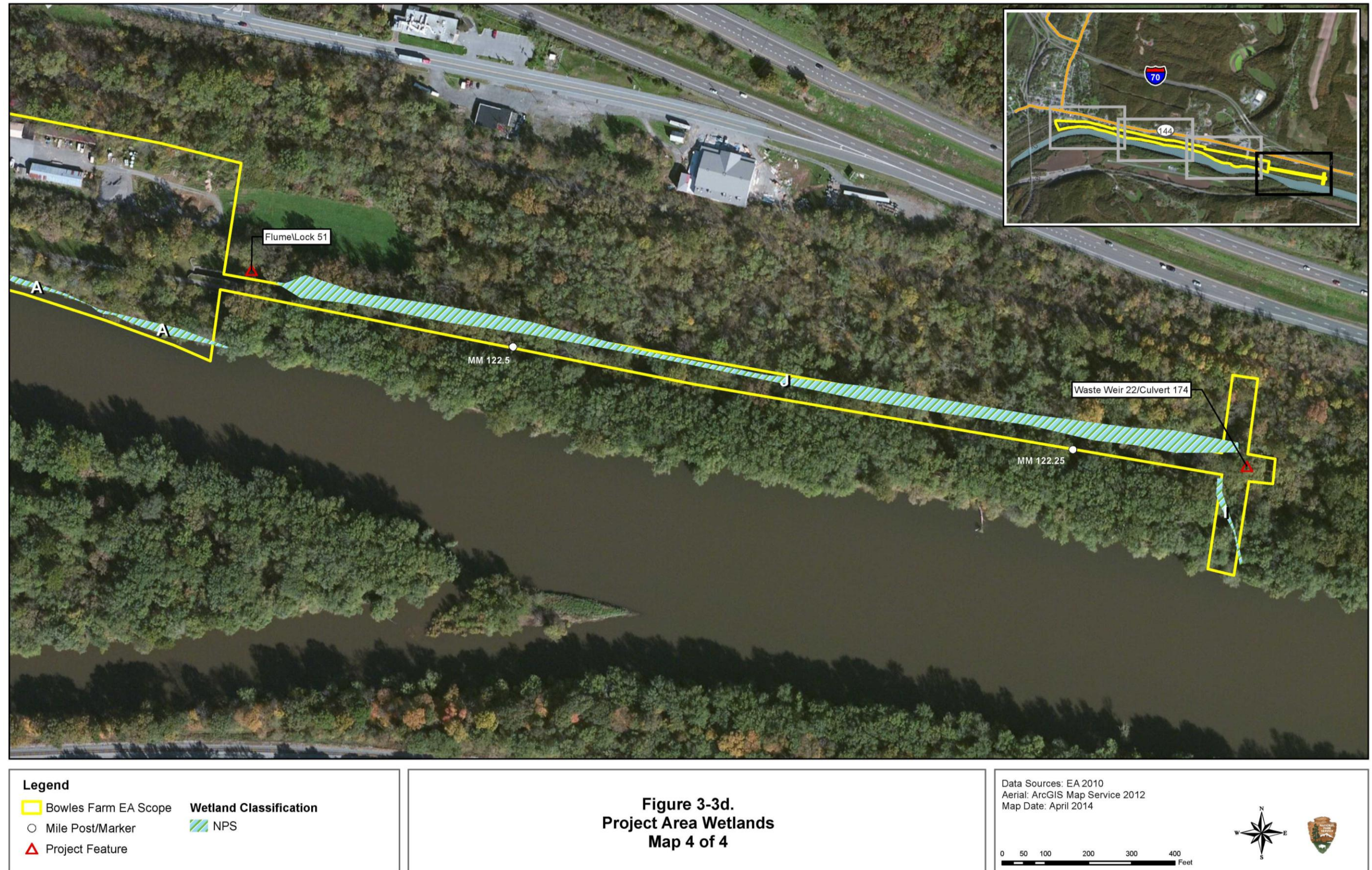






*Page intentionally left blank*







*Page intentionally left blank*

**Table 3-2. Emergent and Forested Wetlands Delineated in the Project Area at Hancock, Maryland**

Delineated Feature	Resource/Cowardin Classification*	Acres
Wetland A	PFO1/PEM1	1.75
Wetland B	PFO1	0.08
Wetland C	PFO1	0.03
Wetland D	PFO1	0.04
Wetland E	PFO1	1.91
Wetland G	PFO1	1.14
Wetland H	PFO1	0.04
Wetland J	PFO1	1.44
Wetland K	PFO1	N/A - Outside of Project Area
Wetland L	PEM1/2	0.04
<b>TOTAL WETLANDS MAPPED IN PROJECT AREA</b>		<b>6.47</b>

\*PFO1/PEM1 = perennial stream shoreline with emergent/forested wetlands

PFO1 = forested wetland

PEM1/2 = emergent wetland

### ***Wetland Descriptions and Values***

**Wetland A** - Wetland A is a mosaic system of narrow wetlands located along the shoreline of the Potomac River from the Tonoloway Boat Ramp at the western-most portion of the project area to Lock 51, the eastern-most portion of the project area along the Potomac River. This wetland was identified as a rocky shoreline consisting of pockets of forested and emergent wetlands located above the ordinary high water mark of the Potomac River. It is classified as a palustrine, forested, broad-leaved deciduous/palustrine, emergent, persistent (PFO1/PEM1) wetland. The source of hydrology for wetland A appeared to be water level fluctuations of the Potomac River. The primary function of wetland A was *Sediment/Shoreline Stabilization* (due to the narrow areas of vegetation protection along shoreline), and secondary functions included: *Floodflow Alteration* (due to location within the floodplain of the Potomac River), and *Fish and Shellfish Habitat* (due to proximity to the Potomac River shoreline, particularly in areas inhabited by submerged aquatic vegetation [SAV] species where snails and crayfish were observed). Secondary values included *Wildlife Habitat* (the riverine portion of Potomac River provides excellent wildlife value, particularly for fish and aquatic bird species), *Educational/Scientific Value*, *Uniqueness/Heritage*, and *Visual Quality/Aesthetics*, generally due to its location within a NHP.

**Wetland B** - Wetland B is a small, forested wetland (PFO1) with an herbaceous understory that exists as a depressional area between the canal and the Potomac River; a small drainage swale connects wetland B to the Potomac River. The source of hydrology for wetland B appeared to be runoff from the nearby parking lot and towpath, and potentially from groundwater as well. The primary function of wetland B appeared to be *Groundwater Recharge/Discharge* due to groundwater seeping out of the ground and providing hydrology for the wetland. Secondary values included: *Wildlife Habitat* and *Uniqueness/Heritage* (generally due to its location within a NHP).

**Wetland C** - Wetland C is a small, forested wetland (PFO1) with an herbaceous understory that exists as a depressional area beyond the shoreline but within the riparian/floodplain area of the Potomac River; a small drainage swale connects wetland C to the Potomac River. During the field review, ground water

was observed seeping out of the river bank of the Potomac River directly below wetland C. The source of hydrology for wetland C appeared to be from both runoff and groundwater. Therefore, the primary function of wetland C appeared to be *Groundwater Recharge/Discharge* due to ground water observed seeping out of the river bank of the Potomac River directly below wetland C. Secondary functions included *Sediment/Shoreline Stabilization* and secondary values included *Wildlife Habitat*.

Wetland D - Wetland D is a very narrow, forested wetland (PFO1) with an herbaceous understory that exists as a depressional area beyond the shoreline of the River but within the riparian/floodplain area of the Potomac River. A small drainage swale connects wetland D to an unnamed tributary to the Potomac River. Because of the presence of hydrology, sporadic wetland vegetation, and a defined connection to a nearby stream channel, this area was identified as a NPS wetland. The source of hydrology for wetland D appeared to be from both runoff and groundwater. However, the primary function appeared to be *Floodflow Alteration* because this area is a topographic depression and described as a vegetated drainage swale. Secondary functions included *Groundwater Recharge/Discharge*.

Wetland E - Wetland E is a narrow, forested wetland (PFO1) with an understory that is herbaceous in some areas and bare in other areas within the historic C&O Canal. This area has been historically disturbed due to the excavation and construction of the C&O Canal. Although this disturbance occurred in the 1830s, the canal has generally been left fallow since 1924. Noteworthy observations at wetland E included two wood turtles within the canal during the July 2010 wetland delineation, and three wood turtles within the canal during the June 2010 terrestrial plant survey. The primary value of this wetland was *Wildlife Habitat* due to the presence of numerous wood turtles observed in the wetland. The location of the wetland within the C&O Canal also indicates that *Uniqueness/Heritage* is a primary value of wetland E. Secondary functions included: *Groundwater Recharge/Discharge*, *Floodflow Alteration*, *Sediment/Toxicant Retention*, and *Nutrient Removal* (due to observations of culverts with runoff from highways that flow into the canal). Secondary values included: *Recreation*, *Educational/Scientific Value*, and *Visual Quality/Aesthetics*.

Wetland G - Wetland G is a narrow, forested wetland (PFO1) with an understory that is herbaceous in some areas and bare in other areas within the historic C&O Canal. Similar to wetland E, this area has been historically disturbed due to the excavation and construction of the C&O Canal. Noteworthy observations at wetland G included a total of five wood turtles observed during the 2010 wetland delineation and rare plant survey periods. The primary value of this wetland was *Wildlife Habitat* due to the presence of numerous wood turtles observed in the wetland. The location of the wetland within the C&O Canal also indicates that *Uniqueness/Heritage* is a primary value of wetland G. Secondary functions included: *Groundwater Recharge/Discharge*, *Floodflow Alteration* as well as *Sediment/Toxicant Retention* and *Nutrient Removal* (due to observations of culverts with runoff from highways that flow into the canal). Secondary values included: *Recreation*, *Educational/Scientific Value*, and *Visual Quality/Aesthetics*. It is important to note that this wetland supports a state endangered sedge species known as Short's sedge (*Carex shortiana*), which is discussed in more detail in the "Special status Species" section.

Wetland H - Wetland H is a small, isolated forested wetland (PFO1) with an herbaceous understory that exists as a depressional area beyond the canal and near the southwestern portion of the maintenance area. The source of hydrology for wetland H appeared to be runoff from the impervious surfaces at the maintenance area and parking lot. Therefore, the primary function of wetland H was *Groundwater Recharge/Discharge* due to groundwater recharge and collecting water from a nearby impervious surface. A secondary function is *Sediment/Toxicant Retention* due to adjacency to the maintenance yard and possible treatment of runoff; a secondary value is *Wildlife Habitat*.

**Wetland J** - Wetland J is a narrow, forested wetland (PFO1) with an understory that is herbaceous in some areas and bare in other areas within the historic C&O Canal. Similar to wetlands E and G, this area has been historically disturbed due to the excavation and construction of the C&O Canal. Due to the location of the wetlands within the C&O Canal, the primary value observed includes *Uniqueness/Heritage*.

Secondary functions included: *Groundwater Recharge/Discharge*, *Floodflow Alteration*, *Sediment/Toxicant Retention*, and *Nutrient Removal* (due to observations of culverts with runoff from highways that flow into the canal). Secondary values included: *Recreation*, *Educational/Scientific Value*, and *Visual Quality/Aesthetics*.

**Wetland K** - Wetland K is a narrow, forested wetland (PFO1) with a herbaceous understory that receives runoff from the nearby roadways and drains westward into the Tonoloway Creek. This wetland is outside of the project area and is not discussed further in this document.

**Wetland L** - Wetland L is a small, narrow, palustrine, emergent, persistent/nonpersistent wetland (PEM1/2) along the eastern shoreline of the Tonoloway Creek. This wetland exists as a pocket along the steep shoreline of the creek due to groundwater seepage from and down the banks, which supports both hydrophytic vegetation and hydric soils. Therefore, the primary function of this wetland is *Groundwater Recharge/Discharge* as a result of groundwater discharging from the bank to Tonoloway Creek. The primary value of this wetland is *Visual Quality/Aesthetics* because the historic aqueduct can be viewed from the shoreline. Secondary functions include *Sediment/Shoreline Stabilization* (shoreline stabilized with herbaceous vegetation). Secondary values include *Recreation* (can kayak and fish in creek), and *Uniqueness/Heritage* (wetland is within viewshed of C&O Canal NHP).

### **Wetland Restoration at the Canal Farm**

Compensation for wetland losses is a requirement of the NPS Director's Order 77-1, and of other federal and state wetland protection regulations. Therefore, if the wetlands are removed then they must be replaced via some form of wetland restoration within park boundaries. NPS staff identified degraded wetland areas that have restoration potential if wetland impacts occur due to the proposed project and mitigation is required.

The Canal Farm ditch wetland is an 11.42 acre site located at Mile 43 within the park. This site contains a very old terrace in the floodplain of the Potomac River that has evolved into a broad depression area. European settlers cleared the fields on both sides of the low drainage area. In order to dry out and reduce the amount of groundwater holding capacity of the depression area, landowners cut a ditch down the middle of the linear low area. There is no evidence that a stream or drainage channel existed before the landowner dug the ditch. Digging the ditch exposed the ground water table and essentially created a conduit, or a path of least resistance, for the ground water to flow. The ditch is approximately 12 inches deep at one end and travels towards the Potomac River where it deepens to approximately 6 feet. An existing forested wetland is located above the start of the ditch. Draining the site allowed the landowner to narrow the width of the forested wetland area, which in turn expanded the amount of arable land on either side of the drainage area. By dropping the ground water elevation, the landowner also created dryer soils within the forested wetland. The site appeared to have a good potential source of hydrology due to the high water table at the site and evidence of bank full flows (NPS 2012).

### **3.2.4 Vegetation**

Within the project area, floodplain forest habitat occurs in linear stretches of forest between the C&O Canal and the Potomac River. This narrow deciduous forest exhibits steep topography immediately along the river and is composed of many species of mixed hardwoods, but the canopy is most often dominated by box elder, silver maple, and sycamore (EA Engineering 2011). This association is particularly

prevalent on the lowest terrace near the river where flooding and alluvial deposition is most common but also within and surrounding the C&O Canal. The dominant understory shrub species in the project area includes spicebush (*Lindera benzoin*), pawpaw (*Asimina triloba*), and green ash (*Fraxinus pennsylvanica*); dominant vines include Japanese honeysuckle (*Lonicera japonica*) and riverbank grape (*Vitis riparia*), and dominant herbaceous plants include wildrye (*Elymus* sp.), dame's rocket (*Hesperis matronalis*), wingstem (*Verbesina alternifolia*), Indian strawberry (*Duchesnea indica*), and white avens (*Geum canadense*). Narrow wetlands exist along the Potomac River, pockets of wetlands exist interspersed in the floodplain, and forested wetlands exist within the canal as discussed in the preceding "Wetlands" section. The project area within C&O Canal NHP was previously disturbed due to the original excavation of the canal. Although this disturbance occurred in the 1830s, the canal has generally been left fallow since 1924 and the canal has become vegetated. As a result, there are understory trees and shrubs as well as numerous mature canopy species such as eastern cottonwood (*Populus deltoides*), sycamore (*Platanus occidentalis*), box elder (*Acer negundo*), slippery elm (*Ulmus rubra*), and maples (*Acer* spp.) that occur within and adjacent to the canal. Therefore, these canopy species, which generally occur in forested wetland areas, could possibly be a maximum of 87 years old within the existing canal if the trees began growing around 1924. The height and diameter at breast height (DBH) of some specimen or highly valued trees were recorded on datasheets within and adjacent to the canal during site surveys (EA Engineering 2011) and include: eastern cottonwood (75 feet tall, 18 inch DBH) in wetland E, sycamore (200 feet tall, 36 inch DBH) in wetland G, and silver maples (75-200 feet tall, 26-36 inch DBH) in wetland J. Vegetation in other portions of the project area includes mowed/maintained grass with some specimen plantings in some parts of the canal, the areas surrounding the visitor center, the picnic area located at culvert 182, and portions of the NPS maintenance yard.

### 3.2.5 Special status Species

The Endangered Species Act (ESA) of 1973, as amended, requires impacts on all federally listed threatened or endangered species be considered in planning for federal actions. NPS policy also requires examination of the impacts on federal candidate species, as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species. In accordance with Section 7 of the ESA, the NPS sent a letter on April 23, 2013, to the USFWS to solicit comments from the USFWS regarding the existence of threatened or endangered species within the project area. On June 12, 2013, the USFWS responded, confirming that, with the exception of occasional transient individuals, no federally proposed or listed endangered or threatened species are known to exist within the project area (appendix B). Therefore, no Biological Assessment or further Section 7 consultation with the USFWS is required. This EA will also be provided to the USFWS for their review.

In response to a letter sent to MDNR Natural Heritage Program, MDNR identified two listed mussel species and four listed plant species as occurring within the Little Pool area, approximately 1 mile downstream of the project area. In addition, MDNR suggested that the forested area on or adjacent to the project site contains Forest Interior Dwelling Bird Species habitat (appendix B). Below is a discussion of the federal and state status of listed plants:

Federal Status is the legal protection status of a species as determined by the USFWS Office of Endangered Species, in accordance with the ESA. Definitions for the following categories have been modified from 50 CFR 17:

- Federally Endangered: Taxa in danger of extinction throughout all or a significant portion of their range.
- Federally Threatened: Taxa likely to become endangered within the foreseeable future throughout all or a significant portion of their range.



State status is the legal protection status of a species as determined by the MDNR in accordance with the Nongame and Endangered Species Conservation Act (Maryland Natural Heritage Program 2010).

Definitions for the following categories have been taken from Code of Maryland Regulations (08.03.08):

- **State Endangered:** A species whose continued existence as a viable component of the State's flora or fauna is determined to be in jeopardy.
- **State Threatened:** A species of flora or fauna that appears likely, within the foreseeable future, to become endangered in the State.

A survey of terrestrial special status plants within the project area along the C&O Canal at Hancock in the project area was conducted in June, July, and September of 2010 (EA Engineering 2011). During the seasonal surveys, one listed (state watchlist) plant species (common hoptree or wafer-ash), one state endangered species (Short's sedge), and one listed (state watchlist) plant species (basal bee-balm) were observed within the project area. No federally listed species were identified as occurring within the project area.

In addition to plant species, a total of 10 wood turtles were observed in wetland areas mapped within the historic C&O Canal during the June, July, and September 2010 plant surveys. The wood turtle is listed by MDNR Natural Heritage as a G4/S4 species, or apparently secure in Maryland.

Descriptions of Short's sedge, the common hoptree, and the wood turtle are presented below. The basal bee-balm will not be affected by any of the alternatives and is therefore not discussed further in this document.

**Short's Sedge:** This native perennial plant is 1.5–2.5 feet tall, consisting of tufts of basal leaves and flowering culms with alternate leaves. The species grows in full to partial sun, moist conditions, and a fertile loamy soil. Most vegetative growth occurs during the spring, and by mid-summer the achenes have fallen from the spikelets. Habitats include openings in moist deciduous woodlands, woodland borders, moist prairies (particularly along rivers), sedge meadows, seeps and fens, low-lying areas along rivers and ponds, powerline clearances in wooded areas, abandoned fields, and ditches (Lichvar et.al. 2009). A total of approximately 10 Short's sedge plants were observed during the spring survey.

**Common Hoptree:** This native shrub is up to 20 feet tall with an irregular rounded crown, forming a central trunk up to 6 inches across. The common hoptree is typically found in full sun to light shade, mesic to dry conditions, and rocky or sandy soil. Habitats include mesic to upland deciduous woodlands, woodland edges and openings, mesic to upland savannas, rocky bluffs, thickets, limestone glades, and fence rows (Lichvar et.al. 2009). A total of 40 common hoptree plants were observed during the spring, summer, and fall surveys.

**Wood Turtle:** This species ranges from 5.5 inches to 1.5 inches in size. The carapace of this turtle is rough with pronounced annuli, and the plastron is a creamy yellow with black blotches along the outer back corner of each scute. The underside of the chin and legs are bright yellow, orange, or red. The wood turtle uses both wetland and upland habitats. Aquatic habitats are required for mating, feeding, and hibernation, while terrestrial habitats are used for egg laying and foraging. Clear moderate to fast-moving streams, brooks, creeks, or rivers with good water quality within undisturbed uplands such as fields, meadows, or forests are preferred habitat areas (MDNR 2012). Wood turtles are often observed basking on logs in streams and rivers with vegetated shorelines or in wooded areas with little cover. Wood turtles are most active in the spring and fall. The wood turtle generally breeds between May and July, though the nesting season varies by geographic location. Once mature, mating can take place anytime during the active season, but generally occurs in spring and fall. Mating takes place in water and then females lay a single clutch of 5-18 eggs per year in nests that are usually built on loose, well-drained soils with scant

vegetation that are well-exposed to the sun. From fall to spring, wood turtles hibernate in undercut stream banks, burrows, root masses, thick leaf packs, or occasionally in debris piles near water, or just lying on the bottom. A total of 10 wood turtles were observed in wetland areas during the spring, summer, and fall surveys.

### 3.3 Cultural Resources

This section discusses the historic background of C&O Canal NHP, the historic structures located within the project area, archaeological resources, and cultural landscapes.

#### 3.3.1 Historic Structures and Districts

**Historical Overview of the C&O Canal:** The C&O Canal emerged out of a general national interest in improving transportation and communication during the first part of the nineteenth century. Various plans for tying newly settled interior regions to the east coast were discussed in the United States. The National Road, authorized by Congress in 1802, was one plan for linking the Potomac and Ohio rivers. The C&O Canal was envisioned as a parallel trunk line (Meinig 1993: 341). Eventually state support for a canal connecting the Chesapeake Bay to the Ohio Valley emerged and the Maryland Legislature incorporated the Chesapeake and Ohio Canal Company in 1824. Early plans were to connect the canal to the Ohio River at Pittsburgh, but Cumberland, Maryland became the western terminus. A proposed canal between Georgetown and Baltimore never materialized (Mackintosh 1991, 1; Unrau 1974, 2; Van Ness 1983, 191).

Built on the Maryland side of the Potomac River between 1828 and 1850, the canal reached a total length of 184.5 miles, and gained 605 feet in elevation by way of 74 lift locks. Aqueducts carried the canal across major streams, while culverts enabled small streams to flow underneath it. Associated features included lock houses, river locks, stop locks, bridges, shops, wharfs, and basins (Gray 2009). When the canal opened in 1850, the railroad had made many of its functions obsolete but the canal provided a better means of shipping heavy freight such as coal, produce, stone, lumber, and cement (Gray 2009; Mackintosh 1991, 1-2; Van Ness 1983, 197). The canal operated through the nineteenth century, despite competition from the railroad and a yearlong stoppage following a flood in 1889. Flooding in 1924 finally led to its permanent closure (Mackintosh 1991:2).

The canal encouraged various subsidiary economic and social activities. Canals in general supported local trade and commerce. Merchants and innkeepers often set up near locks to supply waiting boats; some of these stops grew into communities. Industrial concerns also took advantage of easy access to supplies and shipping. Canal-based towns often developed with factories and warehouses along the canal and commercial and residential districts radiating outward (Gordon and Malone 1994:140-141).

**Historic Structures:** The National Register is an official list, maintained by the NPS, of buildings, structures, sites, districts, and objects that are important to the nation's history, architectures, archeology, engineering, and culture. Properties on or eligible for the National Register may have historic importance to the community, state, or nation. The C & O Canal was listed in the National Register of Historic Places (NRHP) in 1966 as a historic district. The nomination lists many historic properties within the project area that are also within the district. These are also listed in the NPS List of Classified Structures (LCS), an inventory of all historic structures owned or under easement by the NPS. Historic properties that could be affected by the proposed action are listed in table 3-3.

The historic properties on the LCS in the vicinity of the project area include the C&O Canal and related structures, as well as properties related to general farming, industrial, and residential activities along the

canal or reflecting the growth of Hancock as a canal-port. These resources are all either listed on the National Register as contributing structures or have been determined eligible.

**Table 3-3. List of Classified Structures In or Adjacent to the Project Area**

Structure No.	Structure Name	LCS ID	Primary Historic Function	National Register Status***
111.25*	Culvert 174/Waste Weir 22 (1840)	012796	Water Control Feature	Entered-Contributing
122.59*	Bypass Flume-Lock 51	017221	Water Works	Entered-Contributing
122.60*	Lock 51	017233	Canal Lock	Entered-Contributing
122.61*	Lockhouse-Lock 51-Ruins	017234	Single Family Dwelling	Entered-Contributing
122.80A*	Yates, William Property **	049950	Single Family Dwelling	Determined Eligible-Contributing
122.80B*	Smoke House/Wash House--Yates, William Property	049951	Utility Service Structure	Determined Eligible-Contributing
122.80C*	Carriage House--Yates, William Property	049952	Equipment/Vehicle Storage	Determined Eligible-Contributing
122.80D*	Carriage Steps--Yates, William Property	049953	Other	Determined Eligible-Contributing
122.80E*	Barn Foundation--Yates, William Property	049921	Barn	Determined Eligible-Contributing
122.80F*	Privy--Yates, William Property	049988	Other	Determined Eligible-Contributing
122.89*	Bypass Flume-Lock 52 (1838)	011729	Water Works	Entered-Contributing
122.90	Lockhouse-Lock 52-Foundation (1840)	017235	Single Family Dwelling	Entered-Contributing
122.91*	Lock 52 (1839)	011728	Canal Lock	Entered-Contributing
122.92*	Great Tonoloway Creek Aqueduct (1839)	045772	Aqueduct	Entered-Contributing
122.92*	Waste Weir at Great Tonoloway Creek Aqueduct (1838)	045777	Water Control Feature	Entered-Contributing
123.00*	Mile 123-124, Towpath (1835)	045829	Canal	Entered-Contributing
123.01*	Mile 123-124, Canal Prism (1835)	045828	Canal	Entered-Contributing
123.50	Bridge Over Canal in Hancock (1926)	049955	Transportation	Entered-Contributing
123.84	Tanney/Little Warehouse and Dwelling Ruins (1875, 1900)	012883	Warehouse	Entered-Contributing
123.90*	Hancock Boat Basin (1900)	011730	Water-Related	Entered-Contributing
123.95*	Culvert 179 (1840)	011731	Water Control Feature	Entered-Contributing
124.00*	Mile 124-125 Towpath (1835)	045831	Canal	Entered-Contributing
124.01*	Mile 124-125 Canal Prism (1835)	045830	Canal	Entered-Contributing

Structure No.	Structure Name	LCS ID	Primary Historic Function	National Register Status***
124.02*	Rinehart Sumac Mill Ruins (1874)	049956	Manufacturing	Determined Eligible-Contributing
124.14	Old Hancock Bridge-Stone Piers (1889)	011732	Road Bridge	Entered-Contributing
124.38	Culvert 182 (1840)	011733	Water Control Feature	Entered-Contributing

\* Denotes resources that are within or immediately adjacent to planned project components.

\*\* The Yates Property/House is the William Bowles Property/House (also known as the William Little Property/House). The LCS describes the William Yates Property as the Preferred Structure Name.

\*\*\* National Register Status: Entered-Contributing designates resources listed on the National Register that contribute to the historic character of the C&O Canal but are not eligible for individual listing; Determined Eligible-Contributing indicates the resource is not formally listed but is considered to have traits that would allow listing as a resource that contributes to the historical character of the C&O Canal.

These resources are located in three clusters. The Rinehart/Sumac Mill Ruins, Tanney/Little Warehouse and Dwelling Ruins, Bridge Over Canal at Hancock, Hancock Boat Basin, and culvert 182 are all located near Hancock around Mile 123. The Great Tonoloway Creek Aqueduct, Lock 52, Bowles/Little (Yates) House and Barn Ruins, Lock 51, Lock 51 Keeper's House, and Flume 51 are all located near Mile 122.8. Finally, culverts 175 and 174 are located further to the east along the C&O Canal.

Survey for historic structures has been comprehensive in the project area. There are likely no unrecorded historic buildings or structures present.

### 3.3.2 Archeological Study and Resources

Although historic structures in the project area have been documented, there have been few comprehensive archeological surveys completed. The Louis Berger Group, Inc. conducted surveys in portions of the project area, including sections of the river terraces on either side of Great Tonoloway Creek and on the west bank of Little Tonoloway Creek (Bedell et al. 2009b). New South Associates, Inc. surveyed locations associated with the present project area. The survey areas included yards east of the Bowles House, the Bank Barn foundation, a segment of the C&O Canal berm and lower Potomac River terrace, and unpaved areas east of Little Tonoloway Creek associated with the picnic area and boat ramp (Botwick 2011).

Four archaeological sites have been identified in or adjacent to the planned project areas. Sites 18WA578 and 18WA579 lie on upper Potomac River terraces on either side of Great Tonoloway Creek and north of the C&O Canal. Site 18WA578 consists of an historic artifact scatter possibly related to the Bowles Property or general activities along the canal. The dates for the site are uncertain. No recommendation was provided as to this site's significance (Bedell et al. 2009b:67).

Site 18WA579 represents a prehistoric and historic site. The prehistoric component included a sparse scatter of lithic artifacts of indeterminate date. The historic component was an artifact scatter probably associated with the Bowles Property or general canal operations. Artifact dates provided only a broad 19<sup>th</sup> to 20<sup>th</sup> century range, and the site's significance is undetermined (Bedell et al. 2009b:67).

Site 18WA590 is a prehistoric and historic site associated with the Bowles House. The undated prehistoric component lies in the east yard of the house. The historic component consists of artifact scatters, structure remains, and standing buildings associated with the Bowles farmstead. The site requires further evaluation to establish its historical and archeological significance (Botwick 2011).

Site 18WA591 is a prehistoric and historic site located at the Little Tonoloway Creek Picnic Area. The prehistoric component is an artifact scatter with a general Woodland period date. The historic component consists of rubble associated with the 19<sup>th</sup>-Century Rinehart Sumac Mill. Additionally, the site occupies a probable Holocene Potomac River terrace and has a potential for deeply buried cultural deposits. The site was recommended potentially significant pending further study (Botwick 2011).

Because it has been well documented, archaeological investigation of the C&O Canal prism was not conducted for this survey. Although it could contain materials discarded or lost by people using the canal, these are not likely to yield information important to history. The canal and any remnant structures associated with it are considered among the historic structures impacts.

### **3.3.3 Cultural Landscape**

The C&O Canal NHP at Hancock does not have a delineated cultural landscape. However, in combination the various elements of the canal (e.g., prism, locks, etc.) and associated resources, such as the Bowles Property (including all buildings and structures), the Old Hancock Bridge, the Tanney/Little Warehouse and ruins, and the Reinhart Mill ruin, form a distinct landscape that is relatively intact. This is particularly true in the vicinity of the Bowles Property, where grounds keeping helps maintain a vista of the canal, lock, and nearby farm buildings. The park has adequate photos and other documentation to accurately reconstruct missing buildings within the Bowles Property viewshed. Although the rest of the historic landscape cannot be reconstructed accurately, photos show the landscape to be much more open during the time the canal was in use, and a more appropriate setting can be maintained. Other locations within the project area, such as the Little Tonoloway Picnic Area and the canal's viewshed include modern structures, a boat ramp, and parking areas that detract from the sense of an historic place. Consideration of effects on the cultural landscape is therefore most relevant to the Bowles Property.

## **3.4 Socioeconomics**

This section discusses the socioeconomic environment in the communities near the project area.

The U.S. Census Bureau (USCB) provides population data, demographic information, housing statistics, and employment information at the state, county, city, and census tract levels. The project area is located in Hancock, Maryland. Census data for the city of Hancock is currently available from the 2010 Census. The project area is solely located within Washington County, Maryland. The 2010 census estimates that approximately 1,545 residents live in the town of Hancock, while the total population of Washington County is estimated at 147,430 (USCB 2011a; USCB 2011b).

Population projections for Washington County, as determined by the Maryland Department of Planning, estimate a change in the county population from 140,650 in 2005 to 189,750 in 2030, with the annual growth rate ranging from 0.98 to 1.46% (MDP 2008). This would be 26% population growth for Washington County.

**Employment:** Within the city of Hancock in the 2007-2011 census, approximately 66.2% of the population over the age of 16 was in the labor force (USCB 2012a). Of the employed population, 12.4% were in management, professional, or related occupations, while an additional 21.3% were in the service industry, 39.3% in sales or office occupations, and 18.0% in production, transportation, and moving materials occupations. Approximately 9.0% were in natural resources, construction, and maintenance operations (USCB 2012a).

In Washington County, approximately 65.1% of the population above the age of 16 is in the labor force (USCB 2012b). A majority of the population is involved in management, professional, and related occupations (30.5%), and sales (27.1%), according to the 2007 - 2011 census data. Other occupations



included service operations (18.3%); natural resources, construction, and maintenance operations (11.1%); and production, transportation, and material moving occupations (12.9%) (USCB 2012b).

### **3.5 Transportation**

The visitor center and other park facilities at Hancock are a short distance away from Interstate 70. They can be accessed by taking Interstate Exit 3 to Route 144, which is also called Main Street. The park is located on Main Street. Main Street/Route 144 is a paved two-lane road. The access road that leads from Route 144 into the park is currently a single lane road. On the park grounds, there are several access roads for park visitors and maintenance activities. There are also parking areas to accommodate recreational users. Parking for visitors is provided by the Hancock Visitor Center as well as by the boat ramp.

### **3.6 Visitor Use and Experience**

In 2012 an estimated 4,712,377 people visited the park. The busiest months were May, June, and August, when monthly attendance exceeded 490,000 visits. January and February were the least visited months with approximately 178,586 visitors to the park in January and 230,285 visitors in February (NPS 2013b).

Since the park extends for 184.5 miles along the Potomac River from Georgetown to Cumberland, it is divided into five districts. The five districts include Washington D.C., Montgomery County, Frederick County, Allegheny County, and Washington County. The project area lies within the Washington County District. Within the Washington County District visitor counts, either by vehicle or trail, are documented at fourteen sites. An inductive loop traffic counter is located at the entrance/exit to Little Tonoloway. Vehicles are adjusted for entering and exiting the unit by dividing by two. The adjusted count is multiplied by the person per vehicle multiplier of 2.5 (NPS 2009). In 2012, a total of 78,074 visitors were estimated at Little Tonoloway (NPS 2013c).

Visitors to the C&O Canal NHP can participate in many different recreational and cultural activities. The recreational opportunities at the park include swimming, canoeing, kayaking, bank fishing, small boat fishing, wade fishing, hiking, biking, camping, picnicking, horseback riding, and wildlife viewing. Within the project area, the primary recreational use of the canal is hiking and biking along the original towpath. Hikers and bikers can access the WMRT that runs 10 miles from the visitor center in Hancock east to Big Pool. The Tonoloway Picnic Area is utilized by picnickers and other visitors, while the boat ramp allows boat users access to the water. The towpath is also used for picnicking, wildlife viewing, and horseback riding in designated areas. Camping is another popular activity in the park, and overnight camping is available in several locations near Hancock at various intervals along the canal. These include drive-in campsites, as well as hike and bike campsites, which are provided for one night to visitors hiking or biking along the trail. These sites are not fee-based, while a fee is charged at the drive-in campsites. Campsites provide primitive facilities. The closest campgrounds to the project area include White Rock and Leopards Mill to the west and Little Pool and Licking Creek to the east. Fishing occurs along the banks of the canal in rewatered portions; visitors can fish from small boats along the canal or wade in shallow waters of the canal (NPS 2011b).

The Hancock Visitor Center is located in the historic Bowles House. Interpretive displays are located at sites throughout the C&O Canal NHP, including at the Bowles House. These interpretive displays include information for visitors on the history, culture, and environment of the canal. Displays at the Bowles House include information and history specific to the Hancock site. The Hancock Visitor Center operates seasonally from Memorial Day weekend through October, 9:00 am to 4:30 pm Friday through Tuesday (NPS 2011b).

A yearly visitor survey is conducted at the park in compliance with the Government Performance and Results Act. The survey was created as a measure of visitor satisfaction, appreciation, and understanding. It includes questions about the facilities, activities, and recreational opportunities at the park. The percentage of visitors who were satisfied in these categories in 2010 was 91% for the visitor centers and walkways, trails, and roads, with an overall satisfaction for combined park facilities of 82%. For visitor services, the satisfaction rate was 95% for ranger assistance, 91% for park maps and brochures, and 87% for combined visitor services. Visitors had 93% satisfaction with learning about nature, history, and culture, and 99% for outdoor recreation, with a 96% satisfaction rate with overall recreational opportunities. The overall satisfaction rate with the park by visitors was 95% (PSU 2011).

### **3.7 Park Operations**

NPS staff is responsible for maintaining the 19,586 acres of parkland from Georgetown, Washington D.C. to Cumberland, Maryland. The park has designated access points that serve maintenance, law enforcement, river rescue, emergency medical, interpretive ranger, and other support personnel. There are approximately 74 full time park personnel for the entirety of the C&O Canal NHP. Staff members include park rangers, law enforcement, historians, biologists, maintenance workers, volunteer coordinators, and resource managers. Park personnel oversee a range of duties and responsibilities in the park, from maintenance work, to law enforcement, resource management, and interpretation programs. To manage the diverse resources of the canal, staff works out of multiple field offices in addition to the main headquarters within the park, located in Hagerstown, Maryland. The project area is within the Four Locks Maintenance District.

At Hancock, there is one permanent staff member and one seasonal staff member in the visitor center. There are two permanent law enforcement employees stationed at Hancock. The maintenance personnel at Hancock consist of eight permanent employees, six temporary employees, and four inmate labor employees. The maintenance crew is responsible for clearing the towpath of trees and limbs, removing vegetation, maintaining the visual quality of the area, trash collection, and routine maintenance projects.

Volunteers provide an important part of the operation of the C&O Canal NHP. Volunteers facilitate several functions of the parks, from the operation of canal boats to Visitor Center assistance. Volunteers work along the towpath to provide visitors with information about the towpath. Volunteers also provide minimal first aid, information and directions, and informal interpretation. They make sure park visitors are informed of park regulations and rules, and any hazards they may encounter along the towpath. Volunteers provide information, help answer phones, operate bookstores and other Visitor Center components, as well as aid special events and programs (NPS 2011b). At Hancock, there are currently seven volunteers. These volunteers provide assistance in the visitor center with visitor services, informal interpretation, event/festival support, and site research.

*Page intentionally left blank*

## 4.0 ENVIRONMENTAL CONSEQUENCES

### 4.1 Overview

This chapter analyzes both beneficial and adverse impacts that would result from implementing any of the alternatives considered in this EA. This chapter also includes definitions of impact thresholds (e.g., negligible, minor, moderate, and major), methods used to analyze impacts, and the analysis methods used for determining cumulative impacts. As required by CEQ regulations implementing NEPA, a summary of the environmental consequences for each alternative is provided in table 2-4, which can be found in “Chapter 2: Alternatives.” The resource topics presented in this chapter, and the organization of the topics, correspond to the resource discussions contained in “Chapter 3: Affected Environment.”

#### 4.1.1 General Methodology for Establishing Impact Thresholds and Measuring Effects by Resource

The following elements were used in the general approach for establishing impact thresholds and measuring the effects of the alternatives on each resource category:

- General analysis methods as described in guiding regulations, including the context and duration of environmental effects.
- Basic assumptions used to formulate the specific methods used in this analysis.
- Thresholds used to define the level of impact resulting from each alternative.
- Methods used to evaluate the cumulative impacts of each alternative in combination with unrelated factors or actions affecting park resources.
- Methods and thresholds used to determine if impairment of specific resources would occur under any alternative.

These elements are described in the following sections.

#### 4.1.2 General Analysis Methods

The analysis of impacts follows CEQ guidelines and Director’s Order 12 procedures (NPS 2001). Overall, these impact analyses and conclusions were based on the review of existing literature and studies, information provided by on-site experts and other government agencies, the results of site-specific surveys (wetlands, vegetation, and special status species), best professional judgment, and park staff insight. The impact analyses presented in this document are intended to comply with both NEPA and Section 106 of the NHPA; therefore, Section 106 summaries for each cultural resource topic are also included.

#### 4.1.3 Assumptions

Several guiding assumptions were made to provide context for this analysis. These assumptions are described below.

***Geographic Area Evaluated for Impacts (Area of Analysis):*** The geographic study area (or area of analysis) for this project is the Hancock area of the park. This area (Hancock) begins at Mile 122.12 and ends at Mile 124.59 of the towpath, along the Potomac River. This area includes Locks 51 and 52, the Bowles (Little) Farm, the Tonoloway Aqueduct, canal prism, canal boat basin, parking area at Little Tonoloway Picnic Area/Boat Ramp, and the park’s maintenance compound. The project area is

approximately 84 acres and follows the C&O Canal NHP towpath for approximately 2.5 miles. The area of analysis may extend beyond the Hancock project area for some cumulative impact assessments.

Under alternative 2, a total of 4.6 acres of wetlands would be restored at the Canal Farm ditch wetland located at Mile 43 within the park. This site is considered part of the study area for alternative 2.

#### 4.1.4 Impact Thresholds

Determining impact thresholds is a key component in applying NPS *Management Policies* and Director's Order 12. These thresholds provide the reader with an idea of the intensity of a given impact on a specific topic. The impact threshold is determined primarily by comparing the effect to a relevant standard based on applicable or relevant/appropriate regulations or guidance, scientific literature and research, or best professional judgment. Because definitions of intensity vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this document. Intensity definitions are provided throughout the analysis for negligible, minor, moderate, and major impacts. In all cases, the impact thresholds are defined for adverse impacts. Beneficial impacts are addressed qualitatively.

Potential impacts of all alternatives are described in terms of type (beneficial or adverse), context, duration (short- or long-term), and intensity (negligible, minor, moderate, major). Definitions of these descriptors include:

**Beneficial:** A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.

**Adverse:** A change that declines, degrades, and/or moves the resource away from a desired condition or detracts from its appearance or condition.

**Context:** Context is the affected environment within which an impact would occur, such as site-specific, park-wide, regional, global, affected interests, society as whole, or any combination of these. Context is variable and depends on the circumstances involved with each impact topic. As such, the impact analysis determines the context, not vice versa.

- **Site-specific:** The impact would affect the project site.
- **Local:** The impact would affect areas within the general vicinity of the project area.
- **Park-wide:** The impact would affect areas outside the project site yet within the park.
- **Regional:** The impact would affect localities, cities, or towns surrounding the park.

**Duration:** The duration of the impact is described as short-term or long-term. Duration is variable with each impact topic; therefore, definitions related to each topic are provided in the specific impact analysis narrative.

**Intensity:** Because definitions of impact intensity (negligible, minor, moderate, and major) vary by impact topic, intensity definitions are provided separately for each impact topic analyzed.

#### 4.1.5 Cumulative Impacts Analysis Method

The CEQ regulations to implement NEPA require the assessment of cumulative impacts in the decision making process for federal projects. A cumulative impact is defined as “the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such



other actions” (40 CFR 1508.7). As stated in the CEQ handbook, *Considering Cumulative Effects* (CEQ 1997), cumulative impacts need to be analyzed in terms of the specific resource, ecosystem, and human community being affected and should focus on effects that are truly meaningful. Cumulative impacts are considered for all alternatives, including the no action alternative.

Cumulative impacts were determined by combining the impacts of the alternative being considered with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects and plans at C&O Canal NHP and, if applicable, the surrounding area.

The analysis of cumulative impacts was accomplished using four steps:

*Step 1 — Identify Resources Affected* - Fully identify resources addressed in chapters 3 and 4 affected by any of the alternatives.

*Step 2 — Set Boundaries* - Identify an appropriate spatial and temporal boundary for each resource.

*Step 3 — Identify Cumulative Action Scenario* - Determine which past, present, and reasonably foreseeable future actions to include with each resource. Past, present, and reasonably foreseeable future actions are described below.

*Step 4 — Cumulative Impact Analysis* - Summarize impacts of these other actions (x) plus impacts of the proposed action (y), to arrive at the total cumulative impact (z). This analysis is included for each resource in chapter 4.

Table 4-1 includes the past, present, and reasonably foreseeable projects being considered in the cumulative impacts analysis for each resource.

**Table 4-1. Cumulative Impact Scenario Table**

<b>Impact Topic</b>	<b>Study Area</b>	<b>Past Actions</b>	<b>Present Actions</b>	<b>Future Actions</b>
Soils	C & O Canal NHP	<ul style="list-style-type: none"> <li>Rehabilitate, Reconstruct, and Stabilize Big Slackwater Historic Stone Wall and Towpath</li> </ul>	<ul style="list-style-type: none"> <li>No Cumulative Impact Projects</li> </ul>	<ul style="list-style-type: none"> <li>Restoration of Canal Operations</li> <li>Sharpsburg Intake Upgrades</li> </ul>
Floodplains	C & O Canal NHP	<ul style="list-style-type: none"> <li>Rehabilitate, Reconstruct, and Stabilize Big Slackwater Historic Stone Wall and Towpath</li> </ul>	<ul style="list-style-type: none"> <li>No Cumulative Impact Projects</li> </ul>	<ul style="list-style-type: none"> <li>Western Maryland Rail Trail Extension</li> </ul>
Wetlands	C & O Canal NHP	<ul style="list-style-type: none"> <li>Rehabilitate, Reconstruct, and Stabilize Big Slackwater Historic Stone Wall and Towpath</li> </ul>	<ul style="list-style-type: none"> <li>No Cumulative Impact Projects</li> </ul>	<ul style="list-style-type: none"> <li>Restoration of Canal Operations</li> <li>Sharpsburg Intake Upgrades</li> <li>Western Maryland Rail Trail Extension</li> </ul>
Vegetation	C & O Canal NHP	<ul style="list-style-type: none"> <li>Rehabilitate, Reconstruct, and Stabilize Big Slackwater Historic Stone Wall and Towpath</li> </ul>	<ul style="list-style-type: none"> <li>Invasive Species Management</li> </ul>	<ul style="list-style-type: none"> <li>Restoration of Canal Operations</li> <li>Sharpsburg Intake Upgrades</li> <li>Western Maryland Rail Trail Extension</li> </ul>
Special status Species	C & O Canal NHP	No Cumulative Impact Projects	No Cumulative Impact Projects	No Cumulative Impact Projects
Cultural Resources	C & O Canal NHP	<ul style="list-style-type: none"> <li>Rehabilitate, Reconstruct, and Stabilize Big Slackwater Historic Stone Wall and Towpath</li> </ul>	No Cumulative Impact Projects	<ul style="list-style-type: none"> <li>Restoration of Canal Operations</li> <li>Sharpsburg Intake Upgrades</li> <li>Western Maryland Rail Trail Extension</li> </ul>
Socioeconomics	Washington County, MD	<ul style="list-style-type: none"> <li>Rehabilitate, Reconstruct, and Stabilize Big Slackwater Historic Stone Wall and Towpath</li> </ul>	<ul style="list-style-type: none"> <li>The Great Allegheny Passage</li> </ul>	<ul style="list-style-type: none"> <li>Restoration of Canal Operations</li> <li>Eelway Construction at Dams 4 and 5</li> <li>Western Maryland Rail Trail Extension</li> </ul>
Transportation	C & O Canal NHP	<ul style="list-style-type: none"> <li>Rehabilitate, Reconstruct, and Stabilize Big Slackwater Historic Stone Wall and Towpath</li> </ul>	<ul style="list-style-type: none"> <li>The Great Allegheny Passage</li> </ul>	<ul style="list-style-type: none"> <li>Eelway Construction at Dams 4 and 5</li> </ul>

Impact Topic	Study Area	Past Actions	Present Actions	Future Actions
Visitor Use & Experience	C & O Canal NHP	<ul style="list-style-type: none"> <li>Rehabilitate, Reconstruct, and Stabilize Big Slackwater Historic Stone Wall and Towpath</li> </ul>	<ul style="list-style-type: none"> <li>The Great Allegheny Passage</li> </ul>	<ul style="list-style-type: none"> <li>Restoration of Canal Operations</li> <li>Eelway Construction at Dams 4 and 5</li> <li>Western Maryland Rail Trail Extension</li> </ul>
Park Operations	C & O Canal NHP	<ul style="list-style-type: none"> <li>Rehabilitate, Reconstruct, and Stabilize Big Slackwater Historic Stone Wall and Towpath</li> </ul>	<ul style="list-style-type: none"> <li>The Great Allegheny Passage</li> </ul>	<ul style="list-style-type: none"> <li>Restoration of Canal Operations</li> <li>Eelway Construction at Dams 4 and 5</li> <li>Western Maryland Rail Trail Extension</li> </ul>

The following projects were considered in the cumulative impact analysis for each resource:

**Restoration of Canal Operations at Williamsport Environmental Assessment:** This project is a future action that would restore the canal operations between the Lock 44 area to 600 feet upstream of the Conococheague Aqueduct, located between Mile 98.6 and Mile 99.95 of the park at Williamsport, Washington County, Maryland. Project work would include several preservation, restoration, and development projects within the Williamsport area. The purpose of the project is to fully realize the potential of Williamsport as an interpretive venue along the C&O Canal NHP. The project is needed because currently the interpretation at Williamsport is lacking and does not fulfill the vision of the C&O Canal NHP's 1976 General Plan. The EA for this project was on public review during the summer of 2011 and the Finding of No Significant Impact was signed on January 18, 2012.

**Proposed Eelway Construction at Dams 4 and 5 on the Potomac River:** This project is a future action that would include constructing and operating an eelway (also known as eel ladders) at dams 4 and 5. Dam 4 is located immediately downstream of the Big Slackwater area, and dam 5 is located approximately five miles northwest of Williamsport, Maryland. The basic design of the eelway has the eels entering an ascending ramp at the base of the dam and swimming up an angled ascending ramp by pushing against a tubular substrate. The eelway would be supported by attaching the eelway to the structures (dam, abutment, forebay, or powerhouse) using supports, including rock bolts, Hilti anchors, thunderbolt anchors, or masonry joint anchors. Attraction water flow would be provided by a pump, which would help direct the eels to the eelway. The EA for this project was finalized during the winter of 2009.

**Sharpsburg Intake Upgrades.** This project is a future action located at Mile 74.3 that would provide upgrades to the existing raw water conduits between the Potomac River and the Sharpsburg water treatment plant. The proposed project would construct a new water line between the intake structure and the plant. The EA for this project was drafted during the spring of 2011.

**Rehabilitate, Reconstruct, and Stabilize Big Slackwater Historic Stone Wall and Towpath:** This project was recently completed and included rehabilitating portions of the towpath, reconstructing portions of the towpath and retaining wall that had been washed out, and stabilizing the existing historic walls between canal Mile 85 and Mile 88. Approximately 1 mile of the towpath was resurfaced with stone, and approximately 1.5 miles were reconstructed or stabilized to reestablish the walking surface. Intermittent sections of historic masonry walls required reinforcement. Precast concrete retaining walls were constructed in other sections to support elevated walkways and new towpath sections.

**The Great Allegheny Passage (GAP):** This project is presently being completed and is a rail-trails program sponsored by the Allegheny Trail Alliance that offers users the ability to use non-motorized transportation modes to travel from Pittsburgh, Pennsylvania to the District of Columbia. The GAP includes the C&O Canal through Hancock, Maryland.

**Invasive Species Management:** Invasive plant species are currently being managed at C&O Canal NHP, including the Hancock area. This management technique includes removing invasive non-native plant species, the majority of which are aggressive and have been introduced by human activity (such as for groundcover, or ornamental plants that "escape cultivation," or by accident). Non-native species disrupt natural ecological processes by crowding out and replacing native plants and animals through competition for space, light, and water, and by creating new habitat conditions inhospitable to natives. At C&O Canal NHP, non-native plants are the most significant immediate threat to park natural resources and are a particular problem because of the competition they present to the very large number of state rare, threatened, and endangered plant species (NPS 2011d). The park is focusing efforts to reduce non-native

plants in the Hancock Area such as Japanese knotweed (*Fallopia japonica*), as well as the Potomac Gorge area of the park where non-native species such as mimosa (*Albizia* sp.), Japanese stiltgrass (*Microstegium vimineum*), and Japanese honeysuckle (*Lonicera japonica*) threaten to carpet large areas of park land (NPS 2011d).

**Extension of the Western Maryland Rail Trail:** NPS evaluated the proposed extension of the Western Maryland Rail Trail from Pearre Station, near the C&O Canal Lock 56, to the public access parking lot for the C&O Canal NHP Paw Paw Tunnel near Paw Paw, West Virginia. The purpose of the project is to support the park's mission, provide visitors with additional recreational and interpretative experiences, and provide for connectivity to the larger trail system in the region. The project includes the construction of a multi-use asphalt trail that would be suitable for a variety of non-motorized activities such as hiking and bicycling. The trail surface would range from 8 to 10 feet in width with 2-foot wide gravel shoulders. Improvements to existing bridges include replacing the bridge decking to accommodate the multiuse trail surface and installing safety rails. Due to the closure of the Indigo Tunnel, bridge structures would be constructed to bypass the tunnel so that the trail would span the C&O Canal and connect to the canal towpath. Other project components include the construction of a new parking area in Little Orleans near Fifteen Mile Creek, the expansion of the C&O Canal NHP/Paw Paw Tunnel public access parking area, designated road crossings, and various trail amenities.

## **4.2 Natural Resources**

This section discusses the impacts of the alternatives, including the no action alternative, on soils, floodplains, wetlands, vegetation, and special status species. Only those project components that would cause beneficial or adverse impacts for the specific resource are discussed. It should be assumed that no impacts would occur on the resource from project components not mentioned.

### **4.2.1 Soils**

#### ***Methodology and Assumptions***

Potential impacts were based on the extent of disturbance to soils, including natural undisturbed soils, the potential for soil erosion resulting from disturbance, and limitations associated with the soils. Analyses of possible impacts on soils were based upon on-site inspection of the resource in the project area, review of existing literature and maps, information provided by NPS and other agencies, and professional judgment.

#### ***Impact Thresholds***

The following thresholds were used to determine the magnitude of impacts on soils:

*Negligible* – Soils would be impacted below or at the lower levels of detection. Any impacts on soils would be slight.

*Minor* – Impacts to soils would be detectable and would slightly change soil characteristics in a relatively small area but the change would not appreciably alter the potential for erosion. Mitigation would be needed to offset adverse impacts. Mitigation measures would be relatively simple to implement and would likely be successful.

*Moderate* – Impacts to soils would be readily apparent and would appreciably change soil characteristics over a relatively large area. The potential for erosion to remove small quantities of additional soil would increase or decrease. Mitigation measures would be necessary to offset adverse impacts and would likely be successful.



*Major* – Impacts to soils would be readily apparent and substantially change the character of the soils over a large area in or outside of the park. There would be a strong likelihood that the potential for erosion to remove large quantities of additional soil would increase or decrease. Extensive mitigation measures would be necessary to offset adverse impacts, and their success would not be guaranteed.

*Duration* – Short-term impacts occur during the construction phase of the alternative; long-term impacts occur during and beyond implementation of the alternative.

### ***Alternative 1- No Action Alternative***

There would be no excavation of soils or rock, placement of fill, or removal of vegetation as a result of this alternative. There would be no effect on soils since soils would not be disturbed, and the continued visitor use of the existing facilities is not expected to result in new impacts on soils under existing management practices.

***Cumulative Impacts:*** The no action alternative would not adversely affect soils, so this alternative would not contribute to the cumulative impacts on soils from the projects listed above.

***Conclusion:*** Overall, there are no soil impacts as a result of alternative 1 due to the lack of ground-disturbing activities. The lack of impacts on soils as a result of alternative 1 would not contribute to the other present and reasonably foreseeable projects in the project area; therefore, no cumulative impacts on soils would occur.

### ***Alternative 2 - Preferred Alternative***

Under alternative 2, the Bank Barn ruins would be preserved and stabilized, the Bowles House would be rehabilitated, and improvements would be made to the picnic areas, access roads, and parking areas. In general, these project components would occur either in or around existing buildings or in areas that have already been disturbed, but some adverse impacts on soils may occur. Disturbances to soil may occur due to the rehabilitation of Bowles Farm, clearing of vegetation to stabilize the Little Warehouse and stone wall, reconstructing the cultural landscape to reflect the 1870s, expanding visitor parking, widening the access road from Route 144 into the park, providing visitor access along roadways and parking lots, moving the maintenance compound, and improvements to the parking area at Little Tonoloway Picnic Area/Boat Ramp. Adverse impacts on soils would also occur from the restoration and operation of Locks 51 and 52, restoration and hardening of the Tonoloway Aqueduct, installation of the new pedestrian bridge, the construction of a new maintenance road, restoring the bypass flume and waste weirs, and installing the boat dock at the Bowles property. Although detailed project designs are not yet available to determine exact acreage, impacts from the above-mentioned projects are expected to be small but detectable. Most impacts on soil would be construction-related, including temporary compaction, exposure, disturbance, and modification of the structure of soils through the use of heavy equipment. Therefore, the project components described above would have a short-term minor adverse impact on soils from temporary construction activities. Although the proposed parking lot expansions may increase the footprint of the parking areas, the use of permeable materials would decrease the opportunity for storm water runoff and erosion from parking areas in the long term. The widening of the access road from Route 144 into the park would have long-term minor adverse effects on soil due to a small increase in impervious surface and the permanent compaction of soils.

Alternative 2 also includes establishing a walk-in campground within the existing maintenance compound. The use of the campground may contribute to soil compaction and erosion in the long-term; however, impacts would be negligible since the maintenance compound area has been previously

disturbed resulting in soil compaction. In addition, as a result of the improvements to the Hancock area, visitor use is expected to increase. Long-term minor adverse impacts on soils would occur from the increase in both vehicle and foot traffic from visitors.

Under alternative 2, the canal prism would be restored and rewatered at Mile 124.10 near the existing pedestrian bridge and downstream through Lock 51 at Mile 122.59. This activity would disturb approximately 11.3 acres of soil within the canal that would be excavated as a result of restoring the canal prism; a new clay liner would be installed and the canal would be rewatered. As a result of excavating and rewatering the canal, the terrestrial/wetland soil within the canal would be removed. Impacts would be measureable or perceptible and would cause a change in the resource that would be readily apparent within the canal. Permanent loss of soil and functions such as filtration of ground water, holding and providing nutrients necessary for plant growth, and providing habitat for different organisms and microorganisms within the canal prism would be a long-term minor adverse impacts within the canal prism. To minimize the loss of soil that is excavated, the material would be used at the wetland restoration site at the Canal Farm if feasible. Soil specifications would be developed for the soil used as fill at the restoration site to include wetland soil characteristics compatible with the existing wetland soils at the restoration site. Disturbance to existing soils at the restoration site is expected to be minimal from the placement of fill soil on top of soils in the existing drainage ditch. Soil functions at the restoration site would be reestablished that reflect the original hydrologic condition of the site.

Additional localized minor adverse impacts on soils could result if some sections of the canal embankment need to be rebuilt to adequately retain water. Long-term minor impacts would also result from an increase in visitor use of the Hancock area. The improvements to the area are expected to increase visitation, which would intensify soil compaction from visitor foot traffic and vehicles. A slight change in soil characteristics could occur from an increase in visitor activity at the site.

Alternative 2 would include the restoration of 4.6 acres of wetlands at the Canal Farm ditch site located at Mile 43 within the park, to compensate for the loss of wetlands from restoring and rewatering the canal from Miles 122.12 to 124.59. The ditch would be filled in with soil to eliminate the ground water drain. The area would also be revegetated with native wetland species. Impacts to soils would be beneficial, as filling the ditch and revegetating the area would stabilize soils.

Adverse impacts on soils would be partially mitigated through the use of BMPs such as silt fencing to prevent and control soil erosion; construction activities would adhere to an approved erosion and sediment control plan, including reseeding areas to stabilize the soil. BMPs would result in partially offsetting long-term impacts. Overall, short-term minor adverse impacts during construction and long term minor adverse impacts on soils from alternative 2 would be expected. Beneficial impacts would occur to the Canal Farm ditch from the restoration.

**Cumulative Impacts:** Soils would be affected by the restoration of canal operations at Williamsport; the rehabilitation, reconstruction, and stabilization of the historic stone wall and towpath at Big Slackwater; and upgrades to the Sharpsburg water intake. These projects would include the removal of soils creating short and long-term minor adverse impacts on soils. When the long-term minor adverse impacts on soils as a result of alternative 2 are combined with these projects, overall long-term minor adverse cumulative impacts would be expected, with alternative 2 having a small but appreciable contribution.

**Conclusion:** Overall, short- and long-term minor adverse impacts would occur to soils as a result of alternative 2 due to construction-related and ground-disturbing activities (11.3 acres of soil impacts from canal activities) that would result in soil disturbance. To minimize the loss of soil that is excavated, the material would be used at the wetland restoration site at the Canal Farm if feasible or elsewhere in the park. Beneficial impacts would occur to the Canal Farm ditch from the restoration. When the impacts on

soils as a result of alternative 2 are combined with other present and reasonably foreseeable projects, long-term minor adverse cumulative impacts would be expected to soils.

### ***Alternative 3***

Alternative 3 includes many of the same project components as alternative 2 and impacts on soils would be similar. Short-term minor adverse impacts from soil disturbance would occur during the construction period due to the preservation/stabilization of the Bank Barn ruins, clearing of vegetation to stabilize the Little Warehouse and stone wall, reconstruction of the cultural landscape, expansion of visitor parking, provision of visitor access along roadways and parking lots, widening of the access road from Route 144 into the park, movement of the maintenance compound, establishment of a campground within the maintenance compound, and improvements to the parking area at Little Tonoloway Picnic Area/Boat Ramp. Parking lot expansions and widening of the access road would also create long-term minor adverse impacts on soil due to a small increase in impervious surface and the permanent compaction of soils. In addition, like alternative 2, short-term minor adverse impacts would also occur from the restoration and operation of Locks 51 and 52, restoration and hardening of the Tonoloway Aqueduct, installation of the new pedestrian bridge, construction of a new maintenance road, restoration of the bypass flume and waste weirs, and installation of the new water intake. The impacts on soils from the projects mentioned above are expected to be minimal because the area disturbed would be small.

Alternative 3 involves the partial rewatering of the canal. The portion of the canal between Lock 51 and upstream of the Tonoloway Aqueduct (Mile 122.59 – 123) would be rewatered. This activity would disturb approximately 0.7 acres of soil within the canal that would be excavated as a result of restoring the canal prism; a new clay liner would be installed and the canal would be rewatered. Impacts to soils would be similar to those of alternative 2, but much less total area would be affected. Impacts would result from the removal of soil from the canal. Impacts would be measureable or perceptible but the overall viability of the resource would not change. To minimize the loss of soil, the excavated material would be used elsewhere in the park if suitable. Impacts from the rewatering of the canal would be long-term minor and adverse.

Adverse impacts on soils would be partially mitigated through the use of BMPs such as silt fencing to prevent and control soil erosion. Construction activities would adhere to an approved erosion and sediment control plan, including reseeding areas to stabilize the soil. BMPs would result in partially offsetting long-term impacts. Overall, impacts on soils as a result if the project components for alternative 3 would be short-term minor and adverse during the construction period and long-term minor and adverse following project implementation.

***Cumulative Impacts:*** Soils would be affected by three projects in the area: the restoration of canal operations at Williamsport; the rehabilitation, reconstruction, and stabilization of the historic stone wall and towpath at Big Slackwater; and upgrades to the Sharpsburg water intake. Therefore, cumulative impacts from these projects would be mostly construction-related or beneficial and would result in long-term negligible impacts on soils. When the long-term minor adverse impacts on soils as a result of alternative 3 are combined with these projects, overall long-term minor adverse cumulative impacts would be expected, with alternative 3 having a small but appreciable contribution.

***Conclusion:*** Overall, short-term minor adverse impacts and long-term minor adverse impacts would occur to soils as a result of alternative 3; due to construction-related and ground-disturbing activities (0.7 acres of soil impacts from canal activities) that would result in soil disturbance. To minimize the loss of soil, excavated material would be used elsewhere in the park if suitable. When the impacts on soils as a

result of alternative 3 are combined with other present and reasonably foreseeable projects, long-term, minor, adverse cumulative impacts would be expected to soils.

#### ***Alternative 4***

Similar to alternatives 2 and 3, short-term minor adverse impacts from soil disturbance would occur during the construction period due to the preservation and stabilization of the Bank Barn ruins, clearing of vegetation to stabilize the Little Warehouse and stone wall, reconstruction of the cultural landscape, expansion of visitor parking, provision of visitor access along roadways and parking lots, widening of the access road from Route 144 into the park, movement of the maintenance compound, establishment of picnic areas, and improvements to the parking area at Little Tonoloway Picnic Area/Boat Ramp. Parking lot expansions and widening of the access road would also create long-term minor adverse impacts on soil due to a small increase in impervious surface and the permanent compaction of soils. Alternative 4 also includes minimal preservation of Locks 51 and 52. Impacts from this project component would be negligible because impacts on soils would be below or at the lower levels of detection and the area affected is very small.

As a result of the improvements to the Hancock area, visitor use is expected to increase slightly and negligible impacts on soils would occur. Impacts would result from an increase in both vehicle and foot traffic from visitors; however, impacts would be less than those resulting from alternatives 2 and 3.

Adverse impacts on soils would be partially mitigated through the use of BMPs, such as silt fencing to prevent and control soil erosion. Construction activities would adhere to an approved erosion and sediment control plan, including reseeding areas to stabilize the soil. BMPs would result in partially offsetting long-term impacts. Overall, impacts on soils as a result if the project components for alternative 4 would be short-term minor and adverse during the construction period and long-term negligible to minor and adverse following project implementation.

***Cumulative Impacts:*** Similar to alternatives 2 and 3, soils could be affected by three projects in the area: the restoration of canal operations at Williamsport; the rehabilitation, reconstruction, and stabilization of the historic stone wall and towpath at Big Slackwater; and upgrades to the Sharpsburg water intake. Therefore, cumulative impacts from these projects would be mostly construction-related or beneficial and would result in long-term negligible impacts on soils. When the long-term negligible to minor adverse impacts on soils as a result of alternative 4 are combined with the present and reasonably foreseeable projects, overall long-term negligible cumulative impacts would be expected.

***Conclusion:*** Overall, short-term minor adverse impacts and negligible to long-term minor adverse impacts would occur to soils as a result of alternative 4, due to construction-related and ground-disturbing activities that would result in very little soil disturbance. When the long-term negligible to minor adverse impacts on soils as a result of alternative 4 are combined with other present and reasonably foreseeable projects, long-term negligible cumulative impacts would be expected on soils.

### **4.2.2 Floodplains**

#### ***Methodology and Assumptions***

According to Director's Order 77-2, *Floodplain Management*, NPS policy is to preserve floodplain values and avoid impacts associated with modification of the floodplain. The location of the 100-year floodplain in the C&O Canal NHP was analyzed using Federal Emergency Management Agency flood insurance rate mapping. To determine impacts, the scope of the proposed actions within the floodplain was considered, and the area of proposed ground disturbance in the floodplain was determined. Predictions of



short-term and long-term impacts were based on an assessment of floodplain functions and values, professional judgment, and similar projects.

### ***Impact Thresholds***

The following thresholds were used to determine the magnitude of impacts on floodplains:

*Negligible* – There would be no measurable change in the values and functions of a floodplain, or its ability to convey floodwaters. The project would not contribute to flooding.

*Minor* – Changes in the values and functions of a floodplain, or its ability to convey floodwaters, would be detectable and local, although the changes may not be measurable. The project would not contribute to flooding. No mitigation would be needed.

*Moderate* – Changes in the values and functions of a floodplain, or its ability to convey floodwaters, would be measurable and local. The project could contribute to flooding. Mitigation measures would be necessary to offset adverse impacts and would likely be successful.

*Major* – Changes in the values and functions of a floodplain, or its ability to convey floodwaters, would be measurable and widespread. The project would contribute to flooding. Mitigation measures necessary to offset adverse impacts would be needed, extensive, and their success would not be guaranteed.

*Duration* – Short-term impacts occur during the construction phase of the alternative; long-term impacts occur during and beyond implementation of the alternative.

### ***Alternative 1- No Action Alternative***

Under the no action alternative, construction activities at the park would not be undertaken, and the rewatering of the canal would not occur. The maintenance compound would remain in the current location at Bowles Farm, within the floodplain area. The maintenance compound houses NPS vehicles, such as mowing tractors and other large vehicles. Currently, the maintenance shop is having a localized effect on the conveyance of floodwaters but is not contributing to flooding. Flooding may cause oil and grease as well as other pollutants to runoff during storm events through the floodplain and into adjacent wetland areas. As a result, a long-term minor adverse impact on floodplains would occur under the no action alternative due to the current location of the maintenance shop. Impacts would be perceptible but the overall viability of the floodplain would not be affected.

***Cumulative Impacts:*** Floodplains would be affected by the rehabilitation, reconstruction, and stabilization of the historic stone wall and towpath at Big Slackwater and the extension of the WMRT. These projects would have a short-term and long-term adverse impact on floodplains from construction staging, reestablishment of the towpath, and the construction of a new parking area within the 100-year floodplain. As a result, impacts on floodplains would result in long-term negligible to minor adverse impacts, since the area disturbed is very small (0.75 acre) and impacts on the floodplain would be barely perceptible. When the long-term minor adverse impacts on floodplains as a result of alternative 1 are combined with these projects, overall long-term minor adverse cumulative impacts would be expected.

***Conclusion:*** A long-term minor adverse impact on floodplains would occur under the no action alternative, and overall long-term minor adverse cumulative impacts would be expected as well.

***Alternatives 2 (Preferred Alternative)***

Under alternative 2, most of the project components are located within the 100-year floodplain. The addition of new structures within the floodplain, such as the parking lots, picnic areas, and campgrounds, would create long-term minor 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. Short-term minor adverse impacts on the floodplain would occur during construction activities associated with the preservation and stabilization of the Bank Barn, rehabilitation of the Bowles House, other visitor improvements, and canal operations.

The maintenance compound would be relocated and visitor parking would be expanded. Since the maintenance compound often floods, moving the maintenance compound outside of the floodplain would eliminate oil, grease, and other pollutants from runoff that occurs during storm events through the floodplain and adjacent wetland areas. This would also allow the floodplain to function naturally. Within the floodplain, the existing maintenance compound would then be returned to resemble an 1870s farm setting. Moving the maintenance compound outside of the floodplain would have a long-term beneficial impact on floodplains. The rewatering of the canal under alternative 2 would not result in long-term development or incompatible human activities in the floodplain.

Alternative 2 would include the restoration of 4.6 acres of wetlands at the Canal Farm site located at Mile 43 within the park to compensate for the loss of wetlands from restoring and rewatering the canal from Miles 122.12 to 124.59. The Canal Farm ditch lies within the 100-year floodplain. Restoring the ditch to a more natural habitat would create long-term, beneficial impacts on the floodplains. Creating a wetland area would benefit the functionality of the floodplain.

Overall, impacts on the floodplain would be short-term minor and adverse during the construction period. Following construction, both long-term minor adverse impacts and beneficial impacts on the floodplain would occur. Normally, a SOF for floodplains would be required to mitigate adverse impacts on floodplains. However, preserving and rehabilitating historic structures, whose locations are integral for park interpretation, are exempt from a SOF for floodplains as stated in NPS *Procedural Manual* #77-2: *Floodplain Management*.

***Cumulative Impacts:*** Floodplains could be affected by the Big Slackwater project and WMRT extension, as discussed above for alternative 1 and would result in long-term negligible to minor adverse impacts on the floodplain. When the short- and long-term minor adverse impacts on the floodplain, as well as the beneficial impacts as a result of alternative 2 are combined with the impacts of the cumulative projects, both short- and long-term beneficial and minor adverse cumulative impacts would occur.

***Conclusion:*** Under alternative 2, there would be a short-term minor adverse impact on floodplains during construction activities. Following construction, both long-term minor adverse impacts and beneficial impacts on the floodplain would occur. There would be long-term beneficial impacts on the floodplain from the restoration of the Canal Farm ditch. Both short-term and long-term beneficial and minor adverse cumulative impacts would occur.

***Alternative 3***

Alternative 3 includes many of the same project components as alternative 2, and impacts on the floodplain would be similar. Under alternative 3 there would be long-term minor adverse impacts on flooding characteristics, such as conveyance of flood flows and flooding potential, due to the addition of new structures within the floodplain, such as the parking lots, picnic areas, and campgrounds. Short-term

minor adverse impacts on the floodplain would occur during construction activities associated with the preservation and stabilization of the Bank Barn, rehabilitation of the Bowles House, other visitor improvements, and canal operations. Moving the maintenance compound outside of the floodplain would have a long-term beneficial impact on floodplains. The rewatering of the canal under alternative 3 would not result in long-term development or incompatible human activities in the floodplain.

**Cumulative Impacts:** Floodplains could be affected by the Big Slackwater project and WMRT extension, as discussed above for alternative 1 and would result in long-term negligible to minor adverse impacts on floodplains. When the short- and long-term minor adverse impacts on floodplains as well as the beneficial impacts as a result of alternative 3 are combined with the impacts of the cumulative projects, both short- and long-term beneficial and minor adverse cumulative impacts would occur.

**Conclusion:** Overall, impacts on the floodplain would be short-term minor and adverse during the construction period. Following construction, both long-term minor adverse impacts and beneficial impacts on the floodplain would occur. Normally, a SOF for floodplains would be required to mitigate adverse impacts on floodplains. However, rehabilitating historic structures like the Bank Barn, whose locations are integral for park interpretation, are exempt from a SOF for floodplains as stated in NPS *Procedural Manual #77-2: Floodplain Management*.

#### **Alternative 4**

Impacts to floodplains from alternative 4 would be similar to alternatives 2 and 3. There would be long-term minor adverse impacts on flooding characteristics such as conveyance of flood flows and flooding potential due to the addition of new structures within the floodplain such as the parking lots and picnic areas. Short-term minor adverse impacts on the floodplain would occur during construction activities associated with the preservation and stabilization of the Bank Barn, rehabilitation of the Bowles House, other visitor improvements, and canal operations. Moving the maintenance compound outside of the floodplain would have a long-term beneficial impact on floodplains.

**Cumulative Impacts:** Floodplains could be affected by the Big Slackwater project and WMRT extension, as discussed above for alternative 1 and would result in long-term negligible to minor adverse impacts on floodplains. When the short- and long-term minor adverse impacts on floodplains, as well as the beneficial impacts as a result of alternative 4, are combined with the impacts of the cumulative projects, both short- and long-term beneficial and minor adverse cumulative impacts would occur.

**Conclusion:** Overall, impacts on the floodplain would be short-term minor and adverse during the construction period. Following construction, both long-term minor adverse impacts and beneficial impacts on the floodplain would occur. Normally, a SOF for floodplains would be required to mitigate adverse impacts on floodplains. However, rehabilitating historic structures like the Bank Barn, whose locations are integral for park interpretation, are exempt from a SOF for floodplains as stated in NPS *Procedural Manual #77-2: Floodplain Management*.

### **4.2.3 Wetlands and Submerged Aquatic Vegetation**

#### ***Methodology and Assumptions***

The NPS has adopted a policy of “no net loss” of wetlands. Executive Order 11990, “Protection of Wetlands”, states that federal agencies are to avoid to the extent possible long-term and short-term impacts associated with the destruction and modification of wetlands to avoid direct and indirect support of new construction in wetlands whenever practical alternatives exist. The USACE regulates development in wetland areas pursuant to Section 404 of the Clean Water Act (33 CFR, 320-330). NPS Director’s

Order 77-1: *Wetland Protection and Procedural Manual* provides NPS policies and procedures for complying with Executive Order 11990 as follows:

Actions proposed by NPS that have the potential to have adverse impacts on wetlands will be addressed in an EA or Environmental Impact Statement. If the preferred alternative in an EA or Environmental Impact Statement will result in adverse impacts on wetlands a SOF documenting compliance with this Director's Order and associated Procedural Manual 77-1 will be completed. Actions that may be excepted from the SOF requirement are identified in the Procedural Manual.

Impact analysis and the conclusions for possible impacts on wetlands were based on review of existing literature and studies, information provided by park staff and other agencies, and on-site investigation. Where possible, locations of wetlands were overlain with the proposed actions to determine impacts on wetlands. A SOF has been prepared for this project and can be found in appendix C of this EA.

### ***Impact Thresholds***

The following thresholds were used to determine the magnitude of impacts on wetlands:

*Negligible* – A barely measurable or perceptible change in wetland size, integrity, or continuity could occur.

*Minor* – The impact would be easily measurable or perceptible. A small change in size, integrity or continuity could occur due to effects such as construction related runoff. However, the overall viability of the resource would not be affected.

*Moderate* – The impact would be sufficient to cause an appreciable change in at least one wetland parameter (size, integrity, or continuity) and resource viability could be affected.

*Major* – The action would result in a substantial change in multiple parameters (size, integrity, and continuity) or a loss of large wetland areas. The impact would be substantial and highly noticeable.

*Duration* – Short-term impacts occur during the construction phase of the alternative; long-term impacts occur during and beyond implementation of the alternative.

### ***Alternative 1- No Action Alternative***

There would be no effect on wetlands under this alternative since wetlands would not be disturbed. The continued visitor use of the existing facilities is not expected to result in new impacts on the wetlands under existing management practices.

***Cumulative Impacts:*** The no action alternative would not adversely affect wetlands, so this alternative would not contribute to the impacts on wetlands by the cumulative projects listed above.

***Conclusion:*** Overall, there are no wetland impacts as a result of alternative 1 due to the lack of ground-disturbing activities. Alternative 1 would not contribute to the previously addressed impacts on wetlands; therefore, no cumulative impacts on wetlands are expected.



**Alternative 2 - Preferred Alternative**

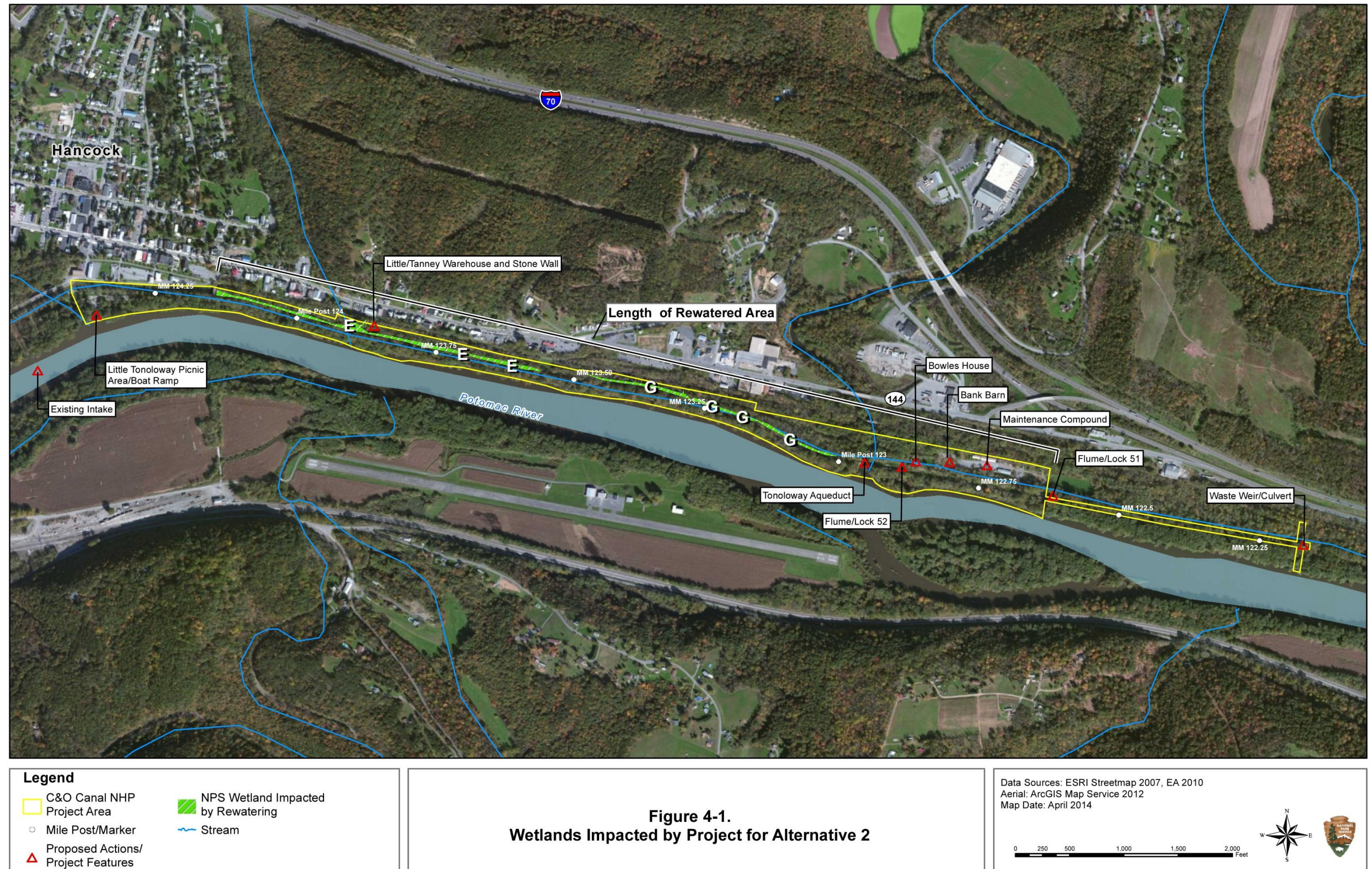
Project components specific to alternative 2 that would adversely affect wetlands include restoring the canal prism, rewatering the canal from Miles 122.59 to 124.10, and updating the town's existing water intake. Total wetland impacts associated with the activities described above are detailed in table 4-2 and figure 4-1. It is important to note that wetland impacts discussed in this section represent the most current approximations at this time; however, this acreage may increase/decrease after final design. Under alternative 2, there would be no impacts on wetlands B, C, D, H, J, or L.

**Table 4-2. Wetland Impacts by Alternative**

Action Alternative	Wetland Name and Type	Project Component Affecting Wetland	Wetland Impacts (acreage)
Alternative 2	Wetland A (PFO1/PEM1)	• water intake structures	< 0.10*
	Wetland B (PFO1)	• no impacts	0
	Wetland C (PFO1)	• no impacts	0
	Wetland D (PFO1)	• no impacts	0
	Wetland E (PFO1)	• restoring canal prism • rewatering canal	1.91
	Wetland G (PFO1)	• restoring canal prism • rewatering canal	1.14
	Wetland H (PFO1)	• no impacts	0
	Wetland J (PFO1)	• no impacts	0
	Wetland L (PEM1/2)	• no impacts	0
<b>TOTAL ALTERNATIVE 2 IMPACTS</b>			<b>3.15*</b>
Alternative 3	Wetland A (PFO1/PEM1)	• water intake and outfall structures	< 0.10*
	Wetland B (PFO1)	• no impacts	0
	Wetland C (PFO1)	• no impacts	0
	Wetland D (PFO1)	• no impacts	0
	Wetland E (PFO1)	• no impacts	0
	Wetland G (PFO1)	• no impacts	0
	Wetland H (PFO1)	• no impacts	0
	Wetland J (PFO1)	• no impacts	0
	Wetland L (PEM1/2)	• no impacts	0
<b>TOTAL ALTERNATIVE 3 IMPACTS</b>			<b>0.10*</b>
Alternative 4	Wetland A (PFO1/PEM1)	• no impacts	0
	Wetland B (PFO1)	• no impacts	0
	Wetland C (PFO1)	• no impacts	0
	Wetland D (PFO1)	• no impacts	0
	Wetland E (PFO1)	• no impacts	0
	Wetland G (PFO1)	• no impacts	0
	Wetland H (PFO1)	• no impacts	0
	Wetland J (PFO1)	• no impacts	0
	Wetland L (PEM1/2)	• no impacts	0
<b>TOTAL ALTERNATIVE 4 IMPACTS</b>			<b>0</b>

\*Wetland impacts on wetland A along the Potomac River are expected. The design plans for these structures are not yet available so the exact acreage of impacts on wetland A cannot be calculated at this time. These impacts cannot be completely discounted because they will not be zero since excavation would occur, but it is sufficient to say that a total of less than 0.10 acres of wetland A would be expected as a result of these activities.







*Page intentionally left blank*

Rewatering of the canal from Mile 122.59 through 124.10 would impact the entire 3.05 acres of wetlands E and G, which are currently within the footprint of the canal prism. The restoration of the canal prism would require the removal of hydrophytic vegetation and other vegetation, along with some excavation of soils. It is estimated that 2,233 trees and saplings would be removed from the rewatering area. Table 4-3 includes the estimated types and numbers of trees that would be removed from the canal prism. A majority (60%) of these trees have a DBH of less than 10 cm; less than 1% were greater than 30cm DBH. The area would remain a wetland, as the water table would be less than 2 meters deep, but would be converted in both form and function from a vegetated and forested palustrine wetland, to a riverine or lacustrine open water wetland. Habitat conversion is considered a wetland impact because most of the wetland functions and values would change (including fish and wildlife productivity and habitat, special status species habitat, vegetation habitat, water purification, and streamflow). Tree removal in the canal prism in the forested wetlands would change wetland functions and values through reduction of the vegetation canopy over these wetlands, which would reduce the biomass and change the species composition of the wetland (Cutlip 1986, cited in Jordan et al. n.d., 153). The reduction in biomass would potentially alter the vegetation and wildlife species that use this wetland. This shift in the vegetation could lessen available resources for wildlife species that depend on the conditions currently found in the wetland. The existing forested wetlands provide habitat for macroinvertebrates, wildlife, floral species, state special status species (the wood turtle and Short's sedge, as described in the "Special status Species" section) and allow for groundwater recharge. Once rewatered, the open water wetland of the canal would provide more habitat for macroinvertebrates and other aquatic species, including the potential for some SAV but would provide less groundwater recharge and no emergent vegetation species. Therefore, measurable changes to the abundance and diversity of wetland vegetation would occur. These areas would continue to function as open-water wetlands, but there would be a reduction in the abundance and diversity of wetland vegetation, which could directly affect use of the area by wildlife and special status species. The conversion of the wetland in the canal prism from vegetated to open water would require joint USACE and Maryland Wetland permits. Impacts as a result of the rewatering the canal would have long-term moderate adverse impacts on wetlands E and G.

**Table 4-3. Types and Number of Trees Estimated in Proposed Rewatering Area**

Common Name	Scientific Name	Total Estimated in 4.5 Acre Rewatering Area
Box elder	<i>Acer negundo</i>	1006
Silver maple	<i>Acer saccharinum</i>	343
Tree of Heaven	<i>Ailanthus altissima</i>	147
Bitternut hickory	<i>Carya cordiformis</i>	12
Common hackberry	<i>Celtis occidentalis</i>	85
Hawthorn sp.	<i>Crataegus spp</i>	12
White ash	<i>Fraxinus americana</i>	12
Green ash	<i>Fraxinus pennsylvanica</i>	355
Black walnut	<i>Juglans nigra</i>	36
Common hoptree	<i>Ptelea trifoliata</i>	12
Black locust	<i>Robinia pseudoacacia</i>	12
American basswood	<i>Tilia americana</i>	12
American elm	<i>Ulmus americana</i>	184



Alternative 2 includes updating the town's existing water intake and pump facility near Mile 124.4. Updating the intake on the Potomac River may require amending the existing water supply and use permit from the state of Maryland. Additional waterway construction permits for disturbance in the Potomac River (which is a water of the United States) may also be needed. The pipe for the intake would be located along the narrow Potomac River shoreline wetland (wetland A), which is subject to NPS procedures for implementing Director's Order 77-1 (NPS 2011c). There is also SAV in the river in this area, with three commonly found SAV species: wild celery (*Apium graveolens*), hydrilla (*Hydrilla* spp.), and water stargrass (*Heteranthera dubia*). Impacts to the SAV and shoreline wetland would depend on construction methods and where and how deep the intake pipe is placed.

The design plans for the intake structure are not yet available so the exact acreage of impacts on wetland A cannot be calculated at this time. This activity would impact wetlands due to excavation in wetland A, which would occur as a result of this project component. These impacts cannot be completely discounted since excavation would occur, but it is sufficient to say that a total of less than 0.10 acres of wetland A would be impacted as a result of the updated intake structure. The updated intake structure would be permanent and may require some excavation activities prior to construction that may be partially located within wetland areas. The updated intake structure is located in a small, discrete location along the Potomac River. Wetland A would continue to function as a shoreline wetland with buffering abilities and the Potomac River would continue to provide hydrological support to wetland A. The pipe for the updated intake located along the Potomac shoreline wetland (wetland A) may require some pipe footers that would be necessary for support within wetland areas.

Mitigation measures would be employed during construction when appropriate to minimize impacts on wetlands and are provided in more detail in appendix C. Additional mitigation for the pipe and intake structure would also include a silt curtain, which would be placed in the river to prevent impacts on the aquatic environment from silt and sediment that might 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 park would keep the limits of the area disturbed by the intake as minimal as possible. Installation of silt curtains immediately downstream of the project area would minimize offsite sedimentation impacts on downstream SAV. SAV is expected to reestablish naturally in all areas except where the permanent pipe structure and filter are placed, which is a very small area.

Overall, the wetland impacts as a result of all components of alternative 2 (3.05 acres + less than 0.10 acres), including the conversion of wetlands from palustrine to open water, would result in a long-term moderate adverse impact, since there would be a change to vegetation and hydrology, which affects the function and value of wetlands. This would cause a change in the resource, including the numerous trees of varying ages within the forested wetland in the canal prism that would be removed and the loss of wetland habitat within the canal that provides habitat for special status species. The canal would however remain characterized as a wetland.

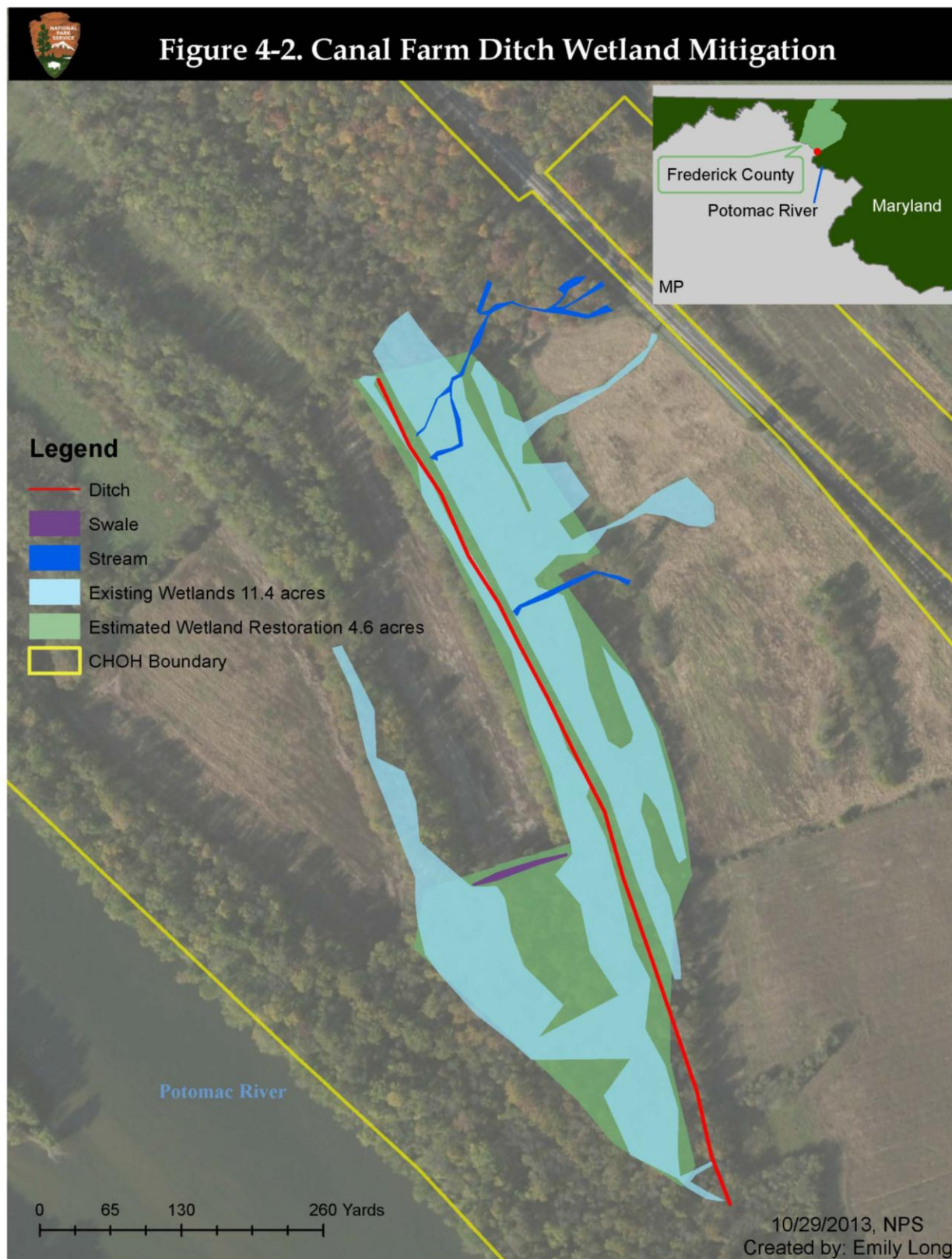
In order to implement the "no net loss of wetlands" policy and the goal of net gain for wetlands, Director's Order 77-1 states that for new actions where impacts on wetlands cannot be avoided, proposals must include plans for compensatory mitigation that restores wetlands on NPS lands at a minimum acreage ratio of 1 to 1 for the preferred alternative. Because alternative 2 is the preferred alternative, mitigation under the NPS Director's Order 77-1 (NPS 2011c) would be required and is discussed in detail in the SOF for wetlands (appendix C). Whenever possible, every effort is made to ensure that the same wetland restoration proposal meets the compensation requirements of both the NPS and the USACE processes to avoid any duplication of effort. 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.

Compensation for the loss of 3.15 acres of wetlands would include the restoration of former forested wetland habitat at the park's Canal Farm, located within the park in the approximate vicinity of Mile 43, Frederick County, Maryland near the confluence of the Monocacy and Potomac Rivers. A drainage ditch was constructed by previous owners of the Canal Farm to increase tillable land for farming. The existing ditch lowers the ground water table and drains the associated forested wetland area. Restoration at the Canal Farm ditch to reestablish the original hydrologic condition would include filling the existing ditch and eliminating the ground water drain; thus, bringing the water table back to a near surface elevation and re-establishing the wetland character. Short segments of the ditch would be left intact to provide linear ponds. The area would then be revegetated with native wetland plant species. Not only would the restoration convert upland on either side of the ditch into wetland and convert marginal wetland into a more functional system, it would reconnect two functional wetland areas that are currently separated by a strip of upland created by the ditch (figure 4-2). This would result in approximately 4.6 acres of wetland restoration. Restoration efforts would have beneficial impacts on wetlands within the Canal Farm area. Alternative 2 would constitute an adverse impact to 3.15 acres of wetlands. It is estimated that 4.6 acres of wetlands would be restored at the Canal Farm ditch wetland mitigation site, thus wetland compensation for this project would occur at a greater than 1:1 ratio.

The loss of forested wetlands within the canal prism in Hancock would result in the loss of a variety of wetland functions, including shrub and tree canopy structure for wildlife habitat, water quality function, and aquatic wildlife habitat function. The restoration of the Canal Farm site could provide functions that would be similar to those lost at the canal prism impact sites. Therefore, the Canal Farm ditch compensation effort would be considered in-kind with the wetland functions being lost at the impact site. NPS would be required to obtain a USACE and MDE Joint Permit for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland. *Procedural Manual #77-1: Wetland Protection* states that compensating for the loss of forested wetlands using restored forested wetlands is appropriate but may require more than one acre of restoration for one acre of impact (NPS 2012). The USACE or MDE 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 (USACE, or MDE) and based on the results of a function and value assessment applied to the impact and compensation sites.

**Cumulative Impacts:** Wetlands could be affected by four projects in the area: the restoration of canal operations at Williamsport; the rehabilitation, reconstruction, and stabilization of the historic stone wall and towpath at Big Slackwater; upgrades to the Sharpsburg water intake; and the WMRT extension. These cumulative projects would result in long-term minor adverse impacts on wetlands. When the long-term moderate adverse impacts on wetlands as a result of alternative 2 are combined with these projects in the project area, long-term moderate adverse cumulative impacts would be expected, but mitigation would be required for all cumulative projects as well as alternative 2 as discussed above.

**Conclusion:** Overall, the wetland impacts as a result of rewatering the canal and updating the existing water intake, including the conversion of wetlands from palustrine to open water, would result in a long-term moderate adverse impact. Wetland impacts within the Canal Farm ditch area would be beneficial from the restoration proposed. It is estimated that 4.6 acres of wetlands would be restored at the Canal Farm ditch wetland mitigation site, thus wetland compensation for this project would occur at a greater than 1:1 ratio. When the long-term moderate adverse impacts on wetlands as a result of alternative 2 are combined with other present and reasonably foreseeable projects in the project area, long-term moderate adverse cumulative impacts would be expected.



### **Alternative 3**

Impacts to wetlands under alternative 3 would occur from installing a new water intake. Installing a new intake to the Potomac River may require amending the existing water supply and use permit from the state of Maryland. Additional waterway construction permits for disturbance in the Potomac River (which is a water of the United States) may also be needed. The pipe for the new intake would be located along the narrow Potomac River shoreline wetland (wetland A), which is subject to NPS procedures for implementing Director's Order 77-1 (NPS 2011c). SAV including wild celery, hydrilla, and water stargrass are also found in the area. Impacts to the SAV and shoreline wetland would depend on construction methods, and placement position of the intake pipe.

The design plans for the intake structure are not yet available so the exact acreage of impacts on wetland A cannot be calculated at this time. This activity would have an impact (less than 0.10 acres) on wetland A as a result of excavation. Wetland A would continue to function as a shoreline wetland with buffering abilities, and the Potomac River would continue to provide hydrological support to wetland A. The pipe for the new intake located along the Potomac shoreline wetland (wetland A) may require some pipe footers that would be necessary for support within wetland areas. Under alternative 3, there are no impacts on wetlands B, C, D, E, G, H, J, or L.

Mitigation measures and BMPs, as described in appendix 2 of Director's Order 77-1, would be employed during construction when appropriate to minimize impacts on wetlands. These BMPs would be similar to those described above for alternative 2.

Overall, the wetland impacts as a result of all components of alternative 3 (less than 0.10 acres) would result in a long-term negligible adverse impact. It is possible that a Joint Federal/State Application for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland may be required as well as applicable permits obtained from the MDE and the USACE prior to initiating any construction activities. All regulated activities within waters of the U.S. and waters of the state, including the 100-year floodplain and jurisdictional wetlands, would be conducted in accordance with permit conditions and *Maryland's Waterway Construction Guidelines* (MDE 2000).

**Cumulative Impacts:** Wetlands could be affected by four projects in the area: the restoration of canal operations at Williamsport; the rehabilitation, reconstruction, and stabilization of the historic stone wall and towpath at Big Slackwater; upgrades to the Sharpsburg water intake, and the WMRT extension. These cumulative projects would result in long-term minor adverse impacts on wetlands. When the long-term negligible adverse impacts on wetlands as a result of alternative 3 are combined with these projects in the project area, overall long-term minor adverse cumulative impacts would be expected.

**Conclusion:** Overall, the wetland impacts as a result of all components of alternative 3 would result in a long-term negligible adverse impact from installing a new water intake. When the long-term negligible adverse impacts on wetlands as a result of alternative 3 are combined with other present and reasonably foreseeable projects in the project area, long-term minor adverse cumulative impacts would be expected.

### **Alternative 4**

Project components associated with alternative 4 would have no impact on wetlands A through L.

**Cumulative Impacts:** Similar to alternatives 2 and 3, wetlands could be affected by four projects in the area as previously described. These cumulative projects would result in long-term, minor, adverse impacts on wetlands. When the lack of impacts on wetlands as a result of alternative 4 are combined with these projects in the project area, overall long-term minor adverse cumulative impacts would be expected.



**Conclusion:** There would be no impacts on wetlands associated with the project components under alternative 4. When combined with other present and reasonably foreseeable projects in the project area, long-term minor adverse cumulative impacts would be expected.

#### **4.2.4 Vegetation**

##### ***Methodology and Assumptions***

In order to evaluate impacts on vegetation, vegetative species composition within the project area was considered. Types of trees, shrubs, and herbaceous plants potentially impacted by the proposed project were determined during a site assessment. Intensity levels of potential impacts were determined based on the anticipated extent of vegetation removal needed for project construction. Impacts to sensitive vegetation species are analyzed in the “Special status Species” section of this document.

##### ***Impact Thresholds***

The following thresholds were used to determine the magnitude of impacts on vegetation:

*Negligible* – Some individual native plants could be affected as a result of the alternative, but there would be no effect on native species populations.

*Minor* – The alternative could affect the abundance or distribution of some individual native plants in a localized area, but would not affect the viability of local populations or overall community size, structure, or composition. Mitigation would be needed to offset adverse impacts and would be relatively simple to implement and would likely be successful.

*Moderate* – The alternative would affect the abundance or distribution of local populations, and localized changes to community size, structure, or composition and ecological processes would occur. Mitigation to offset adverse impacts could be extensive and would likely be successful.

*Major* – The alternative would have a considerable effect on the abundance or distribution of local or regional native plant populations and community size, structure, or composition would be highly altered over a relatively large area. Mitigation measures to offset the adverse impacts would be required, extensive, and success of the mitigation measures would not be guaranteed.

*Duration* – Short-term impacts occur during the construction phase of the alternative; long-term impacts occur during and beyond implementation of the alternative.

##### ***Alternative 1- No Action Alternative***

There would be no excavation of soils or rock, placement of fill, or removal of vegetation as a result of this alternative; invasive plant species removal at the park would continue under the no action alternative. There would be no effect on vegetation under this alternative, since vegetation would not be disturbed, and the continued visitor use of the existing facilities is not expected to result in new impacts on vegetation under existing management practices.

**Cumulative Impacts:** The no action alternative would not adversely affect vegetation, so this alternative would not contribute to the vegetation impacted by the cumulative projects listed above.

**Conclusion:** Overall, there are no vegetation impacts as a result of alternative 1 due to the lack of ground-disturbing activities; therefore, no cumulative impacts on vegetation would be expected under alternative 1.

### ***Alternative 2 - Preferred Alternative***

Long-term negligible impacts on vegetation would occur due to the preservation and stabilization of the Bank Barn, rehabilitation of Bowles Farm, clearing of vegetation to stabilize the Little Warehouse and stone wall, reconstruction of the cultural landscape to reflect the 1870s, expansion of visitor parking, widening of the access road from Route 144 into the park, and improvements to the parking area at the Little Tonoloway Picnic Area/Boat Ramp. Some vegetation removal would be required, but impacts would be negligible since these areas are adjacent to existing structures or are in areas that have been previously disturbed and are very small in size. Adverse impacts on vegetation would also occur from the restoration and operation of Locks 51 and 52, restoration and hardening of the Tonoloway Aqueduct, installation of the new pedestrian bridge, construction of a new maintenance road, restoration of the bypass flume and waste weirs, update of the town's existing water intake, installation of the boat dock at the Bowles property, and establishment of a walk-in campground within the maintenance compound. Impacts from the projects mentioned above are expected to be minimal because each area disturbed would be very small. Restoring and rewatering the canal prism at Mile 124.10 near the existing pedestrian bridge downstream through Lock 51 at Mile 122.59 would disturb approximately 2.5 acres of existing vegetation within the canal that varies from mowed/maintained grasses to mature tree specimens. The project area within C&O Canal NHP was previously disturbed due to the original excavation of the canal. Although this disturbance occurred in the 1830s, the canal has generally been left fallow since 1924 and the canal has become vegetated. As a result, there are understory trees and shrubs as well as numerous mature canopy species (that vary from 75-200 feet tall, 18-36 inch DBH) such as box elder, ash trees, elm species, and maples species that occur within the canal and would be removed as a result of restoring the canal prism, installing a clay liner, and rewatering the canal. Therefore, these canopy species, which generally occur in forested wetland areas, could possibly be a maximum of 87 years old within the existing canal. A majority (60%) of these trees have a DBH of less than 10 cm; less than 1% were greater than 30 cm DBH. In addition to mature tree specimens, the existing vegetation within the canal provides habitat for vegetation species, specifically the special status species known as Short's sedge, as described in the "Special status Species" section. Removal of understory and shrub species as well as some mature canopy tree specimens would disturb vegetation, reduce habitat for special status species, and convert a forested habitat to an open water habitat. These impacts would be measureable or perceptible and cause a change in the resource that would be readily apparent. Therefore, the vegetation impacts as a result of alternative 2 (2.5 acres of vegetation removed) would result in a long-term moderate adverse impact.

Adverse impacts on vegetation would be partially mitigated through the use of BMPs such as silt fencing to prevent and control soil erosion. Construction activities would adhere to an approved erosion and sediment control plan, including reseeding areas to stabilize the soil, initiate new vegetation growth, and prevent the spread of invasive plant species.

Alternative 2 would include restoration of 4.6 acres of wetlands at the Canal Farm ditch site located at Mile 43 within the park, to compensate for the loss of wetlands from restoring and rewatering the canal from Miles 122.12-124.59. The ditch would be filled in with soil to eliminate the groundwater drain. Beneficial impacts on vegetation are expected from the addition of native wetland plant species proposed to be planted within the restored area.

**Cumulative Impacts:** Vegetation could be affected by five projects in the area: invasive species management at the park; the restoration of canal operations at Williamsport; the rehabilitation, reconstruction, and stabilization of the historic stone wall and towpath at Big Slackwater; upgrades to the

Sharpsburg water intake; and the WMRT extension. These projects, with the exception of invasive species management, have required or would require the removal of vegetation as a result of construction activities. Invasive species removal at the park has a beneficial impact on native vegetation because controlling invasive plants reduces competition to native plant species. Although this program would protect native vegetation, the beneficial impacts would not completely outweigh the adverse impacts from the above-mentioned projects. These cumulative projects would result in long-term negligible adverse impacts on vegetation. When the long-term moderate adverse impacts on vegetation as a result of alternative 2 are combined with these projects, overall long-term moderate adverse cumulative impacts would be expected, with alternative 2 having an appreciable contribution.

**Conclusion:** Overall, long-term moderate adverse impacts would occur to vegetation as a result of alternative 2 (2.5 acres of vegetation removed, including impacts on a special status plant species) due to ground-disturbing activities that would result in vegetation removal. Beneficial impacts from the addition of native wetland species at the Canal Farm ditch would occur. When the long-term moderate adverse impacts on vegetation as a result of alternative 2 are combined with other present and reasonably foreseeable projects, long-term moderate adverse cumulative impacts would be expected.

### **Alternative 3**

Long-term negligible impacts on vegetation would occur due to the preservation and stabilization of the Bank Barn ruins, rehabilitation of Bowles Farm, clearing of vegetation to stabilize the Little Warehouse and stone wall, reconstruction of the cultural landscape to reflect the 1870s, expansion of visitor parking, widening of the access road from Route 144 into the park, and improvements to the parking area at the Little Tonoloway Picnic Area/Boat Ramp as described in alternative 2. In addition, alternative 3 would disturb vegetation due to the restoration and operation of Locks 51 and 52, restoration and hardening of the Tonoloway Aqueduct, installation of the new pedestrian bridge, construction of a new maintenance road, restoration of the bypass flume and waste weirs, installation of the new water intake, and establishment of a walk-in campground within the maintenance compound. The impacts from the projects mentioned above are expected to be minimal because the area disturbed would be very small. Alternative 3 involves the partial rewatering of the canal. The portion of the canal between Lock 51 and upstream of the Tonoloway Aqueduct (Mile 122.59 – 123) would be rewatered, which would disturb approximately 0.7 acres of existing vegetation within the canal that varies from mowed/maintained grasses to mature tree specimens. As stated above for alternative 2, the canal has generally been left fallow since 1924 and has become vegetated with understory trees and shrubs as well as numerous mature canopy species that would be removed as a result of restoring the canal prism, installing a clay liner, and rewatering the canal. The special status species Short's sedge, as described in the "Special status Species" section, would not be affected under alternative 3. Removal of understory and shrub species as well as some mature canopy tree specimens would disturb vegetation, but the total vegetation (0.7 acres of vegetation removed) removed under alternative 3 as compared to alternative 2 (2.5 acres of vegetation removed) is less. Therefore, the vegetation impacts as a result of alternative 3 would result in a long-term minor adverse impact because impacts would be measureable or perceptible, but the overall viability of the resource would not be affected. Adverse impacts on vegetation would be partially mitigated through the use of BMPs such as silt fencing to prevent and control soil erosion; construction activities would adhere to an approved erosion and sediment control plan, including reseeding areas to stabilize the soil, initiate new vegetation growth, and prevent the spread of invasive plant species.

**Cumulative Impacts:** Similar to alternative 2, vegetation could be affected by five projects in the area: invasive species management at the park; the restoration of canal operations at Williamsport; the rehabilitation, reconstruction, and stabilization of the historic stone wall and towpath at Big Slackwater; upgrades to the Sharpsburg water intake; and the WMRT extension. These cumulative projects would result in long-term negligible impacts on vegetation. When the long-term minor adverse impacts on

vegetation, as a result of alternative 3, are combined with these projects overall long-term negligible to minor adverse cumulative impacts would be expected, with alternative 3 having a small but appreciable contribution.

**Conclusion:** Overall, the vegetation impacts as a result of all components of alternative 3 (0.7 acres of vegetation removed but no impacts on special status plant species) would result in a long-term minor adverse impact. When the long-term minor adverse impacts on vegetation as a result of alternative 3 are combined with other present and reasonably foreseeable projects in the project area, long-term negligible to minor adverse cumulative impacts would be expected.

#### ***Alternative 4***

Long-term negligible impacts on vegetation would occur due to the preservation and stabilization of the Bank Barn ruins, rehabilitation of Bowles Farm, clearing of vegetation to stabilize the Little Warehouse and stone wall, reconstruction of the cultural landscape to reflect the 1870s, expansion of visitor parking, widening of the access road from Route 144 into the park, and improvements to the parking area at the Little Tonoloway Picnic Area/Boat Ramp as described in alternative 2. The impacts from the project components mentioned above are expected to be minimal because the area disturbed would be very small. Therefore, the vegetation impacts as a result of alternative 4 would result in a long-term negligible impact.

**Cumulative Impacts:** Similar to alternatives 2 and 3, vegetation could be affected by five projects in the area as previously discussed. These cumulative projects would result in long-term negligible impacts on vegetation. When the long-term negligible impacts on vegetation as a result of alternative 4 are combined with these projects, overall long-term negligible cumulative impacts would be expected, with alternative 4 having a negligible contribution.

**Conclusion:** Overall, the vegetation impacts as a result of all components of alternative 4 would result in a long-term negligible impact. When the long-term negligible adverse impacts on vegetation as a result of alternative 4 are combined with other present and reasonably foreseeable projects in the project area, long-term negligible adverse cumulative impacts would be expected.

#### **4.2.5 Special status Species**

##### ***Methodology and Assumptions***

In order to evaluate potential impacts on rare, threatened, and endangered species that have been documented or have the potential to occur within the proposed project area, special status plant surveys were conducted. In addition, special status species were identified through coordination with USFWS and the MDNR. The primary means of evaluation for special status species was the documented occurrence during surveys, the habitat preference of the federal- or state-listed species, and the availability of the preferred habitats within the project area and surrounding land.

##### ***Impact Thresholds***

The following thresholds were used to determine the magnitude of impacts on special status species:

*Negligible* – No special status species would be affected, or the action would affect an individual or its habitat but the small change would not be of any measurable or perceptible consequence to the individual or its population.



*Minor* – The action would result in detectable impacts on an individual(s), their habitat, or to the natural processes sustaining them, but the effects would be limited and localized. Sufficient habitat would remain functional to maintain the viability of the population. Mitigation measures, if needed to offset adverse effects, would be simple and successful.

*Moderate* – The action would result in detectable impacts on individuals or a relatively small proportion of the population, habitat, or the natural processes sustaining them over a large area. Impacts would have limited changes to population demographics (e.g., population numbers, structure) but would not affect the viability of the population. Mitigation measures, if needed to offset adverse effects, could be extensive, but would likely be successful.

*Major* – Populations, habitat, or the natural processes sustaining them would be measurably affected such that the viability of the population would likely be affected. Extensive mitigation measures would be needed to offset any adverse effects, and their success would not be guaranteed.

*Duration* – Short-term impacts occur during the construction phase of the alternative; long-term impacts occur during and beyond implementation of the alternative.

#### ***Alternative 1- No Action Alternative***

There would be no excavation of soils or rock, placement of fill, or removal of vegetation as a result of this alternative. There would be no effect on special status plant or wildlife species under this alternative, since soil would not be excavated and vegetation would not be disturbed, and the continued visitor use of the existing facilities is not expected to result in new impacts on special status species under existing management practices.

***Cumulative Impacts:*** Special status species would not be affected by any of the projects in the area. Therefore, cumulative impacts from nearby projects would result in no impacts on special status species. Because the no action alternative would not adversely affect special status species, this alternative would not contribute to the previously addressed impacts on these species from the cumulative projects; no cumulative impacts on special status species would be expected.

***Conclusion:*** Overall, there are no expected special status plant or wildlife species impacts as a result of alternative 1, due to the lack of ground-disturbing activities and vegetation removal in habitat that would support these species. No cumulative impacts on special status species would be expected.

#### ***Alternative 2 - Preferred Alternative***

Under alternative 2, the canal prism would be restored and rewatered at Mile 124.10 near the existing pedestrian bridge and downstream through Lock 51 at Mile 122.59, which would disturb approximately 2.5 acres of existing vegetation within the canal that supports special status species. During the seasonal surveys for special status species in June, July, and September of 2010, 40 state watchlist plant species, common hoptrees, were found along the edge of the existing canal. In June of 2010, 10 state endangered plant species, Short's sedges, were found in wetland habitat at the bottom of the canal prism of wetland G. In addition, 10 wood turtles were observed in wetland areas within the historic C&O Canal. It is possible that some trees, including the hoptree, may be avoided during construction and vegetation removal activities, but rewatering activities would require removing the 10 Short's sedge plants from the bottom of the canal. Because this special status plant population cannot be avoided under alternative 2, consultations with appropriate state agencies would be required prior to construction and rewatering. These consultations would determine appropriate mitigation measures for any populations affected by the

proposed project. Appropriate measures could include the creation of offsite populations through seed collection or transplanting, preservation, and enhancement of existing populations, or restoration/creation of suitable habitat in sufficient quantities to compensate for the impact. Translocation includes digging up plants and moving them to appropriate areas of the corridor that would not be affected by the proposed construction activities. To determine an appropriate area to transplant the 10 Short's sedge plants occurring within the project area, seeds would be collected from each plant at least one year prior to construction. The seeds would be planted in similar fine, wet soil outside of the project area. Seed germination and plant growth would be monitored over the year to determine if translocation would be successful. If seeds are successful, the 10 Short's sedge plants within the project area would be dug up, keepings soils around the roots, and transplanted to the determined site within the same day. With the implementation of mitigation strategies, impacts on the hoptree and Short's sedge would be long-term minor and adverse. Sufficient habitat adjacent to the project area would remain functional to maintain the viability of the plant populations.

Wood turtles require both upland and stream habitats for their life cycle. Rewatering the canal would require excavation of and vegetation removal from habitat within the canal that supports the wood turtle, which would adversely impact the wood turtle. Terrestrial habitat used by the wood turtle for egg laying and foraging would be lost due to the rewatering of the canal; however, it is likely that the wood turtle would use the rewatered canal as in-water habitat for breeding and feeding. Clear streams, brooks, creeks, or rivers with good water quality within undisturbed uplands such as fields, meadows, or forests are preferred habitat areas for wood turtles (MDNR 2012). The only in-stream construction would be associated with the replacement of the Potomac River intake structure, which would affect a very limited area. Mitigation measures would be implemented to protect water quality of the Potomac River, Tonoloway Creek, and other nearby wetlands. Impacts to turtle aquatic environments and hibernation sites would be minimal. The forested riparian corridor along the Potomac River and Tonoloway Creek would remain as contiguous habitat that would support turtle movements and maintain habitat connectivity along the river corridor.

In order to reduce impacts on the wood turtle during construction activities, mitigation measures would be implemented. Prior to any ground-disturbing or vegetation clearing activities, a qualified biologist would conduct pre-construction surveys for the wood turtle and determine if relocation is an appropriate mitigation measure for this species. If the wood turtle is identified during the preconstruction surveys it is possible that the turtles could be collected and relocated prior to or during construction activities if this was found to be beneficial or appropriate for the species present at the site. If relocation were to be undertaken, a plan for the relocation of the special status species would be designed in accordance with the appropriate state agencies and a qualified and permitted biologist would collect and relocate individuals to similar nearby suitable habitat. For wood turtles, use of barrier fencing along streams and the canal could also be implemented during construction activities to avoid/reduce impacts. Impacts to the wood turtle would be long-term minor and adverse.

Although mitigation would be implemented to avoid and/or reduce impacts on special status species, both direct and indirect impacts would occur over 2.5 acres within the canal. Direct impacts on Short's sedge could occur through direct mortality during construction activities. Indirect impact through loss of terrestrial habitat within the project area would also occur to both the wood turtle and Short's sedge. Therefore, considering the mitigation measures as well as the direct and indirect impacts, a long-term minor adverse impact on special status plant and wildlife species would occur. Impacts would result in detectable impacts on individuals or their habitat, but the effects would be limited and localized. Sufficient habitat would remain functional to maintain the viability of the population.

Alternative 2 would include the restoration of the Canal Farm ditch wetland, an 11.42 acre site located at Mile 43 within the park. To compensate for the loss of wetlands from restoring and rewatering the canal

from Miles 122.12-124.59, a total of 4.6 acres of the wetland would be restored. The ditch would be filled in with soil to eliminate the ground water drain. The area would also be revegetated with native wetland species. It is unknown at this time if federal or state listed species occur within the Canal Farm ditch area. Prior to the restoration efforts, a preconstruction survey would be completed to ensure no listed species would be impacted. If federal or state-listed species are documented within the project area, consultations with appropriate federal or state agencies would be required prior to construction on and rewatering of the canal.

**Cumulative Impacts:** Special status species would not be affected by any of the projects in the area. Therefore, cumulative impacts from nearby projects would result in no impacts on special status species. When the long-term minor adverse impacts on special status species as a result of alternative 2 are combined with these projects, long-term minor adverse cumulative impacts are expected, with alternative 2 having an appreciable contribution.

**Conclusion:** Overall, there are three known special status plant and wildlife species that would be affected as a result of alternative 2 due to restoring and rewatering the canal. The three special status species that utilize habitat within and adjacent to the canal include the state watchlist plant species common hoptree, the state endangered plant species Short's sedge, and the wood turtle. Impacts to these species due to the rewatering of the canal would be long-term minor and adverse. A preconstruction survey would be completed prior to restoration efforts at the Canal Farm ditch to determine if species are present. When the long-term minor adverse impact on special status species as a result of alternative 2 are combined with other present and reasonably foreseeable projects in the project area, long-term minor adverse cumulative impacts are expected.

### **Alternative 3**

Alternative 3 only involves the partial rewatering of the canal. The portion of the canal between Lock 51 and upstream of the Tonoloway Aqueduct (Mile 122.59 – 123) would be rewatered. Because there are no wetlands within the areas proposed for rewatering the canal, the wood turtle was not found in the canal habitat between Miles 122.59 and 123. Short's sedge and the common hoptree were also not found in this area of the canal; therefore, direct impacts on special status species are unlikely to occur since habitat is not present in areas proposed for construction and rewatering. However, the wood turtle has been observed in the project area and could use the portion of the canal that is proposed for rewatering if the turtle is transient and moving from wetland areas adjacent to the canal to the Potomac River or Tonoloway Creek. Similar to alternative 2, mitigation would still be required to avoid any direct impacts on the wood turtle, such as conducting pre-construction surveys. If the wood turtle is observed in areas proposed for construction, a relocation plan for the turtle would be designed in accordance with the appropriate state agencies and a qualified and permitted biologist would collect and relocate individuals to nearby suitable habitat. For wood turtles, use of barrier fencing along streams and the canal could also be implemented during construction activities to avoid/reduce impacts. Direct impacts on the turtle are unlikely because mitigation would be implemented to avoid and/or reduce impacts on the turtle, and it is unlikely that the wood turtle occurs in the area proposed for construction. Considering the mitigation measures as well as the direct and indirect impacts, a long-term minor adverse impact on special status wildlife species would occur. Impacts would be measureable or perceptible if relocation is required, but the overall viability of the wood turtle would not be affected and, if left alone, would recover.

**Cumulative Impacts:** Special status species would not be affected by any of the projects in the area. Therefore, cumulative impacts from these projects would result in no impacts on special status species. When the long-term minor adverse impacts on special status species as a result of alternative 3 are combined with these present and reasonably foreseeable projects, long-term minor adverse cumulative impacts are expected, with alternative 3 having a small but appreciable contribution.

**Conclusion:** Overall, there is one possible special status wildlife species (the wood turtle) that could be affected as a result of alternative 3, but mitigation would likely avoid all impacts on the turtle. There would be no impact on Short's sedge or the common hoptree. When the long-term minor adverse impact on special status species as a result of alternative 3 are combined with other present and reasonably foreseeable projects in the project area, long-term minor adverse cumulative impacts are expected.

#### **Alternative 4**

Alternative 4 would have no impact on the wood turtle, Short's sedge, or common hoptree. Therefore, no impacts on special status species would occur.

**Cumulative Impacts:** Similar to all other alternatives, special status species would not be affected by any of the projects in the area. Therefore, cumulative impacts would result in no impacts on special status species. Because alternative 4 would not adversely affect special status species, this alternative would not contribute to other impacts, and no cumulative impacts on special status species would be expected.

**Conclusion:** Overall, no impacts on the wood turtle, Short's sedge, or common hoptree would result from alternative 4 as these species do not occur within the project area. There would be no cumulative impacts associated with alternative 4.

### **4.3 Cultural Resources**

#### **Methodology and Assumptions**

The analyses of effects on cultural resources that are presented in this section respond to the requirements of both NEPA and Section 106 of the NHPA, although the Section 106 compliance is being handled separately through ongoing consultation with the MHT and a PA. In accordance with the Advisory Council's regulations implementing Section 106 (36 CFR Part 800, *Protection of Historic Properties*), impacts on cultural resources were identified and evaluated by (1) determining the APE; (2) identifying cultural resources present in the APE that are either listed in or eligible to be listed in the NRHP (i.e., historic properties); (3) applying the criteria of adverse effect to affected historic properties; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Under the implementing regulations for Section 106, a determination of either *adverse effect* or *no adverse effect* must also be made for affected historic properties. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the NRHP (for example, diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the proposal that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5). A determination of *no adverse effect* means there is either no effect or that the effect would not diminish, in any way, the characteristics of the historic property that qualify it for inclusion in the NRHP. A PA has been developed for this project to guide the Section 106 process. The provisions of the PA (see draft in appendix D) would also guide the implementation of this project.

#### **Study Area**

For purposes of this EA, the study area for historic structures and districts, archaeological sites, and cultural landscapes can be defined as the section of the C&O Canal and adjacent properties from Mile 122.12 through Mile 124.59 of the towpath, along the Potomac River. This area includes Locks 51 and, the Bowles (Little) Farm, the Tonoloway Aqueduct, canal prism, canal boat basin, parking area at Little Tonoloway Picnic Area, and the park's maintenance compound. The project area is approximately 84



acres and follows the C&O Canal NHP towpath for approximately 2.5 miles. For alternative 2, the project area also includes the Canal Farm Restoration area, located within the park in the approximate vicinity of mile marker 43, Frederick County, Maryland near the confluence of the Monocacy and Potomac Rivers. The restoration area covers approximately 4.6 acres. For cumulative effects, the C&O Canal is considered the study area.

#### **4.3.1 Historic Structures and Districts**

##### ***Impact Thresholds***

For an historic district or structure to be listed on the NRHP, it must possess significance (the meaning or value ascribed to the historic structure or district) and have integrity of those features necessary to convey its significance. Impacts to historic structures and districts occur if the action would alter or eliminate the qualities that gave the resource its historic importance. In the case of structures and districts at the park, modifications (e.g., repairs, renovations, additions) to the physical aspects of structures and their environments have a potential to change their appearance, layout, or function and consequently diminish their historical value. Changes that can impact historic districts generally entail the loss of enough buildings and structures, or the introduction of newer structures and buildings, such that the district no longer conveys a sense of a coherent whole. Beneficial impacts may also occur if elements that are not characteristics (e.g., modern additions to buildings or later buildings) are removed. For purposes of analyzing potential impacts to historic structures and districts, the thresholds of change for the intensity of an impact are defined as follows:

*Negligible* – The impact would be at the lowest level of detection with neither adverse nor beneficial consequences. The determination of effect for Section 106 would be no adverse effect.

*Minor* – Alteration of a pattern(s) or feature(s) of an historic district or structure listed on or eligible for the NRHP would be easily detectable but would not diminish the integrity of a character-defining feature(s) or the overall integrity of the historic property. The determination of effect for Section 106 would be no adverse effect.

*Moderate* – The impact would alter a character-defining feature(s) of an historic district or structure and diminish the integrity of that feature(s) of the historic property. The determination of effect for Section 106 would be adverse effect but could be successfully mitigated by following the provisions of the PA.

*Major* – The impact would alter a character-defining feature(s) of the historic district or structure and severely diminish the integrity of that feature(s) and the overall integrity of the historic property. The determination of effect for Section 106 would be adverse effect, and mitigation through the provisions of the PA would be unlikely to be successful because the impacts would be of such a large and broad extent as to diminish the overall integrity of the historic district within the project area.

*Beneficial* – No levels of intensity for beneficial impacts are defined. Beneficial impacts can occur under the following scenarios: when character-defining features of the historic district or structure would be stabilized/preserved, rehabilitated, restored, or reconstructed in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (Weeks and Grimmer 1995). For purposes of Section 106, a beneficial effect is equivalent to no adverse effect.

*Duration* – Short-term impacts occur during the construction phase of the alternative; long-term impacts occur during and beyond implementation of the alternative.

### ***Alternative 1 – No Action Alternative***

Under alternative 1, the park would continue to manage the historic resources in their current state to prevent further deterioration. In addition, the park would repair any problems to these structures as they develop. There would be no change in the integrity of historic resources or any of the contributing resources associated with the historic structures or districts. Since no direct or indirect impact to historic structures and districts is expected, impacts would be characterized as long-term and negligible.

***Cumulative Impacts:*** Other projects in the region with the potential to impact historic structures and districts include the restoration of canal operations at Williamsport, the rehabilitation and stabilization of the historic stone wall and towpath at Big Slackwater, and upgrades to the Sharpsburg water intake. These projects are located within 25 miles downstream from the project area and would have beneficial impacts to historic resources and districts but would not directly impact the historic structures or districts within the Hancock project area. The WMRT extension would have long-term, minor to moderate adverse impacts on historic structures and districts. When both the beneficial and long-term, minor to moderate, adverse impacts associated with these projects are added to the long-term negligible impacts associated with Alternative 1, cumulative impacts to historic structures and districts at the park would be beneficial.

***Conclusion:*** Because resources would receive periodic maintenance but would not be improved, Alternative 1 would result in long-term negligible adverse impacts to buildings, districts, and structures. When combined with the effects of past, present, and foreseeable projects, the overall cumulative effects to the C&O Canal would be beneficial.

### ***Alternative 2 - Preferred Alternative***

At the Bowles Property, preservation and stabilization of the Bank Barn ruins would be completed in accordance with the *Secretary of the Interior's Standards*, *NPS Management Policies 2006*, and *Director's Order 28: Cultural Resource Management*. Rehabilitation of the Bowles House would mostly involve interior work and restoration of the smokehouse/wash house. Rehabilitation would be completed in accordance with the *Secretary of Interior's Standards* to minimize or avoid permanent or temporary impacts. This action would have long-term beneficial effects to the Bowles House.

Alterations to the maintenance compound (removing buildings and establishing a circa 1870 landscape) would have long-term beneficial impacts. Expanding the parking in the vicinity of the visitor center at the Bowles Property and formalizing pedestrian access would be completed in compliance with the *Secretary of the Interior's Standards*. It should be noted that this area already contains a large paved parking area. Construction of a walk-in campground near the maintenance compound would be situated in such a way so that the campground cannot be viewed from the Bowles property and will have minimal amenities. Therefore the campground would have negligible effects on historic sites and districts.

Improvements would be made to the parking area at the Little Tonoloway Picnic Area/Boat Ramp, picnic areas, access roads, and parking areas, which would be expanded. The Rinehart Sumac Mill ruin, consisting of a low wall segment exposed above ground, is in this area but is considered an archeological site rather than a structure. The picnic area does not contain any other historic structures or districts and this action would therefore have no impact. The project components would tend to stabilize and/or enhance historic structures and their settings, giving them greater viability and interest to park visitors. Thus, indirect impacts are characterized as beneficial for the long-term. Although specific designs have not been finalized for these project elements, it is understood that all actions would be completed in

accordance with the *Secretary of the Interior's Standards* and the PA, as well as other applicable guidelines and regulations, which would minimize or mitigate impacts.

Clearing of vegetation around the Tanney/Little Warehouse and Dwellings Ruins and stabilization of the Tanney/Little Warehouse would have long-term beneficial impacts. Vegetation is currently degrading the ruins and without stabilization the Tanney/Little Warehouse will suffer further degradation.

Under Alternative 2, the entire canal between Miles 122.59 and 124.10 would be made operational by restoring and rehabilitating Locks 51 and 52, bypass flumes, waste weirs, and the Tonoloway Aqueduct. Rehabilitation and restoration of all historic canal structures would be designed and completed in compliance with the *Secretary of the Interior's Standards* to minimize and mitigate impacts. The outcome of these actions would produce structures that are physically stable and compatible in appearance and function to their historic circumstances. Therefore, long-term direct impacts would be beneficial.

As part of this alternative, the canal would be rewatered. This action requires restoring it to its original specifications, adding clay lining, and updating the town's existing water intake structure. The water intake structure would be designed and installed in accordance with the *Secretary of the Interior's Standards* to minimize impacts. Restoring and rewatering this section of the canal would make it consistent with its historical appearance, function, and feeling and would result in long-term beneficial impacts.

Additional tasks under this alternative include placing a new pedestrian bridge at Lock 52, and adding boat docks at the Bowles Property and Little Tonoloway picnic area for the launch boat operation. These would be implemented in compliance with the *Secretary of the Interior's Standards* to avoid and minimize negative impacts. The pedestrian bridge at Lock 52 would replace an existing structure, which is not itself historic. This work would have negligible impact by replacing an existing non-historic structure with another non-historic structure. The potential impact here would be damage to the lock caused by building and securing the new bridge, but conducting the work according to the *Secretary's Standards* would produce a negligible impact for the long-term.

Building boat docks at the Bowles Property and the Little Tonoloway Picnic Area for launch boat operation would involve adding new structures to the canal, which could have negligible long-term impacts. Designing and implementing these structures according to the *Secretary of the Interior's Standards* would minimize the impact of the boat dock construction.

A new maintenance access road would be built in the vicinity of the Bowles Property. Construction of this road would involve extending the new route through existing woodlands from the visitor center parking area and building a dike with through pipes downstream of Lock 51 to allow vehicles to cross. This action would add a new, non-historic feature to the historic canal. However, completing this action according to the *Secretary of the Interior's Standards* would result in a long-term minor adverse impact.

The Canal Farm ditch is a drainage ditch previously dug by farmers that would be filled as part of a wetland restoration. There are no historic structures at this location that would be impacted.

**Cumulative Impacts:** Other projects in the region creating beneficial impacts on historic resources and districts at the park include the restoration of canal operations at Williamsport, the rehabilitation and stabilization of the historic stone wall and towpath at Big Slackwater, and upgrades to the Sharpsburg water intake. These projects are located 25 miles downstream from the project area and would not contribute to foreseeable incremental effects on historic resources at Hancock. The WMRT extension would have long-term minor to moderate adverse impacts on historic structures and districts. When the beneficial and minor to moderate adverse impacts from these projects at the park are combined with the

beneficial impacts associated with the Hancock project, cumulative impacts to historic resources and districts at the park would be beneficial.

**Conclusion:** Preservation and stabilization of the Bank Barn and restoration of the Bowles House and cultural landscape would have long-term beneficial impacts, as these actions would result in stabilization of historic structures and making their setting consistent with their historic appearance and function. Restoration and rewatering of the canal would also have long-term beneficial impacts by restoring the canal to its historic appearance and condition. Construction of a walk-in campground within the location of the current maintenance facility, improvement to the access road, construction of docks, and the replacement of the non-historic bridge crossing the canal would all have negligible or no impacts. Construction of a new maintenance access road with dikes and pipes would have a minor adverse impact. Indirect impacts on known historic structures and the C&O Canal historic district would be negligible to beneficial over the long term. Beneficial impacts would enable visitors to understand the historic operation of the canal, and use/experience it in ways that are compatible with its historic function. Cumulative impacts to historic structures and districts are expected to be beneficial.

### **Alternative 3**

Alternative 3 would involve nearly all of the same project elements as alternative 2, including the preservation and stabilization of the Bank Barn, rehabilitation of the Bowles House, improvements to the picnic area and parking lots, removal of the maintenance compound, vegetation clearing and stabilization of the Tanney/Little Warehouse and ruins, and restoration of canal features such as the waste weirs, bypass flumes, and intakes structures. Impacts would be long-term beneficial. Replacement of the pedestrian bridge at Lock 52 would have the same long-term negligible impacts as discussed in alternative 2 and the new maintenance road would have similar short term, minor to moderate adverse impacts and long term minor adverse impacts as alternative 2. Under alternative 3, rewatering the canal between Miles 123 and 124.10 would be omitted, the boat dock at the Bowles Property and Little Tonoloway would not be included, and the Canal Farm wetland mitigation would not occur.

Rewatering the downstream segment of the canal and restoring its functions would result in the same beneficial direct impacts as those described above. Restoring this section of the canal would make it consistent with its historical appearance, function, and feeling and so would result in long-term beneficial impacts. Construction of the outfall at waste weir #22 would present a negligible impact, as long as it is conducted in accordance with the *Secretary of the Interior's Standards* and in compliance with the PA.

Construction of a walk-in campground near the maintenance compound would be situated in such a way so that the campground cannot be viewed from the Bowles property and will have minimal amenities. Therefore the campground would have negligible effects on historic sites and districts.

**Cumulative Impacts:** Other projects in the region creating beneficial impacts on historic resources and districts at the park include the restoration of canal operations at Williamsport, the rehabilitation and stabilization of the historic stone wall and towpath at Big Slackwater, and upgrades to the Sharpsburg water intake. These projects are located 25 miles downstream from the project area and would not contribute to foreseeable incremental effects on historic resources at Hancock. The WMRT extension would have long-term, minor to moderate adverse impacts on historic structures and districts. When the beneficial and minor to moderate adverse impacts from the projects at the park are combined with the long-term negligible impacts, as well as the beneficial impacts associated with the Hancock project, cumulative impacts to historic resources and districts at the park would be beneficial.

**Conclusion:** Preservation and stabilization of the Bank Barn and restoration of the Bowles House, cultural landscape, and Tanney/Little Warehouse and ruins would have long-term beneficial impacts as



these actions would result in stabilization of historic structures and making their setting consistent with their historic appearance and function. Restoration and rewatering of the canal between Miles 122.10 and 123 would also have long-term beneficial impacts by restoring the canal to its historic appearance and condition. Improvement to the access road, and replacement of the non-historic bridge crossing the canal would all have negligible or no impacts. Construction of a new maintenance access road with dikes and pipes would have a minor adverse impact. Indirect impacts on known historic structures would be negligible to beneficial over the long term. Beneficial impacts would enable visitors to understand the historic operation of the canal and use/experience it in ways that are compatible with its historic function. Cumulative impacts to historic structures and districts would be beneficial.

#### ***Alternative 4***

Impacts for the preservation and stabilization of the Bank Barn; rehabilitation of the Bowles House; clearing of vegetation and stabilization of the Tanney/Little Warehouse and ruins; and improvements to the area, including parking areas and picnic areas, would be the same as alternative 2: long-term and beneficial. Alternative 4 would involve only minimal preservation/stabilization of Locks 51 and 52 and no rewatering of the canal. Long-term impacts would be beneficial because they would provide greater stability to the extant structures. Stabilization and preservation would be completed according to the *Secretary of the Interior's Standards* to minimize and avoid impacts.

***Cumulative Impacts:*** Other projects in the region creating beneficial impacts on historic structures and districts at the park include the restoration of canal operations at Williamsport, the rehabilitation and stabilization of the historic stone wall and towpath at Big Slackwater, and upgrades to the Sharpsburg water intake. These projects are located 25 miles downstream from the project area and would not contribute to foreseeable incremental effects on historic resources at Hancock. The WMRT extension would have long-term, minor to moderate adverse impacts on historic structures and districts. When the beneficial and minor to moderate adverse impacts from these projects at the park are combined with the long-term beneficial impacts associated with the Hancock project, cumulative impacts to historic resources and districts at the park would be beneficial.

***Conclusion:*** Impacts are expected to be long-term beneficial because there would be greater stability to historic structures, with short-term minor adverse impacts during construction. Cumulative impacts would be beneficial.

### **4.3.2 Archaeological Sites**

#### ***Impact Thresholds***

Potential impacts to archaeological resources mainly occur as a result of activities that cause disturbance to below-ground environments or that can trigger or worsen such consequences, for example by causing erosion at previously stable locations. Changing the nature of subsurface environments, by altering moisture levels for instance, would also be considered disturbance. Impact thresholds for archaeological resources are described below.

*Negligible* – Impact is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for Section 106 would be no adverse effect.

*Minor* – Disturbance of a site(s) results in little, if any, loss of integrity. For purposes of Section 106, the determination of effect would be no adverse effect.

*Moderate* – Disturbance of a site(s) results in loss of integrity to the extent that there is a partial loss of the character-defining features and information potential that form the basis of the site's NRHP eligibility. Mitigation is accomplished by a combination of archeological data recovery and in-place preservation. The determination of effect for Section 106 would be adverse effect.

*Major* – Disturbance of a site(s) results in loss of integrity to the extent that it is no longer eligible for the NRHP. Its character-defining features and information potential are lost to the extent that archeological data recovery is the primary form of mitigation. The determination of effect for Section 106 would be adverse effect.

*Beneficial* – A beneficial impact would occur when actions were taken to actively preserve or stabilize a site in its preexisting condition, or when it would be preserved in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (Weeks and Grimmer 1995) to accurately depict its form, features, and character as it appeared during its period of significance. For purposes of Section 106, the determination of effect would be no adverse effect.

*Duration* – All impacts on archeological resources are considered long term.

#### ***Alternative 1 – No Action Alternative***

Alternative 1 would involve no preservation or restoration activities. Archeological resources would be preserved in their current state, which can be assumed to be stable. This alternative would not cause any ground disturbance at known resources and therefore would result in long-term negligible impacts.

***Cumulative Impacts:*** Other projects in the region that are resulting in beneficial impacts to cultural resources include the restoration of canal operations at Williamsport, the rehabilitation and stabilization of the historic stone wall and towpath at Big Slackwater, and upgrades to the Sharpsburg water intake. These projects are located 25 miles downstream from the project area and would not contribute to foreseeable incremental effects on archeological resources at Hancock. There are no known past, present, or reasonably foreseeable future actions taking place elsewhere that would, in combination with the above-described actions, cause negative impacts to archeological sites. However, when the beneficial impacts from the projects at the park are combined with the long-term negligible impacts associated with the Hancock project, cumulative impacts to archeological resources at the park would be negligible.

***Conclusion:*** There would be long-term negligible impacts to archeological resources as a result of alternative 1 since there would be no ground disturbance. When the beneficial impacts from the past, present, and future projects at the park are combined with the long-term negligible impacts associated with the Hancock project, cumulative impacts to archeological resources at the park would be negligible.

#### ***Alternative 2 - Preferred Alternative***

Under alternative 2, the Bank Barn ruins would be preserved and stabilized at the Bowles Property; the Bowles House would be rehabilitated; and the cultural landscape of the house would be altered to reflect the 1870s. Direct minor impacts could occur to archeological resources associated with Site 18WA590 as a result of restoring the smokehouse/washhouse, expanding the parking lot, and improving pedestrian access. This site has not yet been evaluated for the National Register. Consultation as the design and work proceed to avoid these resources and use protective construction matting would minimize or avoid impacts and produce negligible effects. Rehabilitation of the Bowles House would mostly involve interior work and would have no direct impacts to archeological resources.

The existing maintenance compound near the Bowles Property would be relocated and the existing maintenance buildings, which are modern, would be removed. A new walk-in campground would be installed here, the parking area in the vicinity of the visitor center at the Bowles Property would be expanded by incorporating the existing maintenance compound parking lot into it, and pedestrian access along existing roadways from parking lots would be formalized. The maintenance compound area would be further altered with the addition of a setting resembling the circa 1870s landscape of the Bowles Property. These actions have a low potential to have adverse impacts on archeological resources because this location has been disturbed by construction of the maintenance compound. The effects of these actions on archeological resources are therefore characterized as negligible.

Additional project elements under alternative 2 include widening the access road from Route 144 to two lanes. The existing access road crosses the former Western Maryland Railway line, consisting of a deep cut through the original upper Potomac River terraces. The track has been removed and the remnant of the rail line is presently used as a pedestrian trail. The access road would not affect the railway line and the road itself has been disturbed. This action is expected to have negligible impacts.

Improvements would be made to the parking area at the Little Tonoloway Picnic Area/Boat Ramp, picnic areas, and access roads, which would be expanded. Improvements to the parking area for the Little Tonoloway Picnic Area/Boat Ramp would involve expanding the existing paved parking lot into grassy locations that presently contain picnic tables. Site 18WA591 occupies this area, and has not yet been evaluated for the National Register. Consultation as the design and work proceed to avoid these resources and use protective construction matting would minimize or avoid impacts and produce negligible effects.

Under alternative 2, the entire canal between Miles 122.59 and 124.10 would be rewatered and made operational by restoring and rehabilitating Locks 51 and 52, bypass flumes, waste weirs, and the Tonoloway Aqueduct. Rehabilitation and restoration of historic structures would be designed and completed in compliance with the *Secretary of the Interior's Standards* to minimize and mitigate direct impacts. Rewatering the canal requires restoring it to its original specifications, adding clay lining, and updating the town's existing water intake structure. Rehabilitating the locks, flumes, and weirs would involve selective repairs, installation of gates, and repointing. The restored aqueduct would resemble the 1870s time period and would have the towpath, parapet walls, and barrel vault preserved and stabilized. Temporary measures would be taken to shield waterways from falling material, diverting water flow, and creating access for construction equipment, and establishing erosion control. Alternative 2 has negligible potential for disturbance to unrecorded archaeological resources in the canal, near the locks, and in the boat basin as it is prepared for rewatering (potential disturbance to the canal, locks, aqueduct and other resources was covered under historic structures).

Construction of boat docks at the Bowles Property and Little Tonoloway Picnic Area for the launch boat operation would cause minimal ground disturbance. The only potential for directly impacting archeological resources is at the locations of footings or mooring structures. An additional task includes placing a new pedestrian bridge at Lock 52. This action would not involve ground disturbance and therefore would have no impact on archeological resources. Finally, a new maintenance access road would be built in the vicinity of the Bowles Property, requiring a new route through existing woodlands from the visitor center parking area and a culvert downstream of Lock 51 to allow vehicles to cross. Prior to implementing this plan, an additional archeological survey would be conducted in compliance with the PA for this project. Ways to avoid, minimize or mitigate impacts to archeological sites would be determined in consultation with the SHPO. Impacts would be long term, adverse and moderate or less.

The Canal Farm wetland mitigation would consist of the in-filling of a drainage ditch on Canal Farm. Filling will not affect archaeological resources around the Canal Farm ditch, since ground disturbance is not expected to take place. However, should ground disturbance be determined to be necessary after

design, NPS would follow the PA to test the area and avoid impacts to archeological sites prior to completing this project. This project is expected to have negligible adverse impacts.

In general, impacts to archeological resources can also result from disturbance in areas used to create access and storage for vehicles, equipment, and materials during the implementation of specific actions. All work for project components would conform to the *Secretary of the Interior's Standards*, NPS *Management Policies 2006*, Director's Order 28, PA, and Section 106 of the NHPA to ensure that disturbance to archeological resources is minimized or avoided.

All of the project components planned specifically for alternative 2 have a potential to cause indirect impacts to archeological resources. Potential indirect impacts to archeological resources could occur if actions cause erosion at sites that are presently stable. This is most likely to happen if ground surfaces are destabilized through grading or removal of vegetation. These potential impacts could range from negligible to minor adverse. They could also occur in locations used for equipment, vehicle, or material access and storage during the implementation of any of the undertakings. Continuing consultation as project designs move forward would minimize or avoid such indirect impacts.

**Cumulative Impacts:** Other projects in the region that are resulting in beneficial impacts to cultural resources include the restoration of canal operations at Williamsport, the rehabilitation and stabilization of the historic stone wall and towpath at Big Slackwater, and upgrades to the Sharpsburg water intake. These projects are located 25 miles downstream from the project area and would not contribute to foreseeable incremental effects on archeological resources at Hancock. There are no known past, present, or reasonably foreseeable future actions taking place elsewhere that would, in combination with the above-described actions, cause negative impacts to archeological sites. However, when the beneficial impacts from projects at the park are combined with the long-term, negligible to minor adverse impacts associated with the Hancock project, cumulative impacts to archeological resources at the park would be negligible.

**Conclusion:** Alternative 2 has the potential to have negligible to minor adverse impacts to archeological resources at Hancock, particularly Sites 18WA590 and 18WA591, which lie in the area of the Bowles Property and Tonoloway Picnic Area, respectively, and which have not yet been evaluated for the National Register. Cumulative impacts to archeological resources would be negligible.

### **Alternative 3**

Impacts to archeological resources under alternative 3 would be the same as characterized under alternative 2. The project changes between alternatives 2 and 3, including less canal rewatering and the elimination of boat docks and the wetland mitigation work do not substantially change the impacts that would be expected to occur.

All of the project components planned specifically for alternative 3 have a potential to cause indirect impacts to archeological resources. Potential indirect impacts to archeological resources could occur if actions cause erosion at sites that are presently stable. This is most likely to happen if ground surfaces are destabilized through grading or removal of vegetation. These potential impacts could range from negligible to minor adverse. They could also occur in locations used for equipment, vehicle, or material access and storage during the implementation of any of the undertakings. Continuing consultation as project designs move forward would minimize or avoid such indirect impacts.

**Cumulative Impacts:** Other projects in the region that are resulting in beneficial impacts to cultural resources include the restoration of canal operations at Williamsport, the rehabilitation and stabilization of the historic stone wall and towpath at Big Slackwater, and upgrades to the Sharpsburg water intake. These projects are located 25 miles downstream from the project area and would not contribute to foreseeable

incremental effects on archeological resources at Hancock. There are no known past, present, or reasonably foreseeable actions taking place elsewhere that would, in combination with the above-described actions, cause negative impacts to archeological sites. However, when the beneficial impacts from the projects at the park are combined with the long-term, negligible to minor adverse impacts associated with the Hancock project, cumulative impacts to archeological resources at the park would be negligible.

**Conclusion:** Alternative 3 has the potential to have negligible to minor adverse impacts to archeological resources at Hancock, particularly Sites 18WA590 and 18WA591, which lie in the area of the Bowles Property and Tonoloway Picnic Area, respectively, and which have not yet been evaluated for the National Register. Cumulative impacts to archeological resources would be negligible.

#### **Alternative 4**

Impacts to archeological resources under alternative 4 would be the similar to those characterized under alternative 3. However, since there would be no rewatering, no pedestrian bridge, and no new maintenance road, impacts would be expected to be long-term negligible and adverse.

**Cumulative Impacts:** Other projects in the region that are resulting in beneficial impacts to cultural resources include the restoration of canal operations at Williamsport, the rehabilitation and stabilization of the historic stone wall and towpath at Big Slackwater, and upgrades to the Sharpsburg water intake. These projects are located 25 miles downstream from the project area and would not contribute to foreseeable incremental effects on archeological resources at Hancock. There are no known past, present, or reasonably foreseeable actions taking place elsewhere that would, in combination with the above-described actions, cause negative impacts to archeological sites. However, when the beneficial impacts from the projects at the park are combined with the long-term, negligible adverse impacts associated with the Hancock project, cumulative impacts to archeological resources at the park would be negligible.

**Conclusion:** Long-term negligible impacts to archeological resources are expected under alternative 4. Cumulative impacts would be negligible adverse.

### **4.3.3 Cultural landscape**

#### **Impact Thresholds**

Following the definition used by the NPS to describe rural historic landscapes, a cultural landscape is a “geographical area that historically has been used by people, or shaped or modified by human activity, occupancy, or intervention and that possess a significant concentration, linkage, or continuity of land use, vegetation, buildings and structures, roads, waterways, and natural features” (McClelland et al. 1999). Potential impacts to a cultural landscape include the removal of features or elements (e.g., buildings, structures, vegetation) that contribute to the historic character. Alternatively, adding new elements, such as roads or buildings that are of a scale or design that is inconsistent with the historic setting, is also considered an impact. Finally, impacts can be beneficial if they remove intrusive modern or incompatible features or restore original or matching ones.

*Negligible* – The impact would be at the lowest level of detection with neither adverse nor beneficial consequences. The determination of effect for Section 106 would be no adverse effect.

*Minor* – Alteration of a cultural landscape feature listed on or eligible for the NRHP would be easily detectable but would not diminish the integrity of a character-defining feature(s) or the



overall integrity of the cultural landscape. The determination of effect for Section 106 would be no adverse effect.

*Moderate* – The impact would alter a cultural landscape feature(s) and diminish the integrity of that feature(s) of the cultural landscape. The determination of effect for Section 106 would be adverse effect.

*Major* – The impact would alter a cultural landscape feature(s) and severely diminish the integrity of that cultural landscape feature(s). The determination of effect for Section 106 would be adverse effect.

*Beneficial* – No levels of intensity for beneficial impacts are defined. Beneficial impacts can occur under the following scenarios: when character-defining features of the cultural landscape feature would be stabilized/preserved, rehabilitated, restored, or reconstructed in accordance with the *Secretary of the Interior's Guidelines for the Treatment of Cultural Landscapes* (NPS 1996). For purposes of Section 106, a beneficial effect is equivalent to no adverse effect.

*Duration* – Short-term impacts occur during the construction phase of the alternative; long-term impacts occur during and beyond implementation of the alternative.

#### ***Alternative 1 – No Action Alternative***

The no action alternative would have a negligible long-term impact on the cultural landscape of the study area. Regular groundskeeping at the Bowles Property and vicinity would maintain the established landscape for this location.

***Cumulative Impacts:*** Other projects in the region creating beneficial impacts on cultural resources at the park include the restoration of canal operations at Williamsport, the rehabilitation and stabilization of the historic stone wall and towpath at Big Slackwater, and upgrades to the Sharpsburg water intake. These projects are located 25 miles downstream from the project area and would not contribute to foreseeable incremental effects on historic resources at Hancock. The WMRT extension would have long-term, minor to moderate adverse impacts on historic structures and districts. When the beneficial and minor to moderate adverse impacts from the projects at the park are combined with the long-term, negligible impacts associated with the Hancock project, cumulative impacts to cultural landscapes at the park would be negligible.

***Conclusion:*** The no action alternative would have a long-term negligible direct impact on cultural landscapes. Taking into account other projects in the region, the cumulative impacts on the cultural landscape would be negligible.

#### ***Alternative 2 - Preferred Alternative***

Preservation and stabilization of the Bank Barn ruins would be completed in accordance with the *Secretary of the Interior's Standards*, *NPS Management Policies 2006*, and Director's Order 28 and would only be completed with the permission of the director of the NPS and if enough historical evidence exists to reconstruct it as it appeared in the 1870s.

Restoring the landscape to reflect the 1870s and removing the maintenance compound would have long term beneficial direct impacts because they would remove intrusive modern structures (the maintenance compound) from the scene and replace them with a farm or rural setting that is compatible with an 1870s homestead. The expansion of parking, pedestrian access, and walk-in campground would be developed

following the *Secretary of the Interior's Standards*, and therefore the long-term direct impacts would be negligible to minor adverse. Clearing vegetation at the Tanney/Little Warehouse and ruins and stabilization of the warehouse would have long-term beneficial impact to the cultural landscape.

The replacement of a pedestrian bridge at Lock 52 with a new structure would be completed in compliance with the *Secretary of the Interior's Standards* to minimize and mitigate direct impacts. This action would result in long-term negligible impacts to cultural landscapes. Additional tasks include the addition of a new maintenance access road and culvert crossing of the canal downstream from Lock 52. These actions would have long-term minor adverse impacts on the cultural landscape of this area because they would add detectable alterations to the landscape. Since these project components would be designed in accordance with the *Secretary of the Interior's Standards*, they would not significantly diminish its overall integrity.

Also, boat docks would be built at the Bowles House and Little Tonoloway picnic area for launch boat operation. These would add new and non-historic elements to the historic cultural landscape. However, they would be designed in accordance with the *Secretary of the Interior's Standards*, and would not significantly diminish the overall integrity of the cultural landscape. Therefore, long-term negligible to minor adverse impacts to cultural landscapes would occur.

Under alternative 2, the entire canal between Miles 122.59 and 124.10 would be made operational by restoring and rehabilitating Locks 51 and 52, bypass flumes, waste weirs, and the Tonoloway Aqueduct. Rewatering the canal requires restoring it to its original specifications, adding lining, and installing a updating the town's existing water intake structure. While restoring the Bowles Property vicinity to reflect the 1870s would have a positive effect, restoring the canal to reflect its historic appearance and function would further enhance the quality of the historic setting. Long-term direct impacts to cultural landscapes are beneficial.

Rehabilitating the locks, flumes, and weirs would involve selective repairs, installation of gates, and repointing. Long-term impacts would be beneficial because they would enhance the historic character of these structures and the canal. The restored aqueduct would resemble the 1870s time period and would have the towpath, parapet walls, and barrel vault preserved and stabilized. Temporary measures would be taken to shield waterways from falling material, divert water flow, create access for construction equipment, and establish erosion control. Rehabilitation and restoration of historic structures would be designed and completed in compliance with the *Secretary of the Interior's Standards* to minimize and mitigate direct impacts. This action would have long-term beneficial impacts to the cultural landscape.

Improvements would be made to the parking area at the Little Tonoloway Picnic Area/Boat Ramp, picnic areas, and access roads. Work at the Little Tonoloway picnic area would not have any short-term or long-term direct impacts. This area does not contain or form part of a cultural landscape. The wetland mitigation project at Canal Farm does not contain, nor is it a part of, a cultural landscape.

Under alternative 2, during the construction period short-term negligible to minor adverse impacts would occur from equipment and other materials adding visual intrusions to the cultural landscape.

**Cumulative Impacts:** Other projects in the region creating beneficial impacts on cultural resources at the park include the restoration of canal operations at Williamsport, the rehabilitation and stabilization of the historic stone wall and towpath at Big Slackwater, and upgrades to the Sharpsburg water intake. These projects are located 25 miles downstream from the project area and would not contribute to foreseeable incremental effects on historic resources at Hancock. The WMRT extension would have long-term, minor to moderate adverse impacts on historic structures and districts. When the beneficial and minor to moderate adverse impacts from the projects at the park are combined with the long-term negligible and

beneficial impacts associated with the Hancock project, cumulative impacts to cultural landscapes at the park would be beneficial.

**Conclusion:** Impacts to cultural landscapes under alternative 2 would be a combination of long-term beneficial and negligible to minor adverse impacts, with adverse impacts coming primarily through the addition of new features to the landscape and short-term adverse impacts coming from construction equipment and fencing in the view shed. Taking into account other projects in the region, the cumulative impacts on the cultural landscape would be beneficial.

### ***Alternative 3***

Many of the impacts to cultural landscapes would be the same as alternative 2. Rewatering the canal between Miles 123 and 124.10, although a smaller length of rewatering, would have long-term beneficial impacts because they would enhance the historic character of these structures and the canal. All other impacts would be characterized as the same as alternative 2.

**Cumulative Impacts:** Other projects in the region creating beneficial impacts on cultural resources at the park include the restoration of canal operations at Williamsport, the rehabilitation and stabilization of the historic stone wall and towpath at Big Slackwater, and upgrades to the Sharpsburg water intake. These projects are located 25 miles downstream from the project area and would not contribute to foreseeable incremental effects on historic resources at Hancock. The WMRT extension would have long-term, minor to moderate adverse impacts on historic structures and districts. When the beneficial and minor to moderate adverse impacts from the projects at the park are combined with the long-term negligible to minor adverse impacts and the beneficial impacts associated with the Hancock project, cumulative impacts to cultural landscapes at the park would be beneficial.

**Conclusion:** Impacts to cultural landscapes under alternative 3 would be a combination of long-term beneficial and negligible to minor adverse impacts, with adverse impacts coming primarily through the addition of new features to the landscape and short-term adverse impacts coming from construction equipment and fencing in the viewshed. Taking into account other projects in the region, the cumulative impacts on the cultural landscape would be beneficial.

### ***Alternative 4***

The same short- and long-term beneficial to minor adverse impacts would be expected under alternative 4 with the following exceptions. Alternative 4 would include minimal preservation/stabilization of Locks 51 and 52, and no rewatering of the canal. Instead, the extant canal prism would be mowed. Although mowing and clearing vegetation from the canal bank would help convey its historic feeling and associations, it would not contribute as strongly to the cultural landscape as it would if rewatered. This project element would have a long-term negligible impact. Minimal preservation and stabilization of Locks 51 and 52 would have a long-term negligible impact. Stabilizing the structures in accordance with the *Secretary of the Interior's Standards* would not substantially change them from their current appearance and condition, and therefore this action would not alter the cultural landscape.

**Cumulative Impacts:** Other projects in the region creating beneficial impacts on cultural resources at the park include the restoration of canal operations at Williamsport, the rehabilitation and stabilization of the historic stone wall and towpath at Big Slackwater, and upgrades to the Sharpsburg water intake. These projects are located 25 miles downstream from the project area and would not contribute to foreseeable incremental effects on historic resources at Hancock. The WMRT extension would have long-term minor to moderate adverse impacts on historic structures and districts. When the beneficial and minor to moderate adverse impacts from the projects at the park are combined with the long-term negligible to

minor adverse impacts and beneficial impacts associated with the Hancock project, cumulative impacts to cultural landscapes at the park would be negligible.

**Conclusion:** The preservation and stabilization of the Bank Barn, restoration of the cultural landscape, relocation of the maintenance facilities, and clearing of vegetation and stabilization of the Tanney/Little Warehouse would create long-term beneficial impacts. Long-term negligible to minor adverse impacts would occur from the mowing of the canal and changes proposed to the parking areas, access roads, picnic areas, and pedestrian bridge. There would be short-term, minor adverse impacts during construction. Cumulative impacts would be beneficial.

#### **4.4 Socioeconomics**

##### ***Methodology and Assumptions***

Implementation of the proposed project could have direct and indirect effects on certain socioeconomic elements in the vicinity of Hancock and Washington County. NPS applied logic, experience, and professional expertise and judgment to analyze potential impacts that would result from each alternative on the existing economic conditions in the vicinity of the project area.

##### ***Impact Thresholds***

The following thresholds were used to determine the magnitude of impacts on socioeconomics:

*Negligible* – Very few individuals, businesses, or government entities would be impacted. Impacts would be nonexistent, barely detectable, or detectable only through indirect means and with no discernible impact on regional economic conditions.

*Minor* – A few individuals, businesses, or government entities would be impacted. Impacts would be small but detectable, limited to a small geographic area, comparable in scale to typical year-to-year or seasonal variations, and not be expected to substantively alter economic conditions over the long term.

*Moderate* – Many individuals, businesses, or government entities would be impacted. Impacts would be readily apparent and detectable across a wider geographic area and may have a noticeable effect on economic conditions over the long term.

*Major* – A large number of individuals, businesses, or government entities would be impacted. Impacts would be readily detectable and observed, extend across much of the study area, and would have a substantial influence on economic conditions over the long term.

*Duration* – Short-term impacts occur during the construction phase of the alternative; long-term impacts occur during and beyond implementation of the alternative.

##### ***Alternative 1- No Action Alternative***

Under the no action alternative, there would be no impacts on socioeconomics. Since there would be no new construction or new project components, there would be no alteration in jobs available in the area, or additional opportunities in the county for employment.

**Cumulative Impacts:** The no action alternative would not affect socioeconomics and therefore would not contribute to cumulative impacts.

**Conclusion:** Overall, there are no socioeconomic impacts as a result of alternative 1. In addition, there would be no cumulative impacts.

### ***Alternative 2- Preferred Alternative***

During the construction phase of the project, short-term beneficial impacts on socioeconomics are expected. Alternative 2 includes many project construction components that would require contractors in the local area. Temporary jobs would be created during the preservation and stabilization of the Bank Barn, rehabilitation of the Bowles House, construction of a boat dock, addition of a walk-in campground, and improvements to the picnic areas, access roads, and parking lots. Jobs would also be created for the projects associated with rewatering the canal and restoring operation of the locks, bypass flumes, and waste weirs. Additionally, the restoration of the Canal Farm ditch would provide other job opportunities. After construction is completed, there would be long-term beneficial impacts on the local economy. The improvements proposed would enhance the visitor experience within the Hancock area and visitation is expected to increase. Local businesses would benefit from an increase in tourism of the area. Alternative 2 also includes the operation of boat rides. Benefits to socioeconomics would also occur due to an outside contractor who would conduct boat rides and provide more job opportunities. The movement of the maintenance division into a commercially available space would also have beneficial impacts.

**Cumulative Impacts:** Socioeconomics could be affected by five projects in the area: the restoration of canal operations at Williamsport; the rehabilitation, reconstruction, and stabilization of the historic stone wall and towpath at Big Slackwater; the proposed eelway construction at dams 4 and 5; the GAP (sponsored by the Allegheny Trail Alliance); and WMRT extension. These projects are expected to increase visitation at C&O Canal NHP. Economic benefits in the form of increased visitor spending in Hancock may result from those visitors enjoying improvements at Big Slackwater, dams 4 and 5, Williamsport, and the GAP. Therefore, there would be long-term beneficial cumulative social and economic impacts resulting from the above-mentioned projects. When the long-term beneficial impacts on socioeconomics as a result of alternative 2 are combined with the present and reasonably foreseeable projects, long-term beneficial cumulative impacts would be expected.

**Conclusion:** Under alternative 2, short-term, beneficial impacts on socioeconomics would occur from the creation of temporary jobs during the construction process. There would likely be an increase in visitation at the park, which would have long-term beneficial impacts on the local economy. Additionally, the movement of the maintenance division into a commercially available space would have beneficial impacts. When the long-term beneficial impacts on socioeconomics as a result of alternative 2 are combined with other present and reasonably foreseeable projects, long-term beneficial cumulative impacts would be expected.

### ***Alternative 3***

Impacts to socioeconomics would be similar to alternative 2. Short-term beneficial impacts on socioeconomics are expected during construction activities associated with the preservation and stabilization of the Bank Barn ruins, rehabilitation of the Bowles House, addition of a walk-in campground, improvements to the picnic areas, access roads, and parking lots, and projects associated with rewatering the canal and restoring operation of the locks, bypass flumes, and waste weirs. The increase in visitation to the area would create long-term beneficial impacts on the economy of Hancock. Although boat rides would not be available under alternative 3, an increase in visitation is still expected due to the improvements to visitor amenities and the implementation of a campground. Additionally, the movement of the maintenance division into a commercially available space would have long-term beneficial impacts.



**Cumulative Impacts:** Cumulative impacts would be the same as alternative 2. When the long-term beneficial impacts on socioeconomics as a result of alternative 3 are combined with the present and reasonably foreseeable projects, long-term beneficial cumulative impacts would be expected.

**Conclusion:** Under alternative 3, short-term beneficial impacts on socioeconomics would occur from the creation of temporary jobs during the construction process. There would likely be an increase in visitation at the park, which would have long-term beneficial impacts on the local economy. Additionally, the movement of the maintenance division into a commercially available space would have beneficial impacts. When the long-term beneficial impacts on socioeconomics as a result of alternative 3 are combined with other present and reasonably foreseeable projects, long-term beneficial cumulative impacts would be expected.

#### ***Alternative 4***

Short-term beneficial impacts on socioeconomics are expected during construction activities associated with the preservation and stabilization of the Bank Barn ruins, rehabilitation of the Bowles House, improvements to the picnic areas, access roads, and parking lots, and the preservation of Locks 51 and 52. Since there would be no rewatering of the canal, not as many jobs would be created when compared to alternatives 2 and 3; however, short-term benefits to the economy would still occur. The addition of visitor experience opportunities would create long-term beneficial impacts due to an expected increase in visitation of the area. Additionally, the movement of the maintenance division into a commercially available space would also have long-term beneficial impacts.

**Cumulative Impacts:** Cumulative impacts would be the same as alternative 2. When the long-term beneficial impacts on socioeconomics as a result of alternative 4 are combined with the present and reasonably foreseeable projects, long-term beneficial cumulative impacts would be expected.

**Conclusion:** Under alternative 4, short-term beneficial impacts on socioeconomics would occur from the creation of temporary jobs during the construction process. There would likely be an increase in visitation at the park, which would have long-term beneficial impacts on the local economy. Additionally, the movement of the maintenance division into a commercially available space would have beneficial impacts. When the long-term beneficial impacts on socioeconomics as a result of alternative 4 are combined with other present and reasonably foreseeable projects, long-term beneficial cumulative impacts would be expected.

### **4.5 Transportation**

#### ***Methodology and Assumptions***

Implementation of the proposed project could have direct and indirect effects on the roadways and transportation in the vicinity of Hancock and Washington County. NPS applied logic, experience, and professional expertise and judgment to analyze potential impacts that would result from each alternative on the existing transportation conditions in the vicinity of the project area.

#### ***Impact Thresholds***

The following thresholds were used to determine the magnitude of impacts on transportation:

*Negligible* – Very few roadways or individuals would be impacted. Impacts would be nonexistent, barely detectable, or detectable only through indirect means and with no discernible impact on local transportation conditions.

*Minor* – A few roadways or individuals would be impacted. Impacts would be small but detectable, limited to a small geographic area, comparable in scale to typical year-to year or seasonal variations, and not be expected to substantively alter transportation conditions over the long term.

*Moderate* – Many roadways or individuals would be impacted. Impacts would be readily apparent and detectable across a wider geographic area and may have a noticeable effect on transportation conditions over the long term.

*Major* – A large number of roadways or individuals would be impacted. Impacts would be readily detectable and observed, extend across much of the study area, and would have a substantial influence on transportation conditions over the long term.

*Duration* – Short-term impacts occur during the construction phase of the alternative; long-term impacts occur during and beyond implementation of the alternative.

### ***Alternative 1- No Action Alternative***

Under the no action alternative, there would be no change to the access roads or other transportation infrastructure. Therefore there would be no impact on transportation under the no action alternative.

***Cumulative Impacts:*** Under the no action alternative, there would be no impact on transportation and this alternative would not contribute to impacts associated with the four projects in the area: the restoration of canal operations at Williamsport; the rehabilitation, reconstruction, and stabilization of the historic stone wall and towpath at Big Slackwater; the proposed eelway construction at dams 4 and 5; and the GAP sponsored by the Allegheny Trail Alliance. Therefore, no cumulative impacts would occur.

***Conclusion:*** Overall, there are no transportation impacts as a result of alternative 1. In addition, no cumulative impacts are expected.

### ***Alternative 2 (Preferred Alternative) and Alternative 3***

Under alternatives 2 and 3, the Bank Barn ruins would be preserved and stabilized, vegetation would be cleared to stabilize the Little Warehouse and stone wall, the Bowles House would be rehabilitated, and improvements would be made to the picnic areas, access roads, and parking areas. In addition, a walk-in campground would be installed within the maintenance compound. Equipment needed during construction activities would likely increase the traffic along Route 144, resulting in short-term minor adverse impacts during construction. Access roads in the park may need to be closed at certain times during construction, which would also have short-term minor adverse impacts. A new maintenance road would also be constructed to replace the existing maintenance road, south of Lock 51, and would cross the canal. This access road would result in short-term minor adverse impacts during construction. Once construction work had been completed, there would be beneficial impacts on transportation. Work done to expand the access road into the park from one lane to two lanes and the new maintenance road would provide better access for park users and park staff. The improvement of other access roads and parking lots, particularly the boat trailer parking, would also have beneficial impacts. Overall, there would be a long-term beneficial impact on transportation.

Under alternative 2, additional short-term minor adverse impacts on transportation would occur at the Canal Farm ditch restoration site. Nolands-Ferry Road runs adjacent to the restoration site and there would be an increase in traffic during construction due to equipment.

**Cumulative Impacts:** Transportation could be affected by four projects in the area: the restoration of canal operations at Williamsport; the rehabilitation, reconstruction, and stabilization of the historic stone wall and towpath at Big Slackwater; the proposed eelway construction at dams 4 and 5; and the GAP. These projects are expected to increase visitation in C&O Canal NHP and may affect transportation as well. However, it is expected that long-term negligible adverse cumulative transportation impacts would result from the above-mentioned projects because impacts would be barely measurable or perceptible. When the long-term, beneficial impacts on transportation as a result of alternatives 2 and 3 are combined with these present and reasonably foreseeable projects, long-term negligible adverse cumulative impacts would be expected.

**Conclusion:** Short-term minor adverse impacts on transportation would occur as a result of increased traffic on Route 144. Additional short-term minor adverse impacts would occur under alternative 2 at the Canal Farm ditch restoration site. Overall, there are long-term beneficial transportation impacts as a result of alternatives 2 and 3. When the long-term beneficial impacts on transportation as a result of alternatives 2 and 3 are combined with other present and reasonably foreseeable projects in the project area, long-term negligible adverse cumulative impacts would be expected.

#### ***Alternative 4***

Impacts to transportation would be similar to alternatives 2 and 3. Short-term minor adverse impacts on transportation would occur during the construction phase of the project. Although alternative 4 does not include rewatering of the canal, construction equipment may impact traffic along Route 144. Alternative 4 would include the widening of the access road from Route 144 to two lanes. Improvements to the parking lots would also occur. Impacts to transportation would be long-term and beneficial following the construction phase of the project.

**Cumulative Impacts:** As stated above for alternatives 2 and 3, transportation could be affected by four projects in the area: the restoration of canal operations at Williamsport; the rehabilitation, reconstruction, and stabilization of the historic stone wall and towpath at Big Slackwater; the proposed eelway construction at dams 4 and 5; and the GAP. These projects are expected to increase visitation in C&O Canal NHP and may affect transportation as well. However, it is expected that long-term negligible adverse cumulative transportation impacts would result from the above-mentioned projects because impacts would be barely measurable or perceptible. When the long-term beneficial impacts on transportation as a result of alternative 4 are combined with these present and reasonably foreseeable projects, long-term negligible adverse cumulative impacts would be expected.

**Conclusion:** Short-term minor adverse impacts on transportation would occur as a result of increased traffic on Route 144. Overall, there are long-term beneficial transportation impacts as a result of alternative 4 because of better access to the site. When the long-term beneficial impacts on transportation as a result of alternative 4 are combined with other present and reasonably foreseeable projects in the project area, long-term negligible adverse cumulative impacts would be expected.

## **4.6 Visitor Use and Experience**

### ***Methodology and Assumptions***

Impacts to visitor use and experience were determined by considering the effect of the existing conditions and the proposed enhancement actions.

### ***Impact Thresholds***

The following thresholds were used to determine the magnitude of impacts on visitor use and experience:

*Negligible* – Visitors would likely be unaware of impacts associated with implementation of the alternative. There would be no noticeable change in visitor use and experience.

*Minor* – Changes in visitor use and experience would be slight and detectable, but would not appreciably limit or enhance visitor access or recreational/interpretive opportunities. Some individuals would be affected. If mitigation to offset adverse impacts were needed, it would be relatively simple and would likely be successful.

*Moderate* – Changes in visitor use and experience would be noticeable. Visitor access or recreational/interpretive opportunities may be limited or enhanced and the number of participants engaging in a specified activity would be altered. Some visitors who desire their continued use and enjoyment of the activity might be required to pursue their choices in other available local or regional areas. Other visitors may be attracted by new opportunities. Mitigation measures would probably be necessary to offset adverse impacts and would likely be successful.

*Major* – Changes in visitor use and experience would be highly apparent and visitor access or recreational/interpretive opportunities would be appreciably limited or enhanced. The number of participants engaging in an activity would be greatly reduced or increased. Visitors who desire to use and enjoy the park in their current manner would be required to pursue their choices in other available local or regional areas. Other visitors may be attracted by new opportunities. Extensive mitigation measures to offset adverse impacts would be needed, and success would not be guaranteed.

*Duration* – Short-term impacts occur during the construction phase of the alternative; long-term impacts occur during and beyond implementation of the alternative.

### ***Alternative 1- No Action Alternative***

There would be no impact on visitor use and experience under the no action alternative. Visitor services at Bowles Farm would remain limited and the Hancock Visitor Center would continue to operate out of the first level of the Bowles House, with only temporary exhibits. There would be no improvement in trails or recreational access for visitors coming to the park.

***Cumulative Impacts:*** Under the no action alternative, there would be no impact on visitor use and experience and this alternative would not contribute to impacts associated with the five projects in the area: the restoration of canal operations at Williamsport; the rehabilitation, reconstruction, and stabilization of the historic stone wall and towpath at Big Slackwater; the proposed eelway construction at dams 4 and 5; the GAP; and the WMRT extension. Therefore, no cumulative impacts would occur.

***Conclusion:*** As a result of the no action alternative, there would be no impact on visitor experience and recreational activities. In addition, no cumulative impacts on visitor use and experience are expected.

### ***Alternative 2 - Preferred Alternative***

Under alternative 2, short-term minor adverse impacts on visitor use and experience would occur during the construction period. During the preservation and stabilization of the Bank Barn ruins, clearing of vegetation to stabilize the Little Warehouse and stonewall, rehabilitation of the Bowles House,

construction of the boat dock, establishment of a walk-in campground, and improvements to the picnic areas, access roads, and parking areas, visitor access to these amenities would be restricted until construction is complete. During the construction period for restoring and rewatering the canal, visitors coming to the park for recreation activities such as fishing, hiking, biking, and swimming would be detoured around the staging and construction areas for safety reasons. However, visitors would still have the opportunity to participate in recreation activities in other areas of the park.

Following construction, long-term beneficial impacts on visitor use and experience would occur. Improvements to the visitor center would provide a more informative interpretive experience for visitors to the park. Improved facilities, access to recreation, and the addition of the walk-in campground would also improve the experience at the park for visitors. As a result of alternative 2, the rewatering of the canal would return the park to a landscape reflective of the 1870s. There would also be beneficial impacts from the NPS or from the concession operated boat launch and Kiosk at Little Tonoloway, which would provide additional interpretive experiences for visitors at Hancock. Improvements to pedestrian and vehicular access would also have a beneficial impact. Overall, there would be a long-term beneficial impact on visitor experience under alternative 2.

At the Canal Farm ditch restoration site, short-term minor adverse impacts on visitor use and experience would also occur. During the restoration process, visitors to the park in this area (Mile 43) would also be detoured around the staging and construction areas. Indian Flats campground is located approximately 0.5 mile downstream and Nolands Ferry is located 1.5 miles upstream of the restoration site. Visitors of these two popular areas at the park may be affected by the construction process. Following restoration, beneficial impacts on visitor use and experience are expected due to the improvements at the site.

**Cumulative Impacts:** Visitor use and experience could be affected by five projects in the area: the restoration of canal operations at Williamsport, the repair of the towpath at Big Slackwater, the proposed eelway construction at dams 4 and 5, the GAP, and WMRT extension. Effects to visitor use and experience from these cumulative actions would result in short-term negligible adverse impacts, but in the long-term there would be beneficial cumulative impacts on visitor use and experience. When the long-term beneficial impacts on visitor use and experience as a result of alternative 2 are combined with these projects, long-term beneficial cumulative impacts would be expected.

**Conclusion:** Short-term minor adverse impacts on visitor use and experience would occur during the construction phase of the project in the Hancock area and the Canal Farm ditch restoration area. Following construction, there would be a long-term beneficial impact on visitor experience and recreational activities. The cumulative impacts from alternative 2 and other projects in the area would also result in beneficial impacts.

### **Alternative 3**

Impacts to visitor use and experience would be similar to alternative 2. During construction activities at the Bank Barn ruins, Bowles House, Little Tonoloway, and on the canal, impacts on visitor use and experience would be short-term minor and adverse. Recreation opportunities would be limited during construction activities in these areas.

Under alternative 3, a portion of the canal would be restored and rewatered, which would provide areas of the park that were consistent with the 1870s landscape. Improvements to the visitor center and addition of the walk-in campground would provide a more informative interpretive experience for visitors to the park. Improvements to pedestrian and vehicular access would also improve visitor use of the park. Overall, there would be a long-term beneficial impact on visitor experience under alternative 3.



**Cumulative Impacts:** Similar to alternative 2, visitor use and experience could be affected by five projects in the area: the restoration of canal operations at Williamsport, the repair of the towpath at Big Slackwater, the proposed eelway construction at dams 4 and 5, the GAP, and WMRT extension. Effects to visitor use and experience from these cumulative actions would result in long-term beneficial cumulative impacts on visitor use and experience. When the long-term beneficial impacts on visitor use and experience as a result of alternative 3 are combined with these projects, long-term beneficial cumulative impacts would be expected.

**Conclusion:** As a result of the alternative 3, there would be short-term minor adverse impacts during the construction phase of the project and a long-term beneficial impact on visitor experience and recreational activities following construction. The cumulative impacts from alternative 3 and other projects in the area would also result in beneficial impacts.

#### **Alternative 4**

Short-term minor adverse impacts on visitor use and experience would occur during the preservation and stabilization of the Bank Barn, clearing of vegetation to stabilize the Little Warehouse and stonewall, rehabilitation of the Bowles House, and improvements to the picnic areas, access roads, and parking areas. Visitor access to these amenities would be restricted until construction is complete. No rewatering would occur under alternative 4, but a portion of the canal would be mowed, and there would be some stabilization work to Locks 51 and 52. During the construction period, there would be short-term negligible adverse impacts on visitor experience. Recreational visitors at the park would be detoured around the staging and construction areas for safety reasons, but there would be fewer areas where work was occurring, lessening the impact of construction on visitors who participate in recreation activities in the park. Although no portions of the canal would be restored and rewatered, mowing would make the historical landscape more consistent with that of the 1870s. There would not be any additional interpretive material provided under alternative 4, but improvements to pedestrian and vehicular access would have beneficial impacts on visitor experience. Overall, there would be a long-term, beneficial impact on visitor experience under alternative 4.

**Cumulative Impacts:** Similar to alternatives 2 and 3, visitor use and experience could be affected by five projects in the area: the restoration of canal operations at Williamsport, the repair of the towpath at Big Slackwater, the proposed eelway construction at dams 4 and 5, the GAP, and WMRT extension. Effects to visitor use and experience from these cumulative actions would result in short-term negligible adverse impacts but there would be overall long-term beneficial cumulative impacts on visitor use and experience. When the long-term beneficial impacts on visitor use and experience as a result of alternative 4 are combined with these projects, long-term beneficial cumulative impacts would be expected.

**Conclusion:** As a result of the alternative 4, there would be short-term negligible to minor adverse impacts on visitor use and experience during the construction phase of the project. Following construction a long-term beneficial impact on visitor experience and recreational activities is expected from improvements to the Bowles property and site access. The cumulative impacts from alternative 4 and other projects in the area would also result in beneficial impacts.

## **4.7 Park Operations**

### **Methodology and Assumptions**

C&O Canal NHP is responsible for providing staff to perform all day-to-day operations and maintenance required of the structures that support operations at Hancock and other associated structures that serve

park visitors. Impacts to park operations were determined by considering the effect of the existing conditions and the proposed enhancement actions.

### ***Impact Thresholds***

The following thresholds were used to determine the magnitude of impacts on park operations:

*Negligible* – Impacts would be barely detectable and would not have an appreciable effect on park operations.

*Minor* – The impact would be detectable and would be of a magnitude that would not have an appreciable effect on park operations.

*Moderate* – The impacts would be readily apparent and result in a substantial change in park operations in a manner noticeable to staff and the public.

*Major* – The impacts would be readily apparent, result in a substantial change in park operation in a manner noticeable to staff and the public, and be markedly different from existing operations.

*Duration* – Short-term impacts occur during the construction phase of the alternative; long-term impacts occur during and beyond implementation of the alternative.

### ***Alternative 1- No Action Alternative***

Under the no action alternative, there would be no construction, changes, or improvements to the park. There would be no impacts on park operations from the no-impact alternative.

***Cumulative Impacts:*** The lack of impacts on park operations from the no action alternative would not add to the long-term negligible to minor adverse cumulative impacts expected from the other five projects in the area: the restoration of canal operations at Williamsport; the rehabilitation, reconstruction, and stabilization of the historic stone wall and towpath at Big Slackwater; the proposed eelway construction at dams 4 and 5; the GAP; and the WMRT extension. No cumulative impacts would occur.

***Conclusion:*** There would be no impacts on park operations from the no action alternative. In addition, no cumulative impacts would occur.

### ***Alternative 2 - Preferred Alternative***

The majority of construction needed for the restoration and rewatering of canal operations, clearing of vegetation to stabilize the Little Warehouse and stone wall, preservation and stabilization of the Bank Barn ruins, rehabilitation of the Bowles House, establishment of a walk-in campground, and improvements to the picnic areas, access roads, and parking areas would be handled by contractors. Contractors would also be responsible for the restoration of the Canal Farm ditch. The park would oversee construction activities and would be involved in the planning and monitoring efforts associated with the proposed components. Park staff would be required to aid in the management of contractors and assisting with communication and visitor outreach programs associated with the construction. These changes would have a short-term minor adverse impact on park operations during construction activities, as park personnel would have to monitor construction and inform visitors of restricted or closed areas, all of which would increase staff workloads. Additionally, the movement of the maintenance shed could temporarily disrupt law enforcement and maintenance operations in the park. These impacts would be temporary and would only last until construction was completed.

After construction activities are completed, additional staff would be required at the Hancock area of the C&O Canal NHP. The NPS may be able to supplement some of the additional staffing needs by using trained NPS volunteers. The establishment of the walk-in campground would require additional staff time to register visitors to the campground, maintain the campground, and have frequent patrols of the campground. NPS or concession operated launch boats would provide interpretive programs and connect the Bowles House to the Little Tonoloway area; the boats would cross the Aqueduct and “lock through” Lock 52 and a kiosk/operational booth would be constructed at the Little Tonoloway. Additional staff would be required to run the interpretive launch boat operations. If a concessionaire operates the boat rides, park staff would be responsible for managing the concessionaire contract. Volunteers could potentially be used to aid staff in some of the additional responsibilities under alternative 2, which could reduce the adverse impacts on park operations and management. Existing maintenance staff would most likely continue to maintain Locks 51 and 52, the Tonoloway Aqueduct, and the updated water intake under alternative 2. Overall, alternative 2 would result in long-term moderate adverse impacts on park operations and management due to the increase in staffing needs to support the operation of expanded visitor services.

**Cumulative Impacts:** Park operations could be affected by five projects in the area: the restoration of canal operations at Williamsport; the rehabilitation, reconstruction, and stabilization of the historic stone wall and towpath at Big Slackwater; the proposed eelway construction at dams 4 and 5; the GAP; and the WMRT extension. Effects to park operations from these cumulative projects would result in overall long-term negligible to moderate adverse impacts as park staff would need to shift their daily work duties to accommodate the construction and the operation of these new projects. When the long-term moderate adverse impacts on park operations as a result of alternative 2 are combined with these projects, long-term minor adverse cumulative impacts would be expected.

**Conclusion:** Short-term minor adverse impacts on park operations would occur during construction activities. Overall, alternative 2 would result in long-term moderate adverse impacts on park operations and management due to the increase in staffing needs to support the operation of expanded visitor services. When the long-term moderate adverse impacts on park operations as a result of alternative 2 are combined with other present and reasonably foreseeable projects, minor adverse cumulative impacts would be expected.

### **Alternative 3**

Impacts during the preservation and stabilization of the Bank Barn, clearing of vegetation to stabilize the Little Warehouse and stone wall, rehabilitation of the Bowles House, establishment of a walk-in campground, and improvements to the picnic areas, access roads, and parking areas would create short-term minor adverse impacts on park operations, similar to alternative 2. Park staff would be responsible for monitoring and managing construction activities and informing visitors of restricted or closed areas. The movement of the maintenance shed could temporarily disrupt law enforcement and maintenance operations in the park. Alternative 3 involves the partial rewatering of the canal (Mile 122.59 – 123) and does not include NPS or concession operated launch boats. The only component exclusive to alternative 3 that would impact park operations are the improvements proposed for natural resources interpretation. The construction-related portion of these components that are similar in alternatives 2 and 3 would most likely require park staff would to aid in the planning efforts, including management of contractors and assisting with communication and visitor outreach programs associated with the construction, resulting in a short-term minor adverse impact from the increased workload.

After construction is completed, it is possible that additional staff would be required for the improvements to natural resources interpretation and the campground. Volunteers could potentially be used to aid staff in some of the additional responsibilities under alternative 3, which could reduce the adverse impacts on

park operations and management. Existing maintenance staff would most likely continue to maintain Locks 51 and 52, the Tonoloway Aqueduct, and the new intake under alternative 3. Overall, alternative 3 would result in long-term moderate adverse impacts on park operations and management due to the increase in staffing needs to support the operation of expanded visitor services.

**Cumulative Impacts:** Similar to alternative 2, park operations could be affected by five projects in the area: the restoration of canal operations at Williamsport; the rehabilitation, reconstruction, and stabilization of the historic stone wall and towpath at Big Slackwater; the proposed eelway construction at dams 4 and 5; the GAP; and the WMRT extension. Effects to park operations from these cumulative projects would result in overall long-term negligible to moderate adverse impacts as park staff would need to shift their daily work duties to accommodate the construction and the operation of these new projects. When the long-term moderate adverse impacts on park operations as a result of alternative 3 are combined with these projects, long-term minor adverse cumulative impacts would be expected.

**Conclusion:** Short-term minor adverse impacts on park operations would occur during the construction phase of the project. Overall, alternative 3 would result in long-term moderate adverse impacts on park operations and management due to the increase in staffing needs to support the operation of expanded visitor services. When the long-term moderate adverse impacts on park operations, as a result of alternative 3, are combined with other present and reasonably foreseeable projects, long-term minor adverse cumulative impacts would be expected.

#### ***Alternative 4***

Impacts during preservation and stabilization of the Bank Barn, clearing of vegetation to stabilize the Little Warehouse and stone wall, rehabilitation of the Bowles House, and improvements to the picnic areas, access roads, and parking areas would create short-term, minor, adverse impacts on park operations, similar to alternative 2. Park staff would be responsible for monitoring and managing construction activities and informing visitors of restricted or closed areas. The movement of the maintenance shed could temporarily disrupt law enforcement and maintenance operations in the park. Unlike alternatives 2 and 3, this alternative does not involve restoring the canal or improving natural resources interpretation. The only component exclusive to alternative 4 includes the preservation of Locks 51 and 52, which would have negligible impacts on park resources because impacts would be barely measurable or perceptible. Alternative 4 would result in a long-term negligible adverse impact on park operations.

**Cumulative Impacts:** Similar to alternatives 2 and 3, park operations could be affected by five projects in the area: the rehabilitation, reconstruction, and stabilization of the historic stone wall and towpath at Big Slackwater; the proposed eelway construction at dams 4 and 5; the GAP; and the WMRT extension. Effects to park operations from these cumulative projects would result in overall long-term negligible to moderate adverse impacts as park staff would need to shift their daily work duties to accommodate the construction and the operation of these new projects. When the long-term negligible adverse impacts on park operations as a result of alternative 4 are combined with these projects, long-term minor adverse cumulative impacts would be expected.

**Conclusion:** Short-term minor adverse impacts on park operations would occur during the construction phase of the project. Overall, alternative 4 would result in long-term negligible adverse impacts on park operations and management because impacts would be barely measurable or perceptible. When the long-term negligible adverse impacts on park operations, as a result of alternative 4, are combined with other present and reasonably foreseeable projects, long-term minor adverse cumulative impacts would be expected.

## **5.0 CONSULTATION AND COORDINATION**

Scoping is the effort to involve agencies and the general public in determining the scope of issues to be addressed in the environmental document. Among other tasks, scoping determines important issues and eliminates issues determined to be not important; allocates assignments among the interdisciplinary team members and/or participating agencies; identifies related projects and associated documents; identifies other permits, surveys, consultations, etc. required by other agencies; and creates a schedule that allows adequate time to prepare and distribute the environmental document for public review and comment before a final decision is made. Scoping includes consultation with any interested agency, or any agency with jurisdiction by law or expertise to obtain early input and permits needed for implementation. Scoping also includes coordination with the public regarding the proposed project. All public involvement documents are included in appendix A, and all agency consultation and coordination documents are included in appendix B.

### **5.1 Agency Consultation**

External scoping refers to the interdisciplinary process used to define issues, alternatives, and data needs. Consultation letters were mailed to state and federal agencies on April 23, 2013 requesting consultation and comments regarding the proposed project at Hancock, Maryland. Appendix B contains a list of agencies that received the consultation letter and a copy of the consultation letter. Responses were received from three agencies. Copies of the agency responses are also included in appendix B.

#### **5.1.1 Special status Species Consultation**

In accordance with federal and state requirements for special status species, consultation letters were mailed to state and federal agencies on April 23, 2013, including the USFWS Chesapeake Bay Field Office and the Maryland Wildlife and Heritage Service (appendix B). Information about the proposed project was included in the consultation letter. A response was received from MDNR Natural Heritage Program on June 12, 2013. MDNR identified two listed mussel species and four listed plant species as occurring within the Little Pool area; however, Little Pool is located outside of the project area. A response was also received from the USFWS on June 12, 2013. USFWS confirmed that with the exception of occasional transient bald eagles, no federally proposed or listed endangered or threatened species are known to exist within the project area.

#### **5.1.2 Section 106 Consultation**

Consultations with the SHPO of Maryland, as mandated by the implementing regulations (36 CFR 800) for Section 106 of the NHPA of 1966 as amended, are ongoing. Consultation was initiated on September 2, 2010 when NPS sent the MHT a formal consultation letter explaining the proposed undertaking, APE, historic properties, and the NEPA process. MHT responded on October 4, 2010 stating that further consultation would be needed in the future. In this letter, MHT also requested conceptual plans, a discussion of the proposed alternatives, and NPS's assessment of the project's effects on historic and archeological properties. On September 21, 2011, NPS sent MHT a second letter with an update on the progress of the project and a copy of the initial archeology report conducted by NPS. MHT responded in a letter dated October 19, 2011 offering comments on the initial archeology report and further coordination with NPS to complete Section 106 consultation. On March 5, 2013, NPS sent MHT a copy of the Final Phase I Archeology Report and a draft PA to continue the Section 106 consultation process. On April 9, 2013 MHT responded with comments on both of these documents. MHT stated that the project was preservation positive and that no PA was needed; however, after further discussion NPS decided that it would like to pursue the development of a PA; MHT agreed that a PA would be appropriate for this



project. A copy of the draft PA can be found in appendix D. This draft PA will be forwarded to the SHPO as part of the consultation process.

## **5.2 Public Involvement**

External scoping is the process used to gather public input. For this project, a scoping newsletter was mailed to numerous individuals, organizations, stakeholders, and agencies in order to notify the public that an EA is being completed for this project. The newsletter provided the project history, project purpose and need, a description of preliminary alternatives, an overview of the NEPA process, and a description of the public scoping period. The public was encouraged to use the NPS Planning, Environment, and Public Comment (PEPC) website to submit comments. On PEPC, the park provided six topic questions to the public, which included the following:

1. What type of visitor services and interpretive opportunities would you like to see available to the public?
2. What type of preservation treatments should be given to the canal prism?
3. What level of restoration/rehabilitation should be given to the Bowles (Little) property? This would include the house, barn, outbuildings, and cultural landscape.
4. Should the Tonoloway Aqueduct be restored? To what level?
5. What improvements can be made to the Little Tonoloway picnic area, boat ramp, and site parking?
6. What levels of restoration should be made to Locks 51 and 52?

The newsletter was available for public comment for a total of 32 days (August 13, 2010 through September 13, 2010). A total of 51 correspondences were received. The newsletter and comments are included in appendix A. In addition to the newsletter, a public scoping meeting was held on August 25, 2010. The following is a summary of comments received for each topic question:

1. Suggestions for visitor services and interpretive opportunities included rewatering of the canal, canal boat rides pulled by mules, additional picnic areas, larger parking areas, interactive exhibits for children, and additional signage on Main Street for the Bowles property.
2. Suggestions for preservation treatments within the canal prism included the removal of invasive plants, removal of trees, and installation of a clay liner to rewater the canal prism.
3. Suggestions for the level of restoration/rehabilitation for the Bowles property included maintaining invasive vegetation, restoring the farm to include mules in the barn, having an operational farm with a flower or vegetable garden, construction of a pavilion for large groups, and installation of new signage directing visitors to the Bowles property.
4. Commenters felt the Tonoloway Aqueduct should be restored to the level that it would support the rewatered canal.
5. Suggestions for improvements to the Little Tonoloway picnic area, boat ramp, and site parking included the addition of more parking spaces specifically for trucks with trailers, additional picnic tables/areas, a pavilion, additional grills, a paved driveway to the boat ramp, and a larger entrance to this section of the park.
6. Commenters felt that if funding is available Locks 51 and 52 should be restored to be fully functioning. If funding is unavailable, the Locks should be restored to a level to be capable of holding water.

This EA will be distributed to agencies for public and agency review and comment for a period of 30 days. If no substantive issues are raised, then the process will move forward toward a Finding of No Significant Impact.

### **5.3 Compliance Needs**

The following is a list of required permits, licenses, certifications, and assessments that may be required for the construction and implementation of the project.

- A Joint Federal/State Application for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland (USACE and MDE).
- Additional waterway construction permits for disturbance in the Potomac River may be required.
- It is possible that the existing discharge permit may require modification for the repaired waste weirs and outfall-flow into the Potomac River from the Tonoloway Creek.
- The new intake structure may require amending the existing water supply and use permit from the state of Maryland.
- Grading permit or sediment control permit.
- If a grading permit or sediment control permit is required for this project, and over one acre is disturbed, the Maryland Forest Conservation Act may be applicable and the project may require a Forest Conservation Plan through MDNR.

*Page intentionally left blank*

## **6.0 LIST OF PREPARERS**

### **U.S. Department of the Interior, National Park Service**

Kevin Brandt, Superintendent (Park)

Brian Carlstrom, Deputy Superintendent (Park)

Lynne Wigfield, Former Compliance Officer (Park)

Christopher Stubbs, Chief of Resource Management (Park)

Ahna Wilson, Project Manager and Historian (Park)

Michelle Carter, Natural Resources Program Manager (Park)

Elaine Rideout, Natural Resource Specialist (Denver Service Center)

Margo Brooks, Environmental Compliance Specialist (Denver Service Center)

Gary Smillie, Hydrologist (Denver Service Center) - Floodplains

Kevin Noon, Natural Resource Specialist (Denver Service Center) – Wetlands

Peter Sharpe, Office of Scientific Studies (Denver Service Center) – Wetlands

Mike Martin, Hydrologist (Denver Service Center) – Wetlands

Joel Gorder, Regional Environmental Coordinator, National Capitol Region

Marian Norris, Aquatic Ecologist (National Capitol and Northeast Regional Offices) – Wetlands

### **EA Engineering, Science, and Technology**

Suzanne Boltz, Project Manager

Jeannette Matkowski, Environmental Scientist

Sarah Koser, Wetland Scientist/Botanist

Kathryn Cerny-Chipman, Environmental Scientist

Michelle Harden, Environmental Scientist

### **New South Associates, Inc.**

Brad Botwick, Cultural Resource Specialist

*Page intentionally left blank*



## 7.0 GLOSSARY AND ACRONYMS

### 7.1 Glossary

**Advisory Council on Historic Preservation**—The Advisory Council on Historic Preservation is an independent federal agency that promotes the preservation, enhancement, and productive use of our nation's historic resources, and advises the president and Congress on national historic preservation policy.

**Affected environment**—The existing environment to be affected by a proposed action and alternatives.

**Area of Potential Effects (APE)**—The geographic area or areas within which an undertaking or project may directly or indirectly cause alterations in the character or use of historic properties.

**Archeological resources**—Any material remnants or physical evidence of past human life or activities of archeological interest, including the record of the effects of human activities on the environment. They are capable of revealing scientific or humanistic information through archeological research. Any material remnants of human life or activities at least 100 years of age, and of archeological interest (32 CFR 229.3(a)).

**Artifact**—A material object made or modified in whole or in part by man. Among the most common artifacts on archeological sites are fragments of broken pottery (shards), stone tools, chips (debitage), projectile points, and similar lithic debris.

**Best management practices**—Methods that have been determined to be the most effective, practical means of preventing or reducing pollution or other adverse environmental impacts.

**Canal Prism**—The trapezoidal cross-sectional shape of a canal's channel. The canal prism for the C&O Canal was typically 60 feet wide at the top, 40 feet wide at the bottom, and 6 feet deep.

**Contributing resource**—A building, site, structure, or object that adds to the historic significance of a NRHP property or district.

**Council on Environmental Quality (CEQ)**—Established by Congress within the Executive Office of the President with passage of the National Environmental Policy Act of 1969. The CEQ coordinates federal environmental efforts and works closely with agencies and other White House offices in the development of environmental policies and initiatives.

**Cultural landscape**—A geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values.

**Cultural resources**—Historic districts, sites, buildings, objects, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or any other reasons.

**Deciduous**—Describing tree species that have leaves that fall off annually.

**Endangered species**—"...any species (including subspecies or qualifying distinct population segment) that is in danger of extinction throughout all or a significant portion of its range (ESA Section 3(6))." The

lead federal agency, U.S. Fish and Wildlife Service, for the listing of a species as endangered is responsible for reviewing the status of the species on a five-year basis.

**Endangered Species Act** (16 USC 1531 -1544, 87 Stat 884), as amended—An act to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved and to provide a program for the conservation of such endangered species and threatened species.

**Environmental assessment** (EA)—An environmental assessment is prepared pursuant to the National Environmental Policy Act to determine whether a federal action would significantly affect the environment and thus require a more detailed environmental impact statement.

**Executive Order**—Official proclamation issued by the president that may set forth policy or direction or establish specific duties in connection with the execution of federal laws and programs.

**Lock**—A device for raising and lowering boats between stretches of water of different levels on river and canal waterways that has been extended in a certain direction to allow for passage of larger vessels.

**Finding of No Significant Impact**—A document prepared by a federal agency showing why a proposed action would not have a significant impact on the environment and thus would not require preparation of an environmental impact statement. It is based on the results of an environmental assessment.

**Floodplain**—The flat or nearly flat land along a river or stream or in a tidal area that is covered by water during a flood.

**Historic district**—A geographically definable area, urban or rural, possessing a significant concentration, linkage, or continuity of sites, landscapes, structures, or objects, united by past events or aesthetically by plan or physical developments. A district may also be composed of individual elements separated geographically but linked by association or history.

**Historic landscape**—A cultural landscape associated with events, persons, design styles, or ways of life that are significant in American history, landscape architecture, archeology, engineering, and culture; a landscape listed in or eligible for the NRHP.

**Historic property**—A district, site, structure, or landscape significant in American history, architecture, engineering, archeology, or culture that meets National Register significance criteria.

**Historical significance**—The meaning or value ascribed to a structure, landscape, object, or site based on the National Register criteria for evaluation. It normally stems from a combination of association and integrity.

**Integrity**—The authenticity of a property's historic identity evidenced by the survival of physical characteristics that existed during its historic or prehistoric period; the extent to which a property retains its historic appearance.

**List of Classified Structures** (LCS)—A database maintained by the National Park Service that lists and describes all NRHP-eligible structures in the national park system.

**Mile**—The use of mile markers as a locational convenience follows historical convention. The zero milestone or beginning of the canal is located in Georgetown, where the canal empties into Rock Creek. canal mile markers are widely used in guidebooks, and many are still extant along the canal today.

**National Environmental Policy Act of 1969** (USC 432 1-4347) (NEPA)—The act as amended articulates the federal law that mandates protecting the quality of the human environment. It requires federal agencies to systematically assess the environmental impacts of their proposed activities, programs, and projects including the “no action” alternative of not pursuing the proposed action. NEPA requires agencies to consider alternative ways of accomplishing their missions in ways which are less damaging to the environment.

**National Historic Preservation Act of 1966** (16 USC 470 et seq.)—An act to establish a program for the preservation of historic properties throughout the nation, and for other purposes, approved October 15, 1966 [Public Law 89-665; 80 STAT.915; 16 USC 470 as amended by Public Law 91-243, Public Law 93-54, Public Law 94-422, Public Law 94-458, Public Law 96-199, Public Law 96-244, Public Law 96-515, Public Law 98-483, Public Law 99-514, Public Law 100-127, and Public Law 102-575].

**National Register of Historic Places**—A register of districts, sites, buildings, structures, and objects important in American history, architecture, archaeology, and culture, maintained by the Secretary of the Interior under authority of Section 2(b) of the Historic Sites Act of 1935 and Section 101(a)(1) of the National Historic Preservation Act of 1966, as amended. The National Register provides for three levels of significance: National, State, and Local.

**Organic Act**—Enacted in 1916, this act commits the National Park Service to making informed decisions that perpetuate the conservation and protection of park resources unimpaired for the benefit and enjoyment of future generations.

**Planning, Environment, and Public Comment (PEPC)**—The National Park Service web site for public involvement. This site provides access to current plans, environmental impact analyses, and related documents on public review. Users of the site can submit comments for documents available for public review.

**Programmatic Agreement (PA)**—A written agreement among a federal agency, SHPO, and Advisory Council on Historic Preservation that stipulates how a program or a class of undertakings repetitive in nature or similar in effect will be carried out so as to avoid or mitigate adverse effects on cultural resources.

**Rehabilitation**—The act or process of making possible an efficient compatible use for a historic structure or landscape through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural and architectural values.

**Scoping**—Scoping, as part of NEPA, requires examining a proposed action and its possible impacts; establishing the depth of environmental analysis needed; determining analysis procedures, data needed, and task assignments. The public is encouraged to participate and submit comments on proposed projects during the scoping period.

**Section 106**—Refers to Section 106 of the National Historic Preservation Act of 1966, which requires federal agencies to take into account the effects of their proposed undertakings on properties included or eligible for inclusion in the National Register of Historic Places and give the Advisory Council on Historic Preservation a reasonable opportunity to comment on the proposed undertakings.

**Significance**—Significance of cultural resources is evaluated in terms of NRHP criteria published in 36 CFR 60.

**State Historic Preservation Officer (SHPO)**—Official appointed by the governor of each state and U.S. Territory, responsible for certain responsibilities relating to federal undertakings within the state. In Maryland, the duties of the SHPO are carried out by the MHT, an agency of the Maryland Department of Planning.

**Wetlands**—The U.S. Army Corps of Engineers (Federal Register 1982) and the U.S. Environmental Protection Agency (Federal Register, 1980) jointly define wetlands as: Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

## 7.2 Acronyms

APE	Area of Potential Effects
BMPs	Best Management Practices
C&O NHP	Chesapeake and Ohio National Historical Park
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
CWA	Clean Water Act
DBH	Diameter at Breast Height
DOI	Department of the Interior
EA	Environmental Assessment
ESA	Endangered Species Act
GAP	Great Allegheny Passage
LCS	List of Classified Structures
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MHT	Maryland Historical Trust
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
NWI	National Wetland Inventory
PA	Programmatic Agreement
PEPC	Planning, Environment, and Public Comment
SAV	Submerged Aquatic Vegetation
SHPO	State Historic Preservation Officer
SOF	Statement of Findings
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCB	U.S. Census Bureau
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WMRT	Western Maryland Rail Trail



*Page intentionally left blank*

## 8.0 REFERENCES

- Bedell, John, Jason Shellenhamer, and Charles LeeDecker. 2009b. *Archeological Identification and Evaluation Study of Chesapeake & Ohio Canal National Historical Park, Section III, Hancock to Cumberland (Mile Markers 123 to 184), Washington County, Maryland, Allegheny County, Maryland, Final Year 1 Management Summary*. Prepared for National Park Service, National Capital Region, Washington, D.C. by the Louis Berger Group, Inc., Washington, D.C.
- Botwick, Brad. 2011. *Phase I Archeological Survey for Enhancing the Visitor Experience at Hancock, Milepost 122.12 to 124.10, Chesapeake & Ohio National Historic Park, Washington County, Maryland*. Report Submitted to EA Engineering, Science, and Technology, Inc., Sparks, Maryland, by New South Associates, Inc., Stone Mountain, Georgia.
- Council on Environmental Quality (CEQ). 1981. *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*. Memorandum to Agencies. 46 Fed. Reg. 18026.
- Council on Environmental Quality (CEQ). 1997. *Considering Cumulative Effects Under the National Environmental Policy Act. January 1997*.
- Cowardin et. al. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Fish and Wildlife Service. Publication FWS/OBS-79/31. U.S. Government Printing Office, Washington, D.C. December.
- Cutlip, C.G. 1986. *The Ecological Impact of Three Power Line Corridors Located in Wetland Systems in Florida*. Bio-Scan, Inc. Lehigh, Florida. Cited in Jordan et al. n.d.
- EA Engineering. 2011. *Final Rare, Threatened, and Endangered Plant Species Surveys for Enhancing Visitor Experience at Hancock, MD (Park Mile 122.12 to 124.59)*. Prepared for National Park Service, Chesapeake and Ohio Canal National Historical Park, Washington County, MD. April.
- EA Engineering. 2010. *Wetland Delineation Report for Enhancing Visitor Experience at Hancock, MD (Park Mile 122.12 to 124.59)*. Prepared for National Park Service, Chesapeake and Ohio Canal National Historical Park, Washington County, MD. September.
- Federal Emergency Management Agency (FEMA). 1987. *Flood Insurance Rate Map for Washington County, Maryland*. Map Number 2400700035A. May 1, 1978.
- Gray, Karen. 2009. A Brief History of the Chesapeake and Ohio Canal. Western Maryland's Historical Library. Electronic document <<http://www.whilbr.org>> Accessed April 21, 2010.
- Gordon, Robert B., and Patrick M. Malone. 1994. *The Texture of Industry: An Archeological View of the Industrialization of North America*. Oxford University Press, New York.
- Lichvar, Robert W. and John T. Kartesz. 2009. *North American Digital Flora: National Wetland Plant List, version 2.4.0*. U.S. Army Corps of Engineers, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH, and BONAP, Chapel Hill, NC Available [online]: [https://wetland\\_plants.usace.army.mil](https://wetland_plants.usace.army.mil). Accessed January 15, 2013.
- Mackintosh, Barry. 1991. *C&O Canal, The Making of a Park*. National Park Service, Department of the Interior, Washington, D.C.
- Maryland Department of the Environment (MDE). 2004. Maryland Erosion and Sediment Control Guidelines for State and Federal Projects. Revised January 2004. Available [online]:

- <http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/Documents/www.mde.state.md.us/assets/document/State%20Erosion%20Control%20Guidelines.pdf>.
- Maryland Department of the Environment (MDE). 2000. Maryland's Waterways Construction Guidelines. Revised November 2000. Available [online]: [http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/DocumentsandInfrmation/Pages/programs/waterprograms/wetlands\\_waterways/documents\\_information/gide.aspx](http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/DocumentsandInfrmation/Pages/programs/waterprograms/wetlands_waterways/documents_information/gide.aspx)
- Maryland Department of Natural Heritage (MDNR). 2012. *Field Guide to Maryland's Turtles: Wood Turtle*. Available [online]: [http://www.dnr.state.md.us/wildlife/Plants\\_Wildlife/herps/testudines/WoodTurtle.asp](http://www.dnr.state.md.us/wildlife/Plants_Wildlife/herps/testudines/WoodTurtle.asp) Accessed January 15, 2013.
- Maryland Department of Planning (MDP). 2008. *Historical and Projected Total Population for Maryland's Jurisdictions: Revisions, December 2008*. Prepared by the Planning Data Services. December. Available [online]: [http://www.mdp.state.md.us/msdc/popproj/TOTPOP\\_PROJ08.pdf](http://www.mdp.state.md.us/msdc/popproj/TOTPOP_PROJ08.pdf). Accessed August 29, 2011.
- Maryland Geological Survey (MGS). 2007. *A Brief Description of the Geology of Maryland*. Available [online]: <http://www.mgs.md.gov/esic/brochures/mdgeology.html>. Accessed August 30, 2011.
- Maryland Natural Heritage Program. 2010. *Rare, Threatened and Endangered Plants of Maryland*. April 2010 edition. Maryland Department of Natural Resources, Wildlife and Heritage Service, Annapolis, Maryland.
- Meinig, D.W. 1993. *The Shaping of America, Volume II: Continental America, 1800-1867*. Yale University Press, New Haven, Connecticut.
- McClelland, Linda F., J. Timothy Keller, Genevieve P. Keller, and Robert Z. Melnick. 1989. *National Register Bulletin Guidelines for Evaluating and Documenting Rural Historic Landscapes*. National Park Service, 1989 revised 1999.
- National Oceanic and Atmospheric Association (NOAA). 2013. *Advanced Hydrologic Prediction Service Potomac River at Hancock*. Available [online]: <http://water.weather.gov/ahps2/hydrograph.php?wfo=lmx&gage=hnkm2>. Accessed March 15, 2013.
- National Park Service (NPS). 2013a. *Foundation document, Chesapeake and Ohio Canal National Historic Park*. June 2013. Prepared by NPS.
- National Park Service (NPS). 2013b. *Recreation Visitors for the Chesapeake & Ohio Canal NHP*. Available [online]: <https://irma.nps.gov/Stats/SSRSReports/Park%20Specific%20Reports/All%20Recreation%20Visitors%20By%20Month?Park=CHOH>. Accessed March 13, 2013.
- National Park Service (NPS). 2013c. *YTD Counts for the Chesapeake & Ohio Canal NHP*. Available [online]: <https://irma.nps.gov/Stats/SSRSReports/Park%20Specific%20Reports/CHOH%20YTD%20Report?Park=CHOH>. Accessed March 13, 2013.
- National Park Service (NPS). 2012. *Report for Travel to Chesapeake & Ohio Canal National Historical Park, April 3 through 5, 2012*. Memorandum. June 19.

- National Park Service (NPS). 2011b. NPS Website: Chesapeake and Ohio Canal. Available [online]: <http://www.nps.gov/choh/index.htm> Accessed August 29, 2011.
- National Park Service (NPS). 2011c. NPS Website: Chesapeake and Ohio Canal. Available [online]: <http://www.nps.gov/choh/naturescience/nonnativespecies.htm>. Accessed September 9, 2011.
- National Park Service (NPS). 2011d. *Procedural Manual #77-1: Wetland Protection*. Reissued in April.
- National Park Service (NPS). 2009. Public Use Counting and Reporting Instructions for *Chesapeake & Ohio Canal NHP*. January 2009.
- National Park Service (NPS). 2007. *Nationwide Rivers Inventory*. Available [online]: <http://www.nps.gov/ncrc/programs/rtca/nri/states/md.html>. Accessed December 10, 2010.
- National Park Service (NPS). 2006. *Management Policies 2006*. Prepared by NPS.
- National Park Service (NPS). 2004. *Chesapeake and Ohio Canal National Historical Park Wildlife Fire Management Plan*.
- National Park Service (NPS). 2001. Director's Order 12 and Handbook: *Conservation Planning, Environmental Impact Analysis, and Decision Making*. Prepared by NPS.
- National Park Service (NPS). 1996. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*. U.S. Department of the Interior, National Park Service, Cultural Resource Stewardship and Partnerships, Heritage Preservation Services, Historic Landscape Initiative, Washington, D.C.
- National Park Service (NPS). 1989. *C & O Canal National Historical Park Hancock, Maryland Development Concept Plan*.
- National Park Service (NPS). 1980. *Seneca to Cumberland Interpretive Prospectus*.
- National Park Service (NPS). 1976. *General Plan: Chesapeake & Ohio Canal National Historical Park, District of Columbia/Maryland*. Prepared by NPS. January 30.
- National Wild and Scenic Rivers System (NWSRS). 2008. *Wild and Scenic Rivers by State*. Available [online]: <http://www.rivers.gov/wildriverslist.html>. Accessed December 10, 2010.
- Natural Resources Conservation Service (NRCS). 2010. *Custom Soil Resource Report for Washington County, Maryland*. USDA. December 10.
- Park Studies Unit (PSU). 2011. *Chesapeake & Ohio Canal NHP & Related Areas 2010 Visitor Survey Card Data Report*. University of Idaho. Available [online]: <http://www.psu.uidaho.edu/files/vsc/reports/vsc.CHOH710.pdf>. Accessed August 29, 2011.
- Planning Commission. 2010. *Town of Hancock, Maryland 2010 Comprehensive Plan*. Available [online]: [http://www.mdp.state.md.us/PDF/OurWork/CompPlans/Washington/Hancock/10\\_CMP\\_Draft\\_Hancock.pdf](http://www.mdp.state.md.us/PDF/OurWork/CompPlans/Washington/Hancock/10_CMP_Draft_Hancock.pdf).

- Southworth, Scott, Brezinski, David K., Orndorff, Randall C., Repetski, John E., and Danielle M. Denenny. 2008. *Geology of the Chesapeake and Ohio Canal National Historical Park and Potomac River Corridor, District of Columbia, Maryland, West Virginia, and Virginia*. Professional Paper for USGS. Available [online]: <http://pubs.usgs.gov/pp/1691/P1691.pdf>. Accessed August 30, 2011.
- U.S. Army Corps of Engineers (USACE). 1987. *Corps of Engineers Wetlands Delineation Manual*. Wetlands Research Program Technical Report Y-87-1. January.
- U.S. Census Bureau (USCB). 2012a. *Selected Economic Characteristics 2007-2011 American Community Survey 5-Year Estimates, Hancock, Maryland*. Available [online]: [http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS\\_11\\_5YR\\_DP03](http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_11_5YR_DP03). Accessed April 16, 2013.
- U.S. Census Bureau (USCB). 2012b. *Selected Economic Characteristics 2007-2011 American Community Survey 5-Year Estimates, Washington County, Maryland*. Available [online]: [http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS\\_11\\_5YR\\_DP03](http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_11_5YR_DP03). Accessed April 16, 2013.
- U.S. Census Bureau (USCB). 2011a. *Profile of General Population and Housing Characteristics: 2010, Hancock Town, Maryland*. Available [online]: [http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC10\\_DP\\_DPDP1&prodType=table](http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC10_DP_DPDP1&prodType=table). Accessed August 29, 2011.
- U.S. Census Bureau (USCB). 2011b. *Profile of General Population and Housing Characteristics: 2010, Washington County, Maryland*. Available [online]: [http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC10\\_DP\\_DPDP1&prodType=table](http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC10_DP_DPDP1&prodType=table). Accessed August 29, 2011.
- U.S. Environmental Protection Agency (USEPA). 2010. *Nonattainment for Each County by Year for Maryland*. Available [online]: [http://www.epa.gov/air/oaqps/greenbk/anay\\_md.html](http://www.epa.gov/air/oaqps/greenbk/anay_md.html).
- U.S. Fish and Wildlife Service / National Wetlands Inventory (USFWS/NWI). 2010. U.S. Department of the Interior. Fish and Wildlife Service, Washington, D.C. Accessed [online]: <http://www.fws.gov/nwi/>.
- U.S. Geological Society (USGS) 2014. USGS Real-Time Water Data for the Nation, USGS Gaging Station 01613000 Potomac River at Hancock, Washington County, Maryland. Available [online]: [http://waterdata.usgs.gov/nwis/uv/?site\\_no=01613000&agency\\_cd=USGS&format=gif\\_stats&period=&begin\\_date=2007-10-01&end\\_date=2013-03-17&site\\_no=01613000](http://waterdata.usgs.gov/nwis/uv/?site_no=01613000&agency_cd=USGS&format=gif_stats&period=&begin_date=2007-10-01&end_date=2013-03-17&site_no=01613000).
- U.S. Geological Survey (USGS). 2013. USGS 01613000 POTOMAC RIVER AT HANCOCK, MD. Available [online]: [http://nwis.waterdata.usgs.gov/nwis/uv?cb\\_00060=on&cb\\_00065=on&format=gif\\_stats&period=&begin\\_date=2007-10-01&end\\_date=2013-03-17&site\\_no=01613000](http://nwis.waterdata.usgs.gov/nwis/uv?cb_00060=on&cb_00065=on&format=gif_stats&period=&begin_date=2007-10-01&end_date=2013-03-17&site_no=01613000). Accessed March 15, 2013.
- Unrau, Harlan D. 1974. *Historic Structure Report, The Canal Prism Including Towpath With Canal Berm and River Revetments, Historical Data, Chesapeake and Ohio Canal National Historical Park Md-D.C.-W.Va.* U.S. Department of the Interior, National Park Service, Denver Service Center, Denver, Colorado.



- Van Ness, James S. 1983. Economic Development, Social and Cultural Changes: 1800-1860. In *Maryland, A History*, edited by Richard Walsh and William Lloyd Fox, pp. 156-238. Archives Division, Hall of Records Commission, Department of General Services, Annapolis, Maryland
- Weeks, Kay D. and Anne Grimmer. 1995. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, & Reconstructing Historic Buildings*. U.S. Department of the Interior, National Park Service, Cultural Resource Stewardship and Partnerships, Heritage Preservation Services, Historic Landscape Initiative, Washington, D.C.