

**Chesapeake and Ohio Canal National Historical Park**

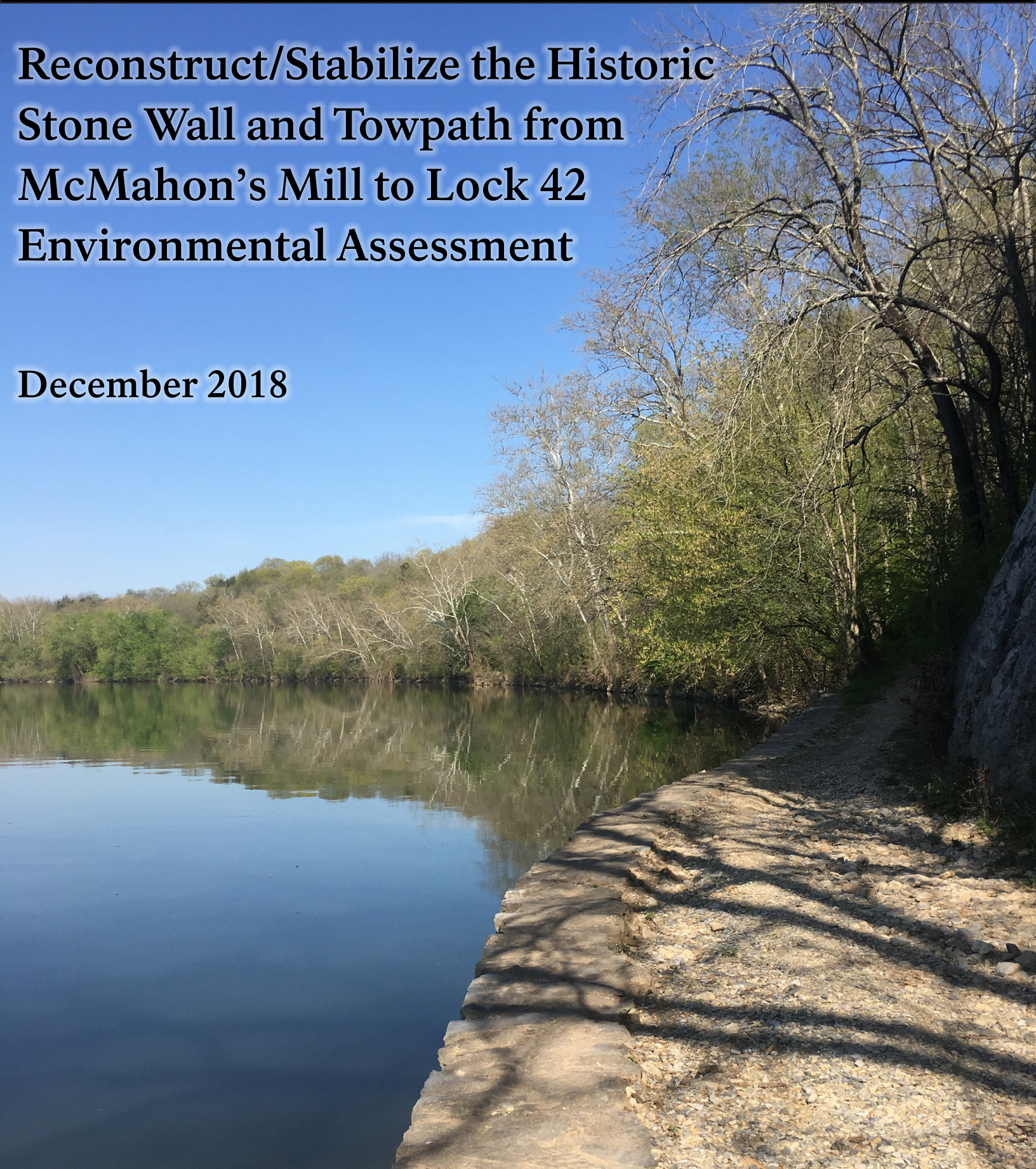
Maryland, West Virginia, District of Columbia

US Department of the Interior  
National Park Service



# **Reconstruct/Stabilize the Historic Stone Wall and Towpath from McMahon's Mill to Lock 42 Environmental Assessment**

**December 2018**





# US DEPARTMENT OF THE INTERIOR, NATIONAL PARK SERVICE CHESAPEAKE AND OHIO CANAL NATIONAL HISTORICAL PARK

## Reconstruct/Stabilize the Historic Stone Wall and Towpath from **McMahon's Mill to Lock 42 Environmental Assessment**

The National Park Service (NPS) has prepared this environmental assessment (EA) to evaluate the impacts of rehabilitating the existing historic stone wall and reestablishing the towpath along approximately 0.9 mile of the Chesapeake and Ohio Canal National Historical Park (C&O Canal NHP or the park).

This EA evaluates two alternatives for managing the portion of the towpath in C&O Canal NHP between McMahon's Mill and Lock 42 in Washington County, Maryland; describes the environment that would be impacted by the alternatives; and assesses the environmental consequences of implementing the alternatives. Under the no-action alternative, the current management of the towpath would continue with no changes. Under the proposed action, which has been identified as the preferred alternative, the historic stone wall would be stabilized or reconstructed, portions of the towpath would be moved inland, the elevation of the towpath would be raised, and the towpath would be resurfaced. Upon conclusion of this EA and decision-making process, one of the alternatives would become the long-term management option for this segment of the C&O Canal NHP.

This EA has been prepared in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended, to provide the decision-making framework that 1) analyzes a reasonable range of alternatives to meet objectives of the proposal, 2) evaluates potential issues and impacts on the park's resources and values, and 3) identifies mitigation measures to lessen the degree or extent of these impacts.

### How to Comment

We invite you to comment on this EA during the 30-day public review period. You may do so by any one of several methods. The preferred method of providing comments is through the NPS's Planning, Environment, and Public Comment (PEPC) website for the park at: <http://parkplanning.nps.gov/CHOH>. You may also submit written comments to:

Kevin D. Brandt, Superintendent  
C&O Canal NHP  
c/o McMahon's Mill Towpath Improvement Project EA  
1850 Dual Highway, Suite 100  
Hagerstown, Maryland 21740-6620

Only written comments will be accepted. Please submit your comments within 30 days of the posting of the notice of availability on the PEPC website. 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; however, NPS cannot guarantee that personal information, such as email address, phone number, etc., will be withheld.

## Table of Contents

<b>Chapter 1: Purpose of and Need for Action .....</b>	<b>1</b>
Purpose of and need for Action .....	1
Project Area .....	4
Significance of the Project Area .....	4
Issues and Resource Topics Retained for Detailed Analysis .....	4
Issues and Resource Topics Dismissed from Detailed Analysis.....	7
Floodplains .....	7
Wetlands .....	7
Special-Status Wildlife Species.....	7
<b>Chapter 2: Alternatives .....</b>	<b>9</b>
Description of the Alternatives.....	9
No-Action Alternative .....	9
Proposed Action/NPS Preferred Alternative .....	9
Alternatives Considered but Dismissed from Detailed Analysis .....	14
Mitigation Measures.....	15
<b>Chapter 3: Affected Environment .....</b>	<b>17</b>
Vegetation.....	17
State Plants of Concern .....	18
Cultural Resources.....	21
Cultural Landscape and Historic Structure.....	21
Visitor Use and Experience.....	22
<b>Chapter 4: Environmental Consequences .....</b>	<b>24</b>
General Methodology .....	24
Past, Present, and Reasonably Foreseeable Actions .....	24
Vegetation.....	25
Methodology .....	25
No-Action Alternative .....	25
Proposed Action/Preferred Alternative.....	26
Cultural Resources.....	28
Methodology .....	28
No-Action Alternative .....	29
Proposed Action/Preferred Alternative.....	29
Visitor Use and Experience.....	32
Methodology .....	32
No-Action Alternative .....	32
Proposed Action/Preferred Alternative.....	33

<b>Chapter 5: Consultation and Coordination .....</b>	<b>36</b>
The Scoping Process.....	36
Internal Scoping.....	36
Public Scoping .....	36
Agency Scoping.....	36
List of Preparers and Consultants .....	37
National Park Service.....	37
EA Engineering, Science, and Technology, Inc., PBC.....	38
<b>References.....</b>	<b>39</b>

## List of Appendixes

Appendix A: Plant List .....	42
Appendix B: Assessment of Effects Table.....	48

## List of Figures

Figure 1. C&O Canal NHP and Project Location.....	2
Figure 2. Photographs Depicting Conditions and Issues within the Project Area.....	3
Figure 3. Project Area .....	5
Figure 4. Proposed Action .....	11
Figure 5. Detour Route for Towpath Closures.....	13

## List of Tables

Table 1. Maryland Plants of Concern within the Project Area .....	19
Table 2. Past, Current, and Future Actions Used in the Analysis of Cumulative Impacts .....	24

## Acronyms and Abbreviations

C&O Canal NHP or park	Chesapeake and Ohio Canal National Historical Park
CFR	Code of Federal Regulations
DBH	Diameter at breast height
EA	Environmental Assessment
HAER	Historic American Engineering Record
McMahon's Mill Towpath Improvement Project	Reconstruct/Stabilize the Historic Stone Wall and Towpath from McMahon's Mill to Lock 42 project
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MHT	Maryland Historical Trust
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
PEPC	Planning, Environment, and Public Comment
USFWS	US Fish and Wildlife Service

## CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

The National Park Service (NPS) proposes to rehabilitate the existing historic stone wall and reestablish the towpath along approximately 0.9 mile of the Chesapeake and Ohio Canal National Historical Park (C&O Canal NHP or the park). This area of the historic stone wall and towpath is located in Washington County, Maryland and extends along the Potomac River from McMahon's Mill (milepost 88.1) to Lock 42 (milepost 89.0). Figure 1 shows the location of the C&O Canal NHP and the location of the project.

The NPS is taking on this project because the historic stone wall that supports the towpath has been badly damaged by repeated floods and vegetation growth in the masonry and has not been repaired adequately since the canal ceased operations in 1924. The work (the proposed action) includes 1) removing vegetation from and adjacent to the towpath and the historic stone wall; 2) reconstructing missing or washed out portions of the historic stone wall; 3) stabilizing and building up other portions of the wall; 4) moving some portions of the towpath inland; and 5) reestablishing the towpath with a width that would allow for safe passage of emergency and maintenance vehicles and at a height that would reduce closures from inundation following flood events. This environmental assessment (EA) analyzes the potential impacts that would result from the implementation of these actions.

This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, and implementing regulations, 40 Code of Federal Regulations (CFR) Parts 1500–1508, NPS Director's Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* (NPS 2011) and the accompanying handbook (NPS 2015). Compliance with Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended, is being conducted concurrently with the NEPA process.

### PURPOSE OF AND NEED FOR ACTION

The purpose of this proposed project is to rehabilitate and stabilize the historic stone wall and towpath to make it more resilient to flooding and to improve visitor access and safety in the project area. This project is needed for the following reasons:

- The historic stone wall has been weakened by vegetation growing through the structure and by water action from the Potomac River and storm events. Portions of the historic stone wall are currently washed out or missing. Periodic flood events continue to weaken the stone wall and create sinkholes in the towpath. The sinkholes have been temporarily filled but will continue to occur.
- Frequent high water from the proximity of the towpath to the Potomac River inundates the low sections of the towpath within the project area, which requires closure of the towpath and detours onto the adjacent county road network. The detour route is potentially dangerous, as the county roads are narrow and winding. The detour onto county roads also detracts from the visitor experience in a unique area of the park. The towpath within the project area is generally closed more than 12 times per year due to unsafe conditions.
- Without intervention, the towpath will continue to deteriorate and will eventually degrade until it is no longer usable by cyclists, pedestrians or maintenance personnel. In its current state, the towpath is impassable to vehicles, prohibiting NPS and emergency response vehicles from reaching injured visitors or employees.

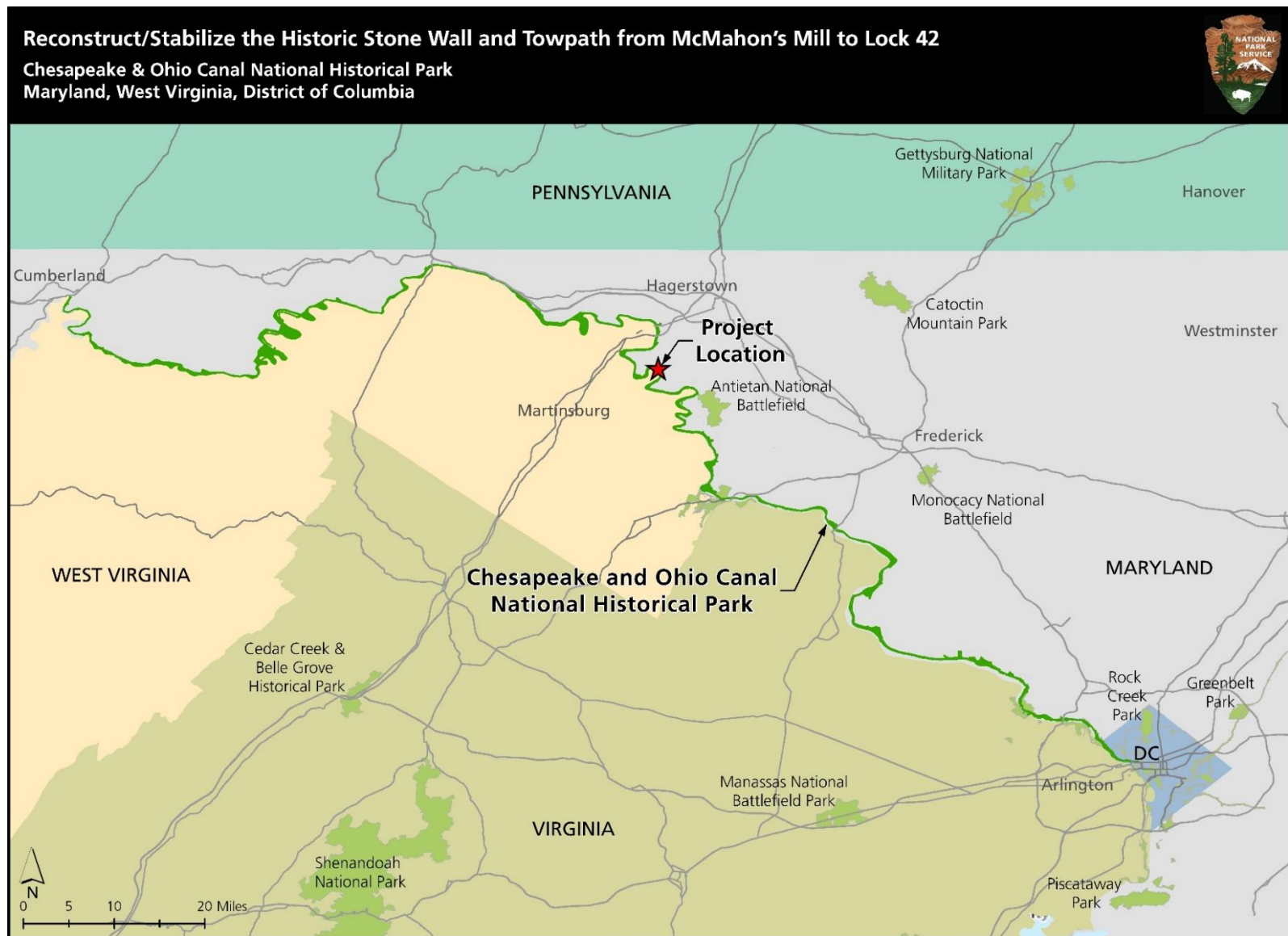


Figure 1. C&O Canal NHP and Project Location



Figure 2 presents photographs showing some of the conditions and issues within the project area.



**2a. Flood event resulting in towpath closure**



**2b. Sediment on the towpath after a flood event**



**2c. Narrow section of the towpath**



**2d. Vegetation growing out of the stone wall**



**2e. Undermining along the base of the stone wall**



**2f. Stone wall collapse**

Figure 2. Photographs Depicting Conditions and Issues within the Project Area

## PROJECT AREA

The Reconstruct/Stabilize the Historic Stone Wall and Towpath from McMahon's Mill to Lock 42 project (McMahon's Mill Towpath Improvement Project) is located between mileposts 88.1 and 89.0 and is immediately adjacent to the Big Slackwater section of the C&O Canal NHP. The project area, depicted in figure 3, includes the towpath and a 5-foot buffer on either side of the towpath, the historic stone wall, the riparian area along the Potomac River, and limestone cliff faces and outcrops in some areas. The project area also includes small portions of the towpath near milepost 88 (Big Slackwater area) and Lock 42 where the proposed action would tie into these areas adjacent to the McMahon's Mill area.

## SIGNIFICANCE OF THE PROJECT AREA

The C&O Canal NHP was established in 1971 and is located along 184.5 miles of the Potomac River shoreline from the mouth of Rock Creek in Georgetown, Washington, D.C. to Cumberland, Maryland. The C&O Canal NHP preserves one of the most intact 19th century canal transportation systems and is currently among the longest continuous historic canal towpaths in the country. The C&O Canal NHP was District-listed on the National Register of Historic Places (NRHP) in 1979 with an update and a boundary increase in 2015. The McMahon's Mill to Lock 42 segment (approximately 0.9 mile) is considered a contributing element, listed as a significant example of an engineered 19th century waterway in the Potomac Valley and Western Maryland, used for commercial transportation purposes. The section of the C&O Canal between McMahon's Mill and Lock 41 is unique in that it is one of only two places that relies on slackwater for canal boat travel, where boats were deliberately navigated out of the engineered canal prism and into the Potomac River; between Locks 41 and 42, boats navigated through the artificial canal prism. The towpath was constructed directly adjacent to the Potomac River at the base of the limestone cliffs, and portions of the towpath undulate as much as 4 to 5 feet in height, making this section of the towpath unique. As a historical resource there is nothing similar in the local or regional area.

## ISSUES AND RESOURCE TOPICS RETAINED FOR DETAILED ANALYSIS

In the context of NEPA reviews, issue statements describe concerns associated with current conditions in the project area or from implementation of an alternative. Through the scoping process, the NPS identified several issues related to the proposed action that were retained for detailed analysis:



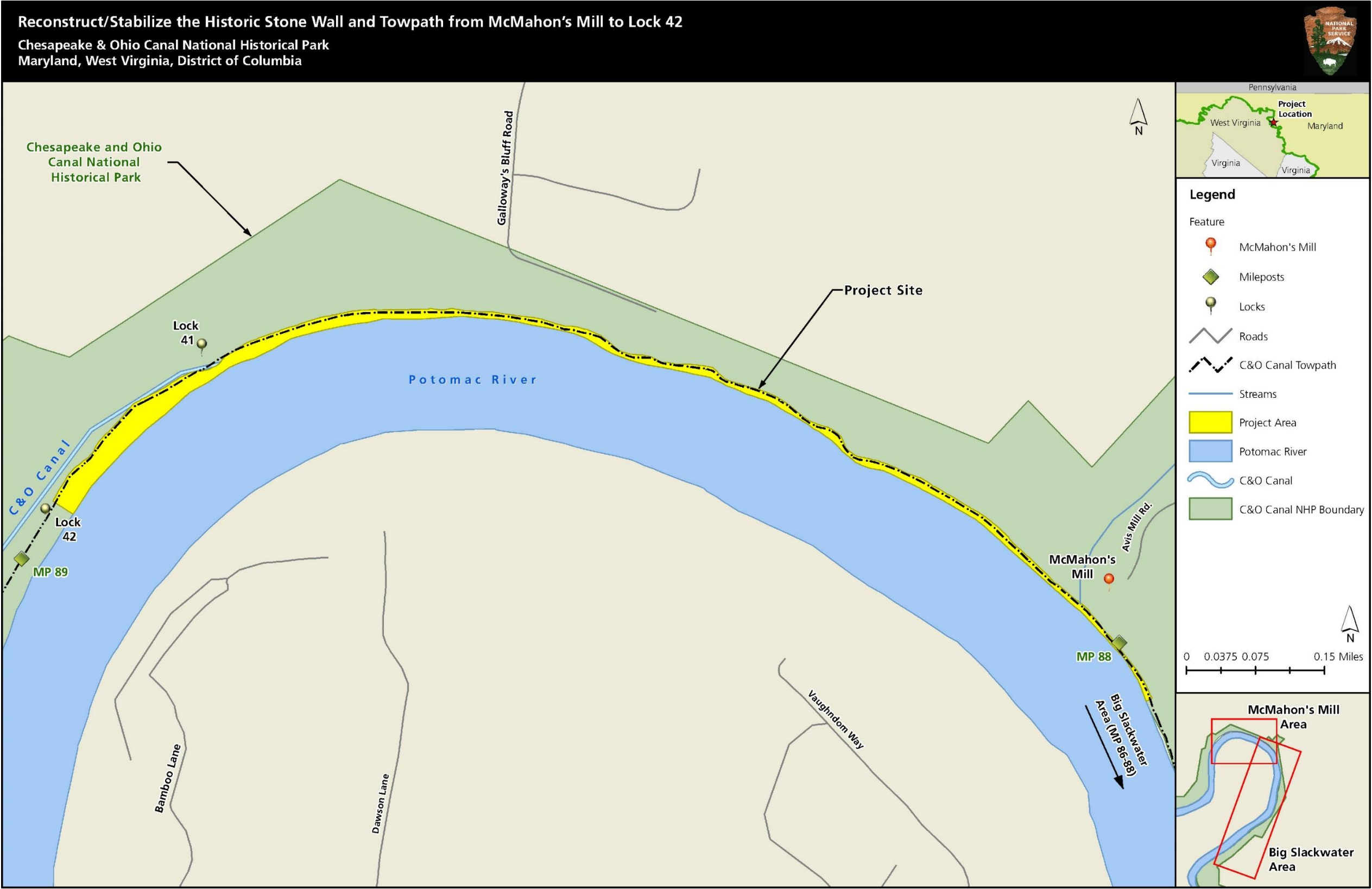


Figure 3. Project Area

Construction activities associated with the project have the potential to impact vegetation communities, including special-status plants.

To repair and stabilize the historic stone wall and raise, resurface, and move portions of the towpath inland, trees and woody vegetation between the towpath and the river would be removed, and selective removal of trees and other woody vegetation on the landward side of the towpath would be completed. In the western portion of the project where the area between the towpath and the river is wide (approximately between Lock 41 and Lock 42), only those trees and woody vegetation adjacent to the towpath (5-foot buffer) and along the retaining wall would be removed. This would result in the removal of approximately 300 trees, as well as some shrubs and herbaceous vegetation. Ten state plants of concern were identified within the project area during plant surveys for this project in April, July, and August 2017 (Normandeau 2017a). The removal of vegetation would also change the viewshed to which visitors are accustomed. Therefore, the potential impacts from vegetation removal are analyzed under the “Vegetation” and “Visitor Use and Experience” resource topics.

Construction activities have the potential to impact contributing and historic features associated with the C&O Canal NHP historic district.

To reduce the frequency of inundation during flood events, portions of the historic stone wall would be reconstructed or stabilized; the towpath would be raised, portions moved inland and resurfaced; and three stormwater pipes would be replaced with similar or larger pipes. These actions have the potential to bury historic district features, such as clusters of rope burns generated by canal boat traffic during the 19th and early 20th century and braided metal cables and iron pipes possibly associated with boat moorings. Further, the undulating nature of the towpath in this area, which is unique along this section of the towpath, would be lessened. The lowest portions of the towpath would be raised to achieve the elevation of 328 to 329 feet<sup>1</sup>, but the undulations would not be removed entirely. The historic stone wall would be repaired with historic and new material; however, the historic integrity could be impacted. For these reasons, potential impacts to the historic features are analyzed under the “Cultural Landscape,” and “Historic Structures,” resource topics.

Construction activities would strengthen the structural integrity of the stone wall and towpath and would reduce the frequency of inundation from high water during flood events.

The reconstruction and stabilization activities of this project would strengthen the stone wall and towpath, allowing the passage of emergency and maintenance vehicles and improving the ability of first responders to reach and treat injured visitors or employees and for the park to maintain and repair the wall and towpath when necessary. The resurfaced towpath would also improve the conditions of the towpath, providing a smooth surface devoid of sinkholes, which would impact visitors to this portion of the C&O Canal NHP. Raising the towpath elevation would result in fewer towpath closures from inundation from flood waters. The potential impacts from these safety enhancements are analyzed under the “Visitor Use and Experience” resource topic.

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<sup>1</sup> Current and proposed elevations in this document are referenced to the North American Vertical Datum of 1988 (NAVD88), the current national standard for vertical datums.



## ISSUES AND RESOURCE TOPICS DISMISSED FROM DETAILED ANALYSIS

The following issues were initially considered but were ultimately dismissed from detailed analysis in this EA. These issues are described below with the reason(s) that further analysis was not warranted.

### Floodplains

The project area lies almost completely within the 100-year floodplain of the Potomac River. As the towpath is a historic structure and the work to rehabilitate the towpath and to stabilize the associated stone wall would not preclude the structure's continued designation as an historic structure, this project is exempt from meeting the floodplain management requirements of the National Flood Insurance Program (FEMA 2008). The goal of the National Flood Insurance Program is to reduce the impact of flooding on private and public structures; however, exemptions are made for historic structures, as long as they maintain their historic designation (FEMA 2008). For this reason, floodplains have been dismissed from further analysis in this EA.

### Wetlands

In accordance with Director's Order 77-1: *Wetland Protection* (NPS 2002), the wetlands within the project area were classified according to wetland habitat type based on the Cowardin Classification System (Cowardin et al. 1979; Federal Geographic Data Committee 2013). The delineation identified 3 wetlands (0.36 acre total), 3 stream channels (0.025 acre total), and 2 navigable waters (Potomac River and C&O Canal) (Normandeau 2017b). The park consulted with the NPS Water Resources Division on the potential wetland impacts and determined that the proposed action is considered an excepted action under Director's Order 77-1, as less than 0.10 acre of palustrine emergent riverine bottomland would be impacted. The NPS would implement appropriate best management practices, as identified in NPS Procedural Manual 77-1: *Wetland Protection* (NPS 2016). Impacts to wetlands and riverine bottomlands in the study area would be negligible; therefore, this topic was dismissed from detailed analysis.

### Special-Status Wildlife Species

Special-status wildlife species are wildlife species that are federally or state listed species of concern or other species the park has been identified as warranting special monitoring or management.

**Federally Listed Bats.** The project area contains potential habitat for the endangered Indiana bat (*Myotis sodalis*) and the federally threatened northern long-eared bat (*Myotis septentrionalis*). Both species have been identified within C&O Canal NHP but not within the project area. Bat habitat could be impacted by the removal of trees; however, no roost or maternity trees are known to occur within the project area. The NPS initiated consultation under Section 7(a)(c) of the Endangered Species Act (16 United States Code 1531 et seq.) with the US Fish and Wildlife Service (USFWS) on September 11, 2018. The USFWS responded on September 28, 2018, concurring with the NPS conclusion that Indiana bat is not likely to occur in the project area, that the northern long-eared bat has no known maternity roosts or hibernacula in the vicinity, and the small amount of tree clearing necessary for the proposed action is not likely to cause adverse effects to these species. The tree clearing would be covered under section 4(d) of the Endangered Species Act for the northern long-eared bat; clearing trees greater than 4 inches in diameter at breast height (DBH) would be prohibited during the pup-rearing season (June 1 through July 31).

State-Listed Mussels. The area of the Potomac River near McMahon's Mill is known to support freshwater mussel species. Freshwater mussel surveys conducted on August 21 and 22, 2017 (Normandeau 2017c) identified 3 species that are listed as special-status by the state of Maryland: Atlantic Spike (*Elliptio producta*), state rare species; Green Floater (*Lasmigona subviridis*), state-listed endangered species; and Paper Pondshell (*Utterbackia imbecillis*), state watchlist species. These mussel species were located in nearshore habitat, up to the base of the stone wall, and along and within the existing stone of the wall. Localized and permanent impacts may occur to individual mussels near the project activities, but the effects would be short-term on the overall mussel population in this section of the Potomac River. Best management practices would be implemented during construction and habitat would be restored following construction. The NPS would coordinate with Maryland Department of Natural Resources (MDNR) regarding mitigation measures for mussel species of conservation concern, including relocating mussels prior to construction and timing restrictions on in-water activities. Re-colonization of mussels in the disturbed area would be expected to occur after construction. Overall effects to the mussel population would be short term and minimal.

With implementation of mitigation measures, adverse impacts on special-status wildlife species would be avoided or minimized through seasonal restrictions and relocation efforts. Although relatively small impacts could occur to mussels due to potential damage during relocation from its existing location to another suitable habitat, these impacts would be temporary and minimal. For these reasons, special-status wildlife species were dismissed from detailed analysis in this EA.

## CHAPTER 2: ALTERNATIVES

Two alternatives were chosen for detailed evaluation in this EA: the no-action alternative and the proposed action/preferred alternative. The chapter also describes other alternatives that were initially considered but dismissed from detailed analysis and presents mitigation measures for the proposed action.

### DESCRIPTION OF THE ALTERNATIVES

#### No-Action Alternative

The no-action alternative is analyzed in the NEPA process for the review and comparison of feasible alternatives to the existing baseline conditions. Under the no-action alternative, the NPS would not reconstruct or stabilize the historic stone wall, resurface the towpath, or raise and widen the towpath. The NPS would continue management actions, including general maintenance and spot repairs of the towpath to resolve voids that occur due to drainage issues. The current drainage infrastructure would remain in place. This includes three culverts ranging in size from 15 to 36 inches, two of which are associated with historic stone headwalls. Other features located within the project area would remain in place, including McMahon's Mill, Lock and Lockhouse 41, Lock 42, historic rope burns located in the bluff walls, and the current viewshed.

Erosion due to flooding would continue to degrade the current conditions of the towpath, and accessibility issues would remain. This scenario would involve a continuance of current maintenance activities, but it would not relieve the risk of eventual voids, surface failures, and closures that may occur throughout the project area. Nor would it reduce the number of trail closures due to incidental flood events. The towpath and the stone wall are unable to support heavy vehicles in their current conditions; therefore, the towpath would remain closed to vehicular traffic, including vehicles for maintenance, law enforcement, and emergency response. The deterioration of the towpath and stone wall could lead to eventual permanent closure of this portion of the towpath.

#### Proposed Action/NPS Preferred Alternative

The proposed action would resurface the entire towpath from milepost 88.1 to milepost 89.0, and the towpath in this area would be raised to an elevation of 328 to 329 feet to correspond more closely to the anticipated river water surface elevation profile during high water events. Reconstruction and stabilization activities proposed along the stone wall and towpath include: 1) recontouring, and in some areas, raising the elevation of the towpath; 2) widening select areas along the towpath; 3) resurfacing portions of the towpath; 4) stone wall stabilization, and in select areas, full reconstruction; 5) replacement of drainage infrastructure; and 6) revegetation of disturbed areas along the towpath. These actions are described in the following paragraphs and would involve approximately 0.9 mile between mileposts 88.1 and 89.0.

#### Towpath

Under the proposed action, sections of the towpath from milepost 88.1 to milepost 89.0 that are frequently flooded would be elevated. The average elevation of the towpath in the project area is 330 feet; however, several areas along the towpath have significantly lower elevations. The low-lying towpath areas that are prone to flooding range between 324 and 327 feet. The proposed action

would raise the low-lying areas of the towpath in the project area from 1 to 5 feet to accomplish the target elevation of 328 to 329 feet. The towpath would be elevated to 328 feet at the downstream end of the project (Big Slackwater area), and select segments of the westernmost portion of the towpath in the Big Slackwater area would be raised to reduce flooding. Approximately 0.1 mile of the Big Slackwater towpath would be incorporated into the McMahon's Mill Towpath Improvement project. Near Lock 42, the towpath would be graded to 329 feet. These elevations were determined based on the Preliminary Hydrology & Hydraulic Assessment for McMahon's Mill to Lock 42 (NPS 2017a), which determined water surface profiles for various storm events.

Some portions of the towpath would be moved inland to accommodate repair and stabilization of the stone wall (total of approximately 0.35 mile of the project area) (figure 4). The lowest portions of the towpath would be raised to achieve the elevation of 328 to 329 feet, but the undulations in the towpath would not be removed entirely, as the undulations are a unique characteristic along this section of the towpath. To allow access of emergency and maintenance vehicles, the towpath would be widened to a minimum of 8 feet and be designed to accommodate heavy vehicles. Some portions of the towpath (total of approximately 0.33 mile) are currently of adequate elevation (figure 4). These portions would be resurfaced by removing the top 14 inches of material, placing geotextile for stabilization, and installing 14 inches of new compacted densely graded aggregate pavement material. The newly elevated and relocated portions of the towpath would be surfaced in the same manner with geotextile and 14 inches of aggregate pavement material.

### Stone Wall

Missing or washed out sections of the historic stone wall would be reconstructed. In reconstructed areas, new foundations would be established. Other sections would be stabilized or reinforced. Sections of the wall would have to be rebuilt to allow for the increased towpath grade, as discussed above. Where erosion from Potomac River wave action is visible, rip-rap would be placed at the base of the existing stone wall. Where grade changes are required for the towpath or where the current wall has collapsed, the existing wall would be built upon to gain adequate elevation. Stone would be placed to the desired height, reinforced with geogrid material for stabilization, and backfilled with additional stone. Repair and reconstruction of these vertical sections of the stone wall would comprise a total of approximately 0.27 mile of the project area (figure 4). In areas where the sloped armament type wall requires repair, the armament would be extended to a higher elevation using new stone material. The towpath would be moved inland in areas where the angle of the stone wall is currently too steep. Moving the towpath inland would allow the wall to be repaired using new material to a sufficient angle to ensure stability. Work on the sloped wall would encompass a total of approximately 0.35 mile (figure 4). In areas where the wall would be raised, stabilized, and/or reconstructed, the NPS would use as much of the existing historic building materials as practicable. Historic material that has fallen into the river would be retrieved and reused, where feasible. Where the use of new material is necessary, consideration would be given to the characteristics of the historic material.





Figure 4. Proposed Action

## Stormwater Conveyance

The surface of the towpath is currently drained by three small culverts, ranging from 15 to 36 inches, that drain into the Potomac River. Two of these culverts have associated historic stone headwalls. The NPS would remove the existing culverts and replace them with new 24- to 36-inch culverts in preparation for potentially larger and more intense storm events. The new culverts would be placed in suitable structural fill materials and stabilized to minimize future erosion along the towpath.

## Vegetation

All trees and woody vegetation between the towpath and the river would be removed, and selective removal of trees and other woody vegetation on the landward side of the towpath would be completed. In the western portion of the project where the area between the towpath and the river is wide (approximately between Lock 41 and Lock 42), only those trees and woody vegetation adjacent to the towpath (5-foot buffer) and along the retaining wall would be removed. The vegetation removal would be necessary for the construction, repair, and stabilization of the existing stone wall. Within the limits of the towpath, trees and woody vegetation would be cut below the proposed grade of the towpath. Outside the limits of the towpath, all trees and brush would be cut flush with the existing grade. Existing stumps between the towpath and the Potomac River would be cut flush and an herbicide treatment would be applied to complete stabilization and reconstruction of the stone wall. Following construction, the NPS would revegetate the areas of disturbance and new construction on both sides of the towpath. Cleared and disturbed areas would be revegetated with a weed-free native grass/forb seed mix to support natural regeneration and reduce the potential for spread of invasive species. The proposed action would include measures for protecting existing larger trees that would not be removed for construction.

## Construction Activities Including Equipment, Timing, and Detours

Construction activities would be completed mechanically and by hand. Construction equipment that could be used include excavators, dozers, compactors, wheel loaders, dump trucks, graders, and rollers. A barge would be used for transport of construction materials and would require the construction of a temporary dock at McMahon's Mill (figure 4). The temporary loading dock would be approximately 40 by 50 feet and would use an existing steel support structure that was installed for the adjacent Big Slackwater project. The temporary loading dock would be welded to the existing support structure; therefore, ground disturbance would not be required.

The construction activities associated with the stone wall and the towpath would take approximately 18 months. McMahon's Mill parking area and an existing concrete pad near McMahon's Mill would be used as the staging areas for construction materials, equipment, and vehicles. This parking area would be closed to visitors during the construction period. Visitors would be excluded from the construction area using fencing. Signage would be installed to inform the visitors of closures and detours and would be present for the duration of the construction phase of the project. The detour would be the same as that used during high water events, an approximately 3-mile route on adjacent county roads (figure 5). Short-term, temporary traffic control may be necessary for construction vehicles, but no road closures are expected during the construction activities.

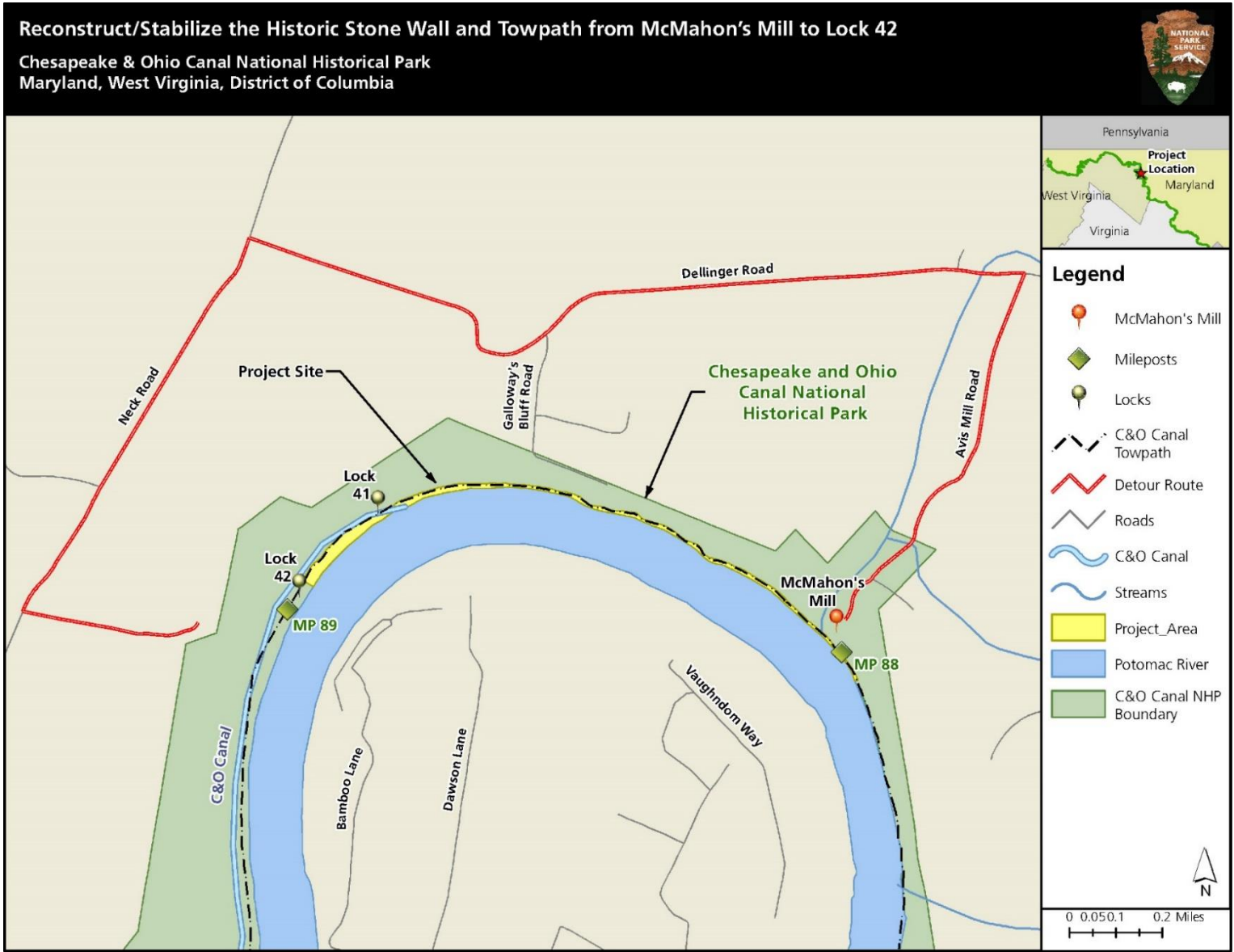


Figure 5. Detour Route for Towpath Closures

## ALTERNATIVES CONSIDERED BUT DISMISSED FROM DETAILED ANALYSIS

The following alternatives were considered for project implementation but were dismissed from further analysis, as described below.

- Maximized bridges and entire towpath from milepost 88.1 to milepost 89.0 resurfaced with towpath elevation ranging from 328 to 330 feet: Under this alternative, the number of bridges would be maximized, and the entire towpath would be resurfaced with a hard-wearing surface. Three new bridges would be installed where stormwater pipes are currently located. The towpath would be raised to an elevation ranging from 328 to 330 feet. In locations where bridges would be installed, the historic stone wall would be removed. This alternative was dismissed because installation of the bridges would require the removal of portions of the existing stone wall. This would cause an adverse effect on cultural resources under Section 106 of the NHPA, as the wall is historic and a contributing element to the C&O Canal NHP, identified as an historic district on the NRHP.
- Reduced bridge count and entire towpath from milepost 88.1 to milepost 89.0 resurfaced with towpath elevation ranging from 328 to 330 feet: This alternative would add two bridges where stormwater pipes are currently located, and the entire towpath would be resurfaced with a hard-wearing surface. The towpath elevation would be raised in select areas with an elevation ranging from 328 to 330 feet. In the two locations where bridges would be installed, the historic stone wall would be removed. This alternative was dismissed from analysis for the same reason as discussed above, installation of the bridges would result in an adverse effect on cultural resources under Section 106 of the NHPA.
- Reduced bridge count and partial towpath resurfacing with towpath elevation ranging from 328 to 330 feet: This alternative would add two bridges where stormwater pipes are currently located with no resurfacing along approximately 970 linear feet of the northern end of the towpath. The towpath elevation would be raised in select areas, ranging in elevation from 328 to 330 feet. In locations where the two bridges would be installed, the historic stone wall would be removed. Installation of the bridges would result in an adverse effect on cultural resources under Section 106 of NHPA, as portions of the existing historic wall would be removed. Additionally, only resurfacing a portion of the towpath would not be meeting the purpose and need of the project, which includes improving the condition of the towpath for the safety of visitors and park staff and providing safe and reliable access for emergency and maintenance vehicles. Therefore, this alternative was dismissed.
- No bridges and partial towpath resurfacing with towpath elevation ranging from 328 to 330 feet: This alternative would eliminate the use of bridges with no resurfacing along approximately 970 linear feet of the northern end of the towpath. A new vertical, slightly laid-back wall would be installed on a below-surface concrete base. The towpath elevation would be raised in select areas, ranging in elevation from 328 to 330 feet. In the location where the new wall would be installed, the historic stone wall would be buried but preserved. Covering the historic stone wall with a new laid-back wall would result in a potential adverse effect on cultural resources under Section 106 of NHPA, though to a lesser degree because the historic stone wall would remain in place but be covered by the laid-back wall. Removing or covering portions of the historic stone wall would also result in an adverse impact on visitor use and experience, as these actions would alter the natural setting of the C&O Canal NHP and cause visual impacts beyond those created by removing vegetation along the towpath. Further, only resurfacing a portion of the towpath would not fully meet the



purpose and need of the project, as stated in the previous paragraph. For these reasons, this alternative was dismissed from full analysis.

## MITIGATION MEASURES

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; and compensating for the impact by replacing or providing substitute resources or environments. To minimize impacts related to the proposed action alternative, the NPS would implement mitigation measures whenever feasible. Subject to the final design and approval of plans by relevant agencies, mitigation measures would include, but would not be limited to, the items listed below.

- The removal of vegetation would result in exposed soils during construction, presenting the possibility for erosion at the proposed study area located immediately adjacent to the Potomac River. 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 2015). The plan would include resource protection measures that conform to *Maryland Standards and Specifications for Erosion and Sediment Control* (MDE 2011) and would be submitted to the Maryland Department of the Environment (MDE) Water Management Administration for approval.
- To minimize potential impacts on northern long-eared bat habitat, removal of trees greater than 4 inches DBH would be prohibited from June 1 to July 31.
- State plants of concern would be located and fenced or flagged prior to construction.
- The NPS would coordinate efforts with the MDNR regarding mitigation measures, including timing restrictions on in-water activities.
- The NPS would coordinate with MDNR to relocate mussel species of conservation concern.
- In-water work would require turbidity curtains to reduce sedimentation in the Potomac River.
- Care would be taken to avoid any rutting caused by vehicles or equipment.
- Buffers between areas of soil disturbance and waterways would be planned and maintained. Soil erosion best management practices would be used (e.g., sediment traps, erosion check screen filters, silt fences) to prevent the entry of sediment into waterways.
- Any structure or fill would be maintained to avoid adverse impacts on aquatic environments or public safety.
- Where seeding is required, a weed-free native grass/forb seed mix would be obtained and used in accordance with NPS policies and guidance. Management techniques would be implemented to foster rapid development of native plant growth.
- Any water vessels used for construction (e.g., barge) would be decontaminated prior to use in the Potomac River so they are free of any vegetation, animals, mud, and any other organic material that is not native to the river.

- To avoid transport of nonnative species to terrestrial portions of the study area, all construction vehicles would be washed prior to use on the towpath and only clean and weed-free fill material would be used.
- Historic American Engineering Record (HAER) documentation of the Chesapeake and Ohio Canal, Big Slackwater Towpath, McMahon's Mill to Lock 42 was completed in consultation with Maryland Historical Trust (MHT) and has been submitted to the Library of Congress.
- The stone wall would be reconstructed to historic specifications using existing historic stone where possible.
- Adequate drainage would be maintained around historic structures (culverts) to promote stability and preservation.
- The towpath would be designed to fit into the cultural landscape as best as possible while also accomplishing flood resiliency. This would include materials used, as well as the width and height of the towpath.
- Some historic and contributing features, such as rope burns, would be buried in place by raising the towpath. These features are documented in the HAER report and preserved under the fill material.
- Visitors would be informed of construction activities by posting information at the trail and/or C&O Canal website. Visitors would also be routed away from work areas during construction.
- Construction employees would be instructed on the sensitivity of the general environment, and their activity would be monitored.
- Best management practices would be followed to avoid exposure of the terrestrial and aquatic environment to risks, such as fuel spills.
- All protection measures would be clearly stated in the construction specifications.

## CHAPTER 3: AFFECTED ENVIRONMENT

This chapter describes the resources that could be impacted from implementation of the alternatives. The descriptions of the resources provided in this chapter serve as an account of the baseline conditions against which the potential impacts of the alternatives considered in this environmental assessment are compared.

### VEGETATION

The project area lies within the Ridge and Valley physiographic region of Maryland, which is characterized by steep ridges and gently sloping valleys. Lands within this region have karst topography that can include sinkholes, underground streams, and caves (NPS 2017b).

The entire project area is located within the Potomac River floodplain in an area generally classified as Basic Mesic Forest (Harrison 2016) and contains floodplain forest habitat. Floodplain forests are common along rivers and are prone to flooding. Common canopy species of floodplain forests include boxelder (*Acer negundo*), silver maple (*Acer saccharinum*), and American sycamore (*Platanus occidentalis*). Other associated trees include American elm (*Ulmus americana*), green ash (*Fraxinus pennsylvanica*), and common hackberry (*Celtis occidentalis*). The understory of floodplain forests often includes pawpaw (*Asimina triloba*) and northern spicebush (*Lindera benzoin*). Vines are common in floodplain forests and include Virginia creeper (*Parthenocissus quinquefolia*) and poison ivy (*Toxicodendron radicans*). The herbaceous layer of floodplain forests is generally well-developed and includes species such as Virginia bluebells (*Mertensia virginica*), white snakeroot (*Ageratina altissima*), mayapple (*Podophyllum peltatum*), and white avens (*Geum canadense*) (Schmit et al 2012; Thomas et al 2014; MDNR 2015).

Plant surveys were conducted in April, July, and August 2017 to document the rare plants within the project area, including the riparian area along the Potomac River, cliff faces, and clifftops. A comprehensive list of plants observed during the field surveys was compiled (appendix A). A total of 158 species were identified during the plant surveys with only one coniferous tree species present, eastern red cedar (*Juniperus virginiana*), an early successional species (Schmit et al 2012). In addition to the deciduous tree species identified in the previous paragraph, the following species are also present: red maple (*Acer rubrum*), northern red oak (*Quercus rubra*), bitternut hickory (*Carya cordiformis*), eastern redbud (*Cercis canadensis*), and American basswood (*Tilia americana*), among others. The project area contains a large variety of shrubs, vines, grasses, and herbaceous species (appendix A). The plant surveys also identified 46 species of nonnative plants within the project area, including tree of heaven (*Ailanthus altissima*), Japanese stiltgrass (*Microstegium vimineum*), garlic mustard (*Alliaria petiolata*), and winter creeper (*Euonymus fortunei*).

The project area includes approximately 0.5 acre on either side of the towpath. The vegetation in this area contains trees ranging from saplings to 40 inches DBH, as well as woody brush and herbaceous species. On the landward side of the towpath, the topography is often steep with areas of exposed limestone bluffs. The project area within the C&O Canal NHP was disturbed by the original excavation of the canal and construction of the towpath in the early 1800s, and forest edge habitat has continued due to maintenance of the towpath as a recreational trail.

## State Plants of Concern

The 2017 plant survey identified 10 plants of special concern, as identified by MDNR and presented in table 1. Only Dutchman's pipevine (*Isotrema macrophyllum*) is listed by the state of Maryland. The remainder of the species are not actively tracked by MDNR and are at low risk of being listed as threatened or endangered due to their extensive range and/or populations.

Based on the current design for this project, 4 of the 10 rare plants are located outside of the project area and would not be impacted; therefore, these species are not carried forward for detailed analysis. The remaining 6 species—Dutchman's pipevine, dwarf larkspur (*Delphinium tricornes*), limestone wild petunia (*Ruellia strepens*), prickly gooseberry (*Ribes cynosbati*), Short's aster (*Symphyotrichum shortii*), and wall rue (*Asplenium ruta-muraria*)—are located within the project area and have the potential to be impacted by construction activities. Most of these plant species were found north of the towpath, growing along the forest edge and out of the limestone cliffs and outcrops adjacent to the towpath in the eastern half of the project area (Normandeau 2017a). A brief life history for each of these species and rationale for dismissing these species from or carrying them forward for detailed analysis in Chapter 4: Environmental Consequences are provided below.

**Dutchman's Pipevine (*Isotrema macrophyllum*):** Dutchman's pipevine is listed as threatened by the state of Maryland. This deciduous woody vine climbs 20-35 feet via twining stems. The dark green leaves of Dutchman's pipevine are large, approximately 12-inches wide, and the pipe-shaped, green and burgundy mottled flowers with yellow tubes grow singly or in clusters of 2 or 3 (Wildflower Center n.d.). Dutchman's pipevine is globally at very low risk of extinction or extirpation due to its extensive range, abundant populations or occurrences, and little to no concern from declines or threats. However, with a state rank of S2, the state of Maryland considers this species at high risk because of its restricted range, low population or occurrence, and other factors. Dutchman's pipevine was observed growing in a tree in a strip of riparian forest between the towpath and the Potomac River on the western portion of the project area (Normandeau 2017a). The area between the towpath and the river is wide in this portion of the project area, and only those trees adjacent to the towpath would be removed for construction. The NPS would flag the tree containing Dutchman's pipevine, as well as surrounding trees that provide shading, prior to construction, and these trees would not be cleared during construction activities to preserve Dutchman's pipevine. Therefore, Dutchman's pipevine will not be carried forward for detailed analysis.

**Dwarf Larkspur (*Delphinium tricornes*):** This is an herbaceous perennial plant that grows to approximately 0.5 to 1.5 feet tall. The deeply-lobed leaves are approximately 4 inches long. A cluster of purple or blue-violet flowers grows at the end of a flowering stalk. Dwarf larkspur is often found in hilly deciduous woodlands but also occurs in mesic woodlands, moist ravines and thinly wooded slopes, thinly wooded bluffs, and partially shaded cliffs along river banks (Illinois Wildflowers n.d.a). Dwarf larkspur is globally demonstrably secure and, ranked as S3, is considered at moderate risk of extinction or extirpation due to its fairly restricted range in the state. A cluster of 18 dwarf larkspur plants was identified in one location along the woodland edge. Prior to vegetation clearing, rare plants, including dwarf larkspur, would be located and flagged or fenced. Because vegetation clearing would target select trees and woody vegetation within 5 feet of the towpath on the landward side, impacts to dwarf larkspur would be able to be avoided during construction activities; therefore, dwarf larkspur will not be carried forward for detailed analysis.



Table 1. Maryland Plants of Concern within the Project Area

Common Name	Scientific Name	State Status	State Rank	Global Rank	Number of Locations in the Project Area	Number of Specimens in the Project Area*	Number of Specimens within the Construction Limits*
Common Hoptree	<i>Ptelea trifoliata</i>	N/A	S3	G5	2	31	0
Dutchman's Pipevine	<i>Isotrema macrophyllum</i>	T	S2	G5	1	1	1
Dwarf Larkspur	<i>Delphinium tricornes</i>	N/A	S3	G5	1	18	18
Limestone Wild Petunia	<i>Ruellia strepens</i>	N/A	S2/S3	G4/G5	6	24	12
Prickly Gooseberry	<i>Ribes cynosbati</i>	N/A	S3	G5	6	28	10
Short's Aster	<i>Symphyotrichum shortii</i>	N/A	S3/S4	G5	16	236	198
Tall Thoroughwort	<i>Eupatorium altissimum</i>	N/A	S3	G5	8	182	0
Vase-vine Leatherflower	<i>Clematis viorna</i>	N/A	S3	G5	1	1	0
Wall Rue	<i>Asplenium ruta-muraria</i>	N/A	S3	G5	12	72	72
Whorled Rosinweed	<i>Silphium trifoliatum</i>	N/A	S3	G4?	1	3	0

Source: 2017 Plant Survey (Normandeau 2017a)

\* Specimen numbers were estimated in several locations; some counts are approximate

State Status Definitions:

N/A = Not Applicable – Species not listed as endangered, threatened, or extirpated by the state of Maryland

T = Threatened – a species that appears likely, within the foreseeable future, to become endangered in Maryland

State/Global Rank Definitions:

S1/G1 = Critically Imperiled/Highly State Rare – At very high risk of extinction or extirpation due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors. Typically occurring in five or fewer populations.

S2/G2 = Imperiled/State Rare – At high risk of extinction or extirpation due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors. Typically occurring in 6-20 populations.

S3/G3 = Vulnerable/Watchlist – At moderate risk of extinction or extirpation due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors. Typically occurring in 21-80 populations.

S4/G4 = Apparently Secure – At fairly low risk of extinction or extirpation due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.

S5/G5 = Demonstrably Secure – At very low risk of extinction or extirpation due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.

Limestone Wild Petunia (*Ruellia strepens*): Twenty-four limestone wild petunia plants were found in 6 locations along the forest edge in the eastern portion of the project area (Normandeau 2017a). This herbaceous perennial plant is approximately 1.5 to 3 feet tall with opposite leaves that are approximately 5 inches long and 3 inches wide. The flowers are pinkish lavender to bluish violet and approximately 2 inches long and 1.5 inches across. The limestone wild petunia is typically found in mesic open woodlands, woodland edges, areas along woodland paths, thickets, thinly wooded slopes along rivers, and rocky banks of streams (Illinois Wildflowers n.d.b). Limestone wild petunia has a global rank of G4/G5 (apparently secure/demonstrably secure), meaning that the species has a fairly to very low risk of extinction or extirpation due to an extensive range, and/or many populations or occurrences, with possible concerns of local recent declines, threats, or other factors. MDNR has ranked limestone wild petunia as S2/S3 (imperiled/vulnerable), indicating that this species is at a moderate to high risk of extinction or extirpation in Maryland. As stated above, rare plants would be flagged or fenced prior to vegetation removal, vegetation removal targets trees and woody vegetation, and impacts to some herbaceous species would be able to be avoided. However, one location of limestone wild petunia occurs in an area where the towpath would be moved inland, which could result in impacts to this species. Limestone wild petunia will be carried forward for detailed analysis in the “Environmental Consequence” chapter.

Prickly Gooseberry (*Ribes cynosbati*): This plant is a woody shrub that reaches approximately 2 to 4 feet in height. The branches have long thorns near the leaves and shorter thorns along the branches. The leaves are lobed and are approximately 2-inches long. Greenish-yellow flowers grow in groups of 1 to 3. Habitats for this species include thin rocky woodlands, wooded slopes, woodland borders, and limestone bluffs (Illinois Wildflowers n.d.c). Prickly gooseberry is globally listed as G5, demonstrably secure and state ranked as S3, vulnerable. Approximately 28 prickly gooseberry plants were observed in 6 locations on the limestone cliffs and outcrops in the central and eastern portion of the project area (Normandeau 2017a). Because prickly gooseberry grows out of the rock face, no impacts to this species are expected from the proposed action. Prickly gooseberry will not be carried forward for detailed analysis.

Short’s Aster (*Symphyotrichum shortii*): A total of 236 Short’s aster plants were observed in 16 locations throughout the towpath predominately along forest edges of the eastern portion of the project area (Normandeau 2017a). Short’s aster is a 2 to 3.5-foot-tall herbaceous perennial plant. The leaves are alternate and 6 inches long by 2 inches wide. Each flowerhead contains 10 to 20 lavender or pale blue-violet florets. This plant prefers partial sun, mesic to dry-mesic conditions, and soil that contains loam or some rocky material with decaying organic matter (Illinois Wildflowers n.d.d). Short’s aster is globally listed as G5, demonstrably secure. MDNR has ranked Short’s aster as S3/S4 (vulnerable/apparently secure), meaning that this species is at a fairly low to moderate risk of extinction or extirpation. Similar to limestone wild petunia, Short’s aster occurs in areas where the towpath would be moved inland. Although rare plants would be located and flagged or fenced prior to construction, impacts to some individual plants could occur, so this species will be carried forward for detailed analysis in the “Environmental Consequence” chapter.

Wall Rue (*Asplenium ruta-muraria*): Wall rue is a perennial evergreen fern. The blueish-green or olive-green leaflets grow on branched fronds that are approximately 1.5 to 7 inches long. Wall rue grows within cracks and fissures on dry ledges of dolomitic limestone and conglomerate in shaded to open sites (Massachusetts DFW 2015). Wall rue is also globally ranked as G5, demonstrably secure and state ranked as S3 (vulnerable). A total of 72 wall rue plants in 12 locations are present on the limestone cliffs and outcrops in the central and eastern portion of the project area (Normandeau 2017a). Similar to prickly gooseberry, the wall rue plants grow out of the rock face, and no impacts to this species are expected from the proposed action. Therefore, wall rue will not be carried forward for detailed analysis.

## CULTURAL RESOURCES

Construction on the C&O Canal began in the 1820s and ended in 1850. The canal stretches for 184.5 miles along the Potomac River from Rock Creek at Georgetown in Washington, D.C. to Cumberland, Maryland. Over time, the canal suffered extensive flooding, railroad competition, the American Civil War, and financial ruin, finally closing in 1924. Management authority of the C&O Canal was given to the NPS in 1938, and it became a national monument in 1961. In 1971, Public Law 91-664 established the C&O Canal National Historical Park “to preserve and interpret the historic and scenic features . . . and develop the potential of the canal for public recreation.”

The C&O Canal was nominated to the NRHP as a historic district in 1979. The resources that contribute to the significance of the canal historic district include cultural landscapes, the canal prism, the towpath, archeological resources, locks, lockhouses, section houses, aqueducts, culverts, dams, turning basins, masonry walls, weirs, and the Paw Paw tunnel. These resources range from fully functional structures and components to ruins. The historic district is a cultural landscape within which several component cultural landscapes have been identified as retaining a high degree of integrity, including the area surrounding the Great Falls Tavern, the C&O Canal in Georgetown, Ferry Hill Plantation, and the Williamsport area.

In the approximately 0.9-mile segment of the C&O Canal between McMahon’s Mill to Lock 42, canal boats were directed out of the canal prism into the calm waters of the Potomac River above Dam 4. This area is known as “Big Slackwater.” This portion of the C&O Canal consists primarily of the towpath and an associated stone wall, culverts, and a concrete bridge located adjacent to McMahon’s Mill. The towpath is bordered to the south by the Potomac River and to the north by a near vertical limestone rock formation known as “Galloway’s Cliffs” and steep earthen embankments (Cochran 2018).

### Cultural Landscape and Historic Structure

The towpath, with integral stone wall and culverts, is identified as a historic structure. The towpath and additional manmade and natural components comprise the cultural landscape within the project area. Because these resources are intertwined, they are described together in this section.

The towpath was constructed around 1836 by quarrying portions of limestone rock faces to provide room for the towpath, building a stone wall adjacent to the Potomac River, and then back filling between the stone wall and the rock face to create a level surface for the towpath. The width of the towpath varies from approximately 6 feet at its narrowest to 12 to 15 feet at its broadest extent. The uppermost portion of the canal towpath is constructed of gravel surfacing, covering historic fill that ranges from 4 to 12 feet in depth over limestone bedrock (Cochran 2018, Mills + Schnoering 2017). Due to flooding, the towpath is currently in disrepair in some areas. Following flooding events, the towpath is occasionally covered with debris, including sediment and woody plant material. When necessary, the NPS repairs failures in the towpath.

Elevations along the canal towpath within the study area vary to some degree. Beginning at the east end located adjacent to McMahon’s Mill, the towpath is 331 feet. At the west end of the proposed project area at Lock 41, the towpath is 333 feet. The average elevation between these two points is 330 feet. The flood-prone areas range in elevation from 324 to 327 feet.

The stone wall was constructed in two distinct styles: a vertical stone wall and a 45-degree angle slope wall. The vertical style wall comprises the majority of the stone wall within the study area. The

45-degree angle slope wall is located near the northwest terminus of the proposed project area, before Lock 41. The location of the slope wall coincides with a steep bend in the Potomac River and is located along the scour side of the river. The stone wall adjacent to the towpath includes both mortared and dry laid (un-mortared) sections. Visible mortared sections of the stone wall appear to be the result of 1970s to present repairs and stabilization efforts. The NPS has also repaired portions of the towpath surface with gravel.

Within the project area, there are two stone culvert inflow headwalls; modern corrugated metal pipes were installed at these two culverts between the 1970s and the present. The McMahon's Mill Culvert No. 138 was constructed in 1837 by Michael Byrne & Co. This culvert, also known as the Downey Branch Culvert, contains a spillway for Downey Branch Creek that fed McMahon's Mill and flowed into the Potomac River (Cochran 2018).

In addition to the towpath, stone wall, and culverts, the following historic features also contribute to the cultural landscape in this section of the C&O Canal NHP: the 7 clusters of rope burns located approximately 1.5 to 3.5 feet above the present grade of the towpath and 0.5-inch in diameters with varying lengths, Galloway's Cliffs, caves, views, wooded vegetation, the Potomac River and the bend in the river, the 20th century concrete bridge (construction date unknown) over Culvert No. 138, and Lock 41 and Lock 42 constructed by Michael Byrne & Co. in 1834 (Cochran 2018).

There are also remnants of early recreational use of the area after the C&O Canal Company ceased commercial transportation operations in 1924. The remains of old boat docks/moorings consist of metal pipes and angle iron sunk into the river bank and metal cables tied around trees. In addition, there are also steel/iron anchors embedded into the cliff face; these are likely the remains of access points to the canal towpath from the top of the cliff. Features associated with the towpath's 20th century post-canal use include:

- Braided metal cable (approximately 0.25 inch) and associated stone structure
- Corrugated steel culvert measuring 15 inches by 18 inches in diameter
- Two 1-inch 20th century iron pipes embedded in towpath adjacent to cliff face
- Braided metal cable (approximately 0.25 inch) embedded in tree
- Metal pipe embedded into cliff face
- 1-inch century rebar imbedded in towpath
- Two angle iron sections embedded into towpath
- Two iron pipes embedded into towpath (Cochran 2018)

Many of these features become obscured from view seasonally due to vegetation growth.

## VISITOR USE AND EXPERIENCE

In 2017, an estimated 4,859,573 people visited the park (NPS 2018a). The busiest months were April, May, and August, when monthly attendance exceeded 524,000 visits. January and December were the least visited months with approximately 237,380 visitors to the park in January and 212,764 visitors in December (NPS 2018b).

In the portion of the park within Washington County, the park counts visitors by vehicle or trail at 14 sites. In 2017, a total of 1,214,786 visitors were estimated in the Washington County District, accounting for approximately 25% of all visitors to C&O Canal NHP (NPS 2018c). At McMahon's Mill, trail counts indicated that 8,168 people visited the towpath in 2017 (NPS 2018c), which accounts for 0.7% of the visitors in Washington County.

The C&O Canal NHP offers a variety of natural, cultural, and recreational resources, including a towpath that provides a nearly level, continuous trail for biking and hiking through the Potomac River Valley. Within the project area, the primary recreational use of the canal is hiking and biking along the original towpath. Visitors to the study area also engage in other recreational activities, such as boating, fishing, swimming, and birdwatching. Visitors can access the towpath from the parking lot at McMahon's Mill on Avis Mill Road.

High water events that inundate the towpath have caused damage, and several sinkholes have developed on the towpath. The NPS patches these sinkholes, but the repairs are unable to withstand subsequent floodwaters. When portions of the towpath become inundated, the NPS closes the towpath and reroutes visitors onto county roads. The approximately 3-mile detour (figure 5) takes visitors onto narrow, hilly, and winding county roads, requiring visitors to walk or bike on these roads without shoulders and with limited sight distances of oncoming vehicles. The towpath within the project area is generally closed more than 12 times per year. Due to the current condition of the towpath and the stone wall, maintenance vehicles are unable to access the portion of the towpath between mileposts 88.1 and 89.0. Emergency response vehicles are also prohibited from using the towpath in the project area. The NPS has not had an emergency in this part of the park to date. However, if an emergency was to occur, park staff and emergency responders would be required to access the towpath on foot, resulting in longer emergency response time.

## CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

### GENERAL METHODOLOGY

This chapter describes the potential environmental consequences of implementing the no-action alternative and the proposed action. It is organized by resource topic and provides a comparison between the two alternatives based on issues and topics discussed in chapter 1 and further described in chapter 3. In accordance with the Council on Environmental Quality regulations, direct, indirect, and cumulative impacts are described, and the impacts are assessed in terms of context, intensity, and duration (40 CFR 1502.16). This analysis assumes that the mitigation measures, as defined in chapter 2, would be implemented for construction activities under the proposed action.

### PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS

Cumulative impacts are 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). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

To determine potential cumulative impacts, past, present, and foreseeable future actions and land uses were identified in or near the project area. Due to the relatively small scope of the proposed action, the study area for this cumulative impact assessment was limited to projects within Washington County. Cumulative impacts are considered for the no-action alternative and the proposed action, by combining the impacts of the alternative being considered with other past, present, and reasonably foreseeable future actions and are presented at the end of each impact topic discussion. Table 2 shows the projects considered in the cumulative impact analysis for each resource.

Table 2. Past, Current, and Future Actions Used in the Analysis of Cumulative Impacts

Project	Project Description	Impact Topics
Big Slackwater Historic Stone Wall and Towpath	The Big Slackwater restoration project reestablished the park's historic towpath along a 1.5-mile section of Big Slackwater portion of the C&O Canal NHP between historic Dam #4 and McMahon's Mill (milepost 86 to milepost 88). Damaged sections of the towpath and historic stone masonry wall were rehabilitated, and sections of the towpath surface were stabilized. The McMahon's Mill Towpath Improvement project is located adjacent to the western portion of the Big Slackwater project. Approximately 0.1 mile of the westernmost portion of the Big Slackwater project would be incorporated into the McMahon's Mill Towpath Improvement project in that select portions of the towpath would be raised to reduce flooding.	<ul style="list-style-type: none"><li>• Cultural Resources</li><li>• Visitor Use and Experience</li><li>• Health and Safety</li></ul>



Project	Project Description	Impact Topics
Towpath resurfacing	The C&O Canal NHP has teamed with the Great Allegheny Passage Bike Trail to improve the towpath as a long-distance bike trail along select sections of the towpath. Along these portions of the towpath, the NPS is completing fine grading along the towpath surface and installing aggregate wearing surface to a depth of 4 inches using a mechanically driven paving machine. Actions include, but are not limited to, fine grading of existing trail surface, removal of the center grass strip, disposal of organic and deleterious materials, and placement and compaction of the aggregate material. In heavily damaged areas, a 4-inch base layer would be installed. The finished towpath would be free of potholes and washouts with drainage toward the canal. Tree roots, rocks, and other surface inconsistencies are removed. The width of the towpath is restored. The towpath remains open during construction.	<ul style="list-style-type: none"> <li>• Vegetation</li> <li>• Visitor Use and Experience</li> <li>• Health and Safety</li> </ul>
Stabilize 184.5 Mile Canal Towpath by Maintaining Historic Stone Culverts	This project would repoint 5 stone culverts from milepost 70.68 to milepost 102.65. Culverts 104, 107, 108, 109, 134, and 135 would be addressed. General treatments would include the repointing of both the river and berm side head walls, resetting of dislodged stones, and minor vegetation and tree removal. Some tuck pointing would be required to stabilize the rubble backfill at culvert 135.	<ul style="list-style-type: none"> <li>• Vegetation</li> <li>• Cultural Landscapes</li> <li>• Historic Structures</li> <li>• Visitor Use and Experience</li> <li>• Health and Safety</li> </ul>

## VEGETATION

In this section, the impacts on vegetation from the proposed action are analyzed. Construction activities could cause direct and indirect impacts on the basic mesic vegetation community through vegetation removal, soil compaction, disturbance, contamination, and spread of nonnative species. The study area for the analysis consists of the limits of construction for the areas proposed for surface alterations, stone wall stabilization, drainage improvements, revegetation activities, and other construction activities (including staging and trail detours).

## Methodology

A description of the baseline conditions of the vegetation within the project area is provided in Chapter 3: Affected Environment. Alternatives were evaluated against this baseline to determine the changes that would occur under each alternative. Potential impacts to vegetation were identified by reviewing existing data sources and literature, quantifying the extent to which the project could impact vegetation, tree removal, and special-status plants.

## No-Action Alternative

Under the no-action alternative, there would be no construction activities, but routine maintenance activities, such as removal of hazard trees, maintenance of vegetation adjacent to the towpath, and repair of sinkholes in the towpath, among others, would continue. Vegetation to be removed would be identified prior to maintenance activities, and state plants of concern would be avoided, to the extent possible. Under the no-action alternative, maintenance activities would continue to result in the removal of select vegetation but would not have an overall effect at the population level or on the

viability of the plant communities. This alternative would not result in new impacts on vegetation within the project area.

## Cumulative Impacts

Under the no-action alternative, vegetation within the project area would remain unchanged; therefore, it would have no potential to contribute to cumulative impacts when considered with past, present and reasonably foreseeable future projects occurring at C&O Canal NHP.

## Conclusion

Under the no-action alternative, treatment of vegetation would remain the same as current conditions. Select vegetation could be impacted during routine maintenance activities, resulting in potential impacts to individual plants, but plant populations would not be impacted at the population level. Vegetation communities within the project area would be unchanged, and the no-action alternative would not contribute to cumulative impacts on vegetation.

## Proposed Action/Preferred Alternative

For the analysis of impacts on vegetation, it was assumed that a 5-foot corridor on either side of the towpath would be cleared of select vegetation for construction activities, resulting in an area of approximately 0.5 acre on either side of the towpath. For most of the project area (approximately 0.75 mile), the area between the towpath and the Potomac River is narrow, and all trees and woody vegetation would be removed. In the western portion of the study area between Lock 41 and Lock 42, the area between the towpath and the river is wider. In this area (approximately 0.15 mile) only the vegetation adjacent to the towpath and along the retaining wall would be removed. Staging areas for construction materials and equipment would be located near McMahon's Mill on an existing concrete pad and the existing gravel parking area, so no additional vegetation clearing would be required for staging areas.

Long-term adverse impacts to vegetation would occur due to the vegetation clearing required for resurfacing the towpath, moving portions of the towpath inland, and stabilization and reconstruction of the stone wall. Clearing and construction activities of the proposed action would result in ground disturbance, soil compaction, and the physical removal of vegetation. Vegetation clearing would remove woody brush and select trees in the canopy and understory. Some herbaceous vegetation would be directly and indirectly impacted by removal and trampling during clearing activities. After construction, all disturbed areas would be seeded with a weed-free native grass/forb seed mix, which would help to stabilize the disturbed soils.

The proposed action would result in the removal of trees and shrubs throughout an 0.5-acre area adjacent to the towpath between the towpath and the river. The 0.5-acre disturbed area would be revegetated using a weed-free native grass/forb seed mix following construction. Riparian herbaceous cover would be established, along with grasses, grass-like plants, and forbs tolerant of intermittent flooding or saturated soils. The vegetation cover would be expected to become established within 2 to 5 years following construction. The NPS would manage this area adjacent to the river to be free of trees and woody vegetation to retain the integrity of the stone wall after construction. This maintenance would result in long-term adverse impacts because it would prevent the vegetation from growing back to its original state.

On the landward side of the towpath, the proposed action would result in both permanent and temporary impacts. The towpath would be moved inland in portions of the project area

(approximately 0.35 mile total; figure 4). This would result in a permanent loss of vegetation in those areas of approximately 0.2 acre or less. Although vegetation removal would be mostly confined to previously disturbed areas along existing forest edge habitats along the towpath, some riparian or shrub vegetation removal along the towpath would occur. Areas within the limits of disturbance would be revegetated with a weed-free native grass/forb seed mix to stabilize these areas. Some herbaceous and shrub cover would be expected to return to preconstruction conditions along some portions of the towpath within 2 to 5 years following construction. Tree and larger shrub cover would take longer – up to 15 years to establish at the sub canopy level and much longer at the canopy level along the landward side. Given the wide-ranging upland forested and extensive similar forest habitat nearby, vegetation loss is not expected to have a discernable negative effect on the riparian and upland forests adjacent to the towpath.

Overall, the proposed action would result in both temporary and permanent loss of vegetation. Disturbed areas would be revegetated using a weed-free native grass/forb seed mix that would restore herbaceous cover within several years of construction. Areas adjacent to the stone wall would be maintained to be free of trees and woody vegetation to protect the structural integrity of the stone wall. The proposed action would impact a small area of riparian forest along a 0.9-mile segment of the C&O Canal NHP. This represents less than 1% of the riparian forest along the 78 miles of the portion of the park within Washington County. The impacts on vegetation would be adverse, but in the context of the park as a whole, the impacts would be minimal.

**State Plants of Concern.** Plant surveys identified approximately 600 specimens comprising 10 species of state plants of concern within the project area (Normandeau 2017a). Most of these specimens would not be impacted by construction activities due to their distribution outside of the limits of disturbance. There are two species of state plants of concern that could be impacted by the proposed action: limestone wild petunia and Short's aster. As previously stated, rare plants would be identified in the project area prior to construction activities and would be flagged or fenced and would be avoided to the extent possible. Limestone wild petunia and Short's aster both grow adjacent to the towpath almost exclusively on the landward side. Although vegetation removal would target trees and woody vegetation, herbaceous species could be directly impacted from mortality or indirectly through trampling, being smothered by disturbed soils or other debris, and by loss of habitat. Some individual plants could be lost during construction activities, particularly those that grow in areas where the towpath would be moved inland. The portions of the towpath to be moved inland lie in the western half of the project area and the majority of the rare plants identified during the 2017 plant survey grow in the eastern half. Although clustered mostly in the eastern half of the project area, both species are present along approximately three quarters of the towpath in the project area. Based on the 2017 plant survey, 1 location of limestone wild petunia with 1 plant and 3 locations of Short's aster with a total of 35 plants were located growing adjacent to the towpath in areas where it would be moved inland. The proposed action would destroy some individual limestone wild petunia and Short's aster plants but would impact only a small subset of the plants that grow within the project area. Most of the plants within the project area would be avoided. The loss of some individual plants would be an adverse impact on these state plants of concern; however, the impact would be minimal, as the proposed action would not cause population-level impacts.

### Cumulative Impacts

There is one present action (the towpath resurfacing for bike trail improvements) and one reasonably foreseeable future action (stabilizing the towpath by maintaining stone culverts) that have the potential to impact vegetation. These actions that contribute to maintaining the towpath require minimal vegetation clearing and would result in negligible adverse impacts on vegetation communities. The proposed action would result in disturbance to the vegetation and would result in

a moderate impact on vegetation within the project area. Overall, the proposed action would contribute a noticeable increment to the adverse cumulative impacts of other actions to vegetation. In the context of the entire park, the cumulative impact on vegetation would be minimal. The proposed action is likely to result in adverse impacts to individual Short's aster and limestone wild petunia plants but would not have population-level impacts. The proposed action would contribute a slight adverse impact on the overall cumulative effects on vegetation due to the loss of individual state plants of concern within the project area.

## Conclusion

The proposed action would require the removal of vegetation to complete construction activities on the stone wall and towpath within the project area. Vegetation within an approximately 1-acre area would be subject to removal, including mature canopy trees, understory species, and some herbaceous species. Following construction, vegetation maintenance would prohibit trees and woody vegetation from growing in and adjacent to the stone wall to retain its structural integrity. This maintenance plan would reduce the available habitat for vegetative communities and wildlife; however, the vegetation growth would be consistent with that which was present during the time when the canal was in use. Disturbed areas would be revegetated with a weed-free native grass/forb seed mix, and the areas on the landward side of the towpath would be allowed to succeed naturally. The proposed action would result in adverse impacts from a loss of vegetation, areas maintained to be free of trees and woody vegetation adjacent to the river, and potentially altered species composition. Vegetation clearing could have an impact on individual specimens of the state plants of concern limestone wild petunia and Short's aster, but most plants of both species would be avoided during construction activities. The proposed action would not have population-level effects on these species. When considering the small amount of area that would be impacted and the 90 vegetation communities present within C&O Canal NHP, the impacts that would result from the proposed action are minimal. The proposed action would contribute a small adverse increment to the minor adverse cumulative impact on vegetation.

## CULTURAL RESOURCES

For the purposes of NEPA, this analysis focuses on the potential impacts of the project to the historic structure (the towpath) and cultural landscape and its features in the McMahon's Mill area of the C&O Canal NHP. The geographic area of the historic structure is the area of potential effects, which extends from 5 feet beyond the towpath on the landward side to the Potomac River between mileposts 88.1 and 89.0. This approximately 0.9-mile area includes the towpath, the stone wall, culverts, McMahon's Mill, Locks 41 and 42, and rope burns in the limestone cliff face, among other historic features.

## Methodology

This analysis considers whether the proposed action would result in changes to the integrity, spatial relationship, and character-defining features of contributing elements of the historic structure and cultural landscape. These changes could be considered beneficial or adverse, depending on whether they enhance or detract from the historic structure, cultural landscape, or associated features.

## No-Action Alternative

**Historic Structure.** Under the no-action alternative, the NPS would continue to manage the McMahon's Mill to Lock 42 portion of the park as it does currently to allow for continued use. Minimal repairs and maintenance efforts would sustain the towpath near its existing state of integrity. New material would be added to fill sinkholes as needed.

The NPS would continue to close the towpath during flood events and detour visitors around the flooded areas. This section of the towpath would continue to be degraded by flooding events, which cause the stone wall to fail and erode the surface of the towpath, resulting in a loss of historic material. Continued flooding events would likely lead to eventual permanent closure of this portion of the towpath. Other features and elements of the historic structure, such as the culverts, bridges, and headwalls, would not be maintained. In the short-term, the historic structure and associated features would be retained with minimal change, but over time, the integrity of workmanship, materials, and feeling would be adversely impacted as the features fail.

**Cultural Landscape.** As stated above, the NPS would continue to perform limited repairs of the towpath to allow for continued use; however, over time, flooding would deteriorate the towpath and stone wall to the point that the structures would fail. In addition to the impacts to the historic structure, vegetation growth would continue to seasonally obscure historic views within the landscape and views of historic features. Although other features, buildings, and structures (McMahon's Mill and the locks) within the cultural landscape would not be impacted, the no-action alternative would result in a loss to this unique section of the towpath. The result would be long-term adverse effects on the workmanship, materials and feeling of this section of the cultural landscape.

## Cumulative Impacts

Other past, present, and reasonably foreseeable future actions have had or would have both adverse and beneficial effects on the historic character of the historic structure and cultural landscape. The Big Slackwater restoration project repaired and added new materials, adversely affecting the historic character of this segment of the towpath; however, the stabilization efforts beneficially affected the towpath by reducing the further deterioration. The ongoing project to resurface the towpath for bike trail improvements involves removal of vegetation and restoring the width of the towpath, resulting in restored historic views of the landscape. The project to stabilize the towpath by maintaining stone culverts would have a beneficial effect on the historic features. The no-action alternative would add a long-term adverse increment to the beneficial and adverse cumulative impacts to the historic structure and cultural landscape.

## Conclusion

In the long-term, the no-action alternative would result in adverse effects to the historic structure and this section of the cultural landscape as the features fail. When combined with the effects of past, present, and foreseeable projects, the overall cumulative effects to the C&O Canal NHP would be adverse, as a portion of the contiguous 184.5-mile towpath would be degraded or lost under the no-action alternative.

## Proposed Action/Preferred Alternative

**Historic Structure.** Under the proposed action, the towpath would be altered in the following ways: portions of the towpath would be raised, portions would be moved inland, the towpath would be

widened to a minimum of 8 feet, and the entire towpath within the project area would be resurfaced. Raising the towpath surface, thus reducing of the undulations, and widening the towpath would change the unique characteristic of this section of the historic structure, changing the design and form and modifying the spatial organization. Moving the towpath inland would alter the original design slightly. No changes to the cliff faces would occur. The NPS would select new resurfacing materials that would blend into the landscape, thus minimizing impacts. These changes to the towpath would have long-term adverse impacts on the historic structure.

The proposed action would result in reconstructing, stabilizing, and/or raising the height of approximately 0.6 mile (about two-thirds of the project area) of the historic stone wall, and the stabilized and reconstructed portions would be within the same footprint as the current walls to the extent feasible. The wall would be extended in height to accommodate the appropriate towpath elevation, and material would be added to the base of the wall in areas where material is missing. Although the proposed action would use as much of the existing historic building materials as practicable, including viable material that has fallen into the river, reconstruction of or adding to the wall would affect the integrity of the historic structure. Where the use of new material is necessary, consideration would be given to the characteristics of the historic material. In areas where the height of the wall is elevated, this contributing feature would be altered and result in adverse physical and visual impacts to the towpath. However, the reconstruction and repairs would be compatible with the historic materials in terms of design, color, and texture and be in accordance with the Secretary of Interior's Standards for restoration and reconstruction. Therefore, except for raising the height of the wall, the overall integrity of the towpath should be minimally affected.

Raising the elevation of the towpath would also bury the clusters of rope burns, the braided metal cables, and pipe elements. This would not result in an adverse impact to these features, as they would be buried in place. Visitors would no longer experience these elements, although vegetation may already obscure these elements from view seasonally under current conditions. Vegetation removal may result in removal of one braided metal post-canal use/recreational feature that is embedded in a tree. Replacement of three non-historic stormwater pipes with new pipe would not result in an adverse effect to the historic structure. Drainage improvements would require a slight modification of features of the towpath, but the overall integrity would not be diminished.

Overall, the proposed action would have a long-term adverse impact on the features and integrity of the historic structure. However, the historic structure would be maintained and would continue to be experienced by visitors.

**Cultural Landscape.** Raising the elevation of the towpath surface and reduction of the undulations would change the unique characteristic of this section of the cultural landscape. Resurfacing the towpath would have no to little change to the spatial relationship of the towpath corridor to the surrounding landscape. Moving the towpath inland would alter the original design slightly. Reducing the undulation and realigning the towpath would result in long-term adverse impacts on the cultural landscape due to the change in the design, form, and spatial organization.

The proposed action calls for the wall to be raised, stabilized, and/or reconstructed. The NPS would use as much of the existing historic building materials as practicable, including viable material that has fallen into the river. Where the use of new material is necessary, consideration would be given to the characteristics of the historic material. Select portions of the historic stone wall would be modified. The stabilized and reconstructed walls would be within the same footprint to the extent feasible; however, the wall would be extended in height to accommodate the appropriate towpath elevation and material would be added to the base of the wall in areas where material is missing. The historic stone wall is an integral part of the towpath, contributing to the historic character of this

section. Modification of this contributing feature would have an adverse physical and visual impact to the towpath. However, the reconstruction and repairs would be compatible with the historic materials in terms of design, color and texture resulting in a minimal effect to the overall integrity of the towpath.

Replacement of three non-historic stormwater pipes with new pipe would not result in an adverse effect to the stone headwalls or the cultural landscape. As previously stated, the new materials would be selected to blend into the landscape (e.g., material, color) with minor changes in structural features.

The vegetation clearing required for construction activities and the ongoing vegetation maintenance to prevent growth in the rehabilitated stone wall would result in a noticeable change to the cultural landscape. The absence of trees between the towpath and the Potomac River would expand views and would resemble a more historic viewshed and landscape. This would result in a beneficial change to the cultural landscape.

The proposed action would have a negligible adverse impact on the overall historic character of the 184.5-mile cultural landscape. The towpath has been resurfaced on other occasions in the past and there would be no further loss of the character-defining features of the towpath. The stone walls would be stabilized or reconstructed as part of the proposed action, and vegetation would be removed. The proposed action would include a slight modification to the alignment and height of the towpath, but the overall integrity of the cultural landscape would not be diminished.

There would be adverse impacts to elements and features of the cultural landscape, but an overall long-term beneficial effect to the cultural landscape by keeping the entire towpath contiguous and this section from further deterioration and failure.

### Cumulative Impacts

Other past, present, and reasonably foreseeable future actions have had or would have both adverse and beneficial effects on the historic character of the historic structure and cultural landscape, as described under the no-action alternative. The proposed action would add short-term and long-term adverse incremental effects to specific elements and features of the historic structure and cultural landscape, and beneficial increment to the cumulative impact to the historic structure and cultural landscape.

### Conclusion

The proposed action would have both adverse and beneficial impacts on the historic structure and cultural landscape. The changes to the towpath would alter the unique characteristics of the towpath within the project area by changing the design and form, modifying the spatial organization, and introducing new materials. The actions to stabilize and reconstruct portions of the stone wall would have a physical and visual effect, which would alter the integrity of materials, workmanship, design, feeling, and association. Vegetation clearing and maintenance would provide a more historic landscape, resulting in beneficial impacts. Overall, some elements and features of the historic structure and cultural landscape would be adversely impacted by the proposed action; however, the construction activities would preserve the McMahon's Mill portion of the towpath, and therefore, the contiguous 184.5-mile towpath in the park. When combined with the effects of past, present, and foreseeable projects, the overall cumulative effects to the C&O Canal NHP would be beneficial under the proposed action.



## VISITOR USE AND EXPERIENCE

To identify the potential impacts of the no-action alternative and the proposed action on visitor use and experience at the park, current conditions on the towpath and surface conditions along the stone wall and towpath area were considered. In addition, opportunities to access the towpath, the potential for reducing the number of closures due to flooding, providing a towpath that is safe for visitors, and creating a towpath that can accommodate emergency vehicles and maintenance vehicles were considered. The study area for visitor use includes the limits of construction between milepost 88.1 and Lock 42, as well as staging areas and towpath detours.

### Methodology

The potential for changes in visitor experience and the safety of visitor and park staff were evaluated by assessing the limitations and assumed changes to visitor access and associated visitor uses related to the proposed action and determining whether these projected changes would impact visitor experience. The analysis also considered the effect of the existing conditions and the construction and operation of the proposed action on the safety of visitors and park staff.

### No-Action Alternative

Under the no-action alternative, the stone wall and the towpath would remain in the current condition. No construction activities would occur; therefore, no vegetation would be removed, and the cultural context of the canal towpath would remain unchanged. Visitors would continue to use the towpath in its current condition with sinkholes that are occasionally patched by the NPS. The no-action alternative would maintain the current visitor use and experience, but visitors could be adversely impacted by the condition of the towpath. Hikers, bikers, and all other visitors would be required to use the deteriorating towpath. Additionally, following flood events, the towpath could be covered with sediment, vegetation, or other debris. Sinkholes, debris on the towpath, and washouts could increase tripping and slipping hazards for visitors.

When the towpath is inundated from flooding, visitors are required to follow a detour onto country roads for approximately 3 miles (figure 5). Walking or cycling along a road is not the desired experience for C&O Canal NHP visitors and diminishes their experience. Further, use of the approximately 3 miles of county roads poses dangers to visitors due to vehicular traffic, as the roads are winding, do not have shoulders, and have reduced lines of sight. For those that visit the project area for activities such as fishing, swimming, or birdwatching, these activities would be unavailable to them for the duration of the detour during the towpath closure, resulting in adverse impacts on those visitors. The length of towpath closures varies, as it depends on the persistence of the floodwaters.

The current condition of the towpath is not able to support emergency vehicles due to the condition of the stone wall and towpath and the width of the towpath in certain areas. To date, emergency response has not been necessary in the McMahon's Mill area of the park. In the event an emergency was to occur with the current conditions of the towpath and stone wall, emergency response would be more difficult, time-consuming, and costly, as park rangers and county rescue personnel would be required make a great effort to reach injured visitors or conduct search and rescue operations, resulting in adverse impacts to the injured or stranded visitor and the response team.

Under the no-action alternative, the experience of C&O Canal NHP visitors would remain unchanged. Long-term adverse impacts would occur due to the condition of the towpath, degraded

or unavailable experiences due to towpath closures, potential conflicts with vehicular traffic during towpath closures, and the effort and time necessary for first responders to reach injured visitors.

### Cumulative Impacts

Visitor use and experience, including safety, would remain unchanged under the no-action alternative; therefore, it would have no potential to contribute to cumulative impacts when considered with past, present and reasonably foreseeable future projects occurring at C&O Canal NHP.

### Conclusion

There would be no new impact on visitor use and experience under the no-action alternative. There would be continued adverse impacts on visitors to the McMahon's Mill area due to the deteriorating towpath conditions, prevalence of mud and vegetative debris on the towpath following floods, the detours onto county roads during towpath closures, and the time, energy, and cost required for first responders to reach a lost or injured visitor in the case of an emergency. Visitor experience for C&O Canal NHP visitors within the project area would be unchanged, and the no-action alternative would not contribute to cumulative impacts on visitor use and experience.

### Proposed Action/Preferred Alternative

Under the proposed action, the stone wall would be stabilized and reconstructed and the towpath would be raised and resurfaced. During construction, the towpath would be closed to visitors, resulting in a short-term adverse impact on visitor use, experience, and safety. During construction (approximately 18 months), visitors would be required to detour around the project area on county roads for approximately 3 miles (figure 5), the same as they would for a flood closure. Visitors would be subject to dangers of sharing the road with vehicles on roads that are winding, do not have shoulders, and have reduced lines of sight. For visitors that use the McMahon's Mill area for activities such as swimming or fishing, the detours would be adverse, as these recreational opportunities would not be available within the project area or the detour. The NPS would have this information posted on their website and available at ranger stations, allowing visitors to make alternate plans to avoid the detour. Further, noise from construction may reach visitors in adjacent areas, resulting in minimal short-term impacts.

Following construction, the landscape would be changed. The construction activities would require the removal of approximately 300 trees and other vegetation. All disturbed areas of the project area would be revegetated with a weed-free native grass/forb seed mix, which are generally established quickly, and the landward side of the towpath would be allowed to succeed naturally. Tree species present in the forest adjacent to the towpath include boxelder, silver maple, American sycamore, American elm, green ash, and common hackberry. These species are fast-growing (NC State University n.d. a-e) with several species growing more than 24 inches per year (Arbor Day Foundation n.d. a-c). Visual impacts for visitors from disturbed areas would be temporary. The area between the towpath and the Potomac River from McMahon's Mill to approximately Lock 41 would remain free of trees and woody vegetation indefinitely to protect the structural integrity of the stone wall and the towpath. The area between Lock 41 and Lock 42 is wider and would only require removal trees and brush adjacent to the towpath and along the stone wall. The absence of trees along the river between McMahon's Mill and Lock 41 would have a long-term adverse impact on the viewshed for visitors that frequent the McMahon's Mill area and are accustomed the presence of the trees, some of which are mature and large. For those that visit the McMahon's Mill area for the first

time, there would be no impact from the lack of trees along the river. Conversely, the landscape could be beneficial for first-time visitors and some return visitors, as it would create a landscape that is similar to the working days of the C&O Canal where the presence of trees would have impeded the ability to pull the boats.

The cultural context of the project area would be altered slightly by the proposed action. Any new materials used for construction would be compatible with historic materials. Raising portions of the wall and towpath, realigning portions of the towpath, and reducing the undulations of the towpath could result in long-term impacts on experience for some visitors that frequent the McMahon's Mill area. For those that visit the area for the first time and even for some return visitors, these changes would have no impact on their experience. Visitor experience is unique to the individual.

The resurfaced and raised towpath would also have substantial beneficial impacts on visitor use and experience, as well as visitor and staff safety. The resurfaced and raised towpath would be smoother for walking, hiking, and biking and would be less susceptible to mud and vegetative debris after flood events, resulting in decreased risks for visitor injuries from slips, trips, and falls. Ongoing vegetation maintenance would consistently provide increased viewshed of the river and additional fishing access from the towpath, enhancing visitor experience for some. The higher elevation of the towpath would result in fewer closures from flood events, and therefore, fewer detours onto county roads for visitors and a safer park experience. Additionally, the strengthened stone wall and resurfaced and widened towpath would allow for emergency vehicle access, resulting in quicker emergency response time.

Overall, the proposed action would allow for long-term use of the towpath, as the NPS would have the ability to properly maintain it for visitor use. Although the viewshed and the cultural context would be altered under the proposed action, the project area would remain available to visitors for recreation under safe conditions, resulting in beneficial impacts to visitor use and experience, as well as the safety of visitors, park staff, and emergency responders.

## Cumulative Impacts

The proposed action would result in beneficial impacts to visitor experience and safety through improved towpath conditions, expanded recreation opportunities, and improved access for emergency responders. Past, present, and reasonably foreseeable future actions would improve drainage and stabilize the towpath and improve the conditions along the towpath and reduce the locations where emergency access conflicts occur. These projects have had short-term adverse impacts to visitor experience but have resulted in a long-term beneficial impact. Overall, the proposed action would contribute a small long-term beneficial impact on the overall cumulative effects on visitor experience and safety because of increased capacity of visitor facilities and improved quality of the towpath along the C&O Canal.

## Conclusion

Short-term adverse impacts on visitor experience and safety would occur during construction activities, due to disruption of use in the project area, construction noise, and detours onto potentially dangerous county roads. Construction activities would result in permanent changes to the viewshed and cultural context of the project area, which would be adverse for some visitors but would not impact others. The proposed action would result in an improved towpath and stone wall, which would allow for long-term maintenance for visitor use with increased recreation opportunities and fewer safety concerns, fewer detours along county roads from high water events,

and faster response time in the event of an emergency. It is important to note that both short-term and long-term impacts would be localized to a small section of the park, less than 1 mile in length, and that visitors would only experience these impacts as they traverse the study area. The beneficial and adverse impacts of the proposed action would contribute a small increment to the cumulative impact, and overall, the impact on visitor use and experience at C&O Canal NHP would be beneficial.

## CHAPTER 5: CONSULTATION AND COORDINATION

This chapter summarizes the process undertaken by the NPS to contact individuals, agencies, and organizations for information or that assisted in identifying important issues, analyzing impacts, or that will review and comment on the Reconstruct/Stabilize the Historic Stone Wall and Towpath from McMahon's Mill to Lock 42 Environmental Assessment. Throughout the planning process, the C&O Canal NHP staff encouraged elected officials, culturally associated American Indian tribes and groups, partners in other agencies, park visitors, and private citizens to participate in this planning effort, as summarized below.

### THE SCOPING PROCESS

Scoping is the process of determining the scope of issues to be addressed in an environmental document. It includes internal scoping with NPS staff, consultation with all interested parties and any agency with jurisdiction by law or with special expertise, and the general public.

#### Internal Scoping

Internal scoping discussions for the McMahon's Mill Towpath Improvement Project started in the summer of 2016 among NPS staff from the park and the National Capital Region. Internal scoping included determining the purpose and need for the project and developing alternatives. Draft schematic designs were created for the preliminary alternatives. In May 2017, a team from Denver Service Center, National Capital Region, C&O Canal NHP, and architect and engineering contractors met to discuss the feasibility of the preliminary alternatives. Using a choosing by advantages process, the team evaluated the preliminary alternatives and ultimately chose the proposed action for this project.

#### Public Scoping

The public was notified of the McMahon's Mill Towpath Improvement Project through a press release on July 9, 2018, distributed via email. The press release was also posted on C&O Canal NHP's website and on social media. The press release notified all interested parties of the 30-day scoping comment period and of the public meeting, which was held on July 23, 2018 at the park's headquarters in Hagerstown, Maryland. The public meeting was an open house format where participants were welcome to review informative materials on the project and ask park staff questions. Five individuals attended the public meeting.

The public was encouraged to submit their comments on the McMahon's Mill Towpath Improvement Project electronically through the NPS Planning, Environment and Public Comment (PEPC) website. Public comments were accepted in writing at the public meeting and by mailing comments to the park. The park received 3 correspondences: 2 from individuals and 1 from a non-governmental organization. The correspondences were generally supportive of the project.

#### Agency Scoping

Agency scoping was held in an effort to obtain early input on the scope of issues to be addressed in this EA. Scoping letters were sent to MDE, MDNR, MHT, and USFWS.

## Endangered Species Act Section 7 Consultation

In accordance with federal and state requirements for special-status species, scoping letters were mailed to state and federal agencies on June 26, 2018. These letters provided information on the proposed project and requested information on any federal or state-listed species that could be impacted by the proposed project.

The NPS initiated consultation with the USFWS on September 11, 2018, and in a letter dated September 28, 2018, the USFWS concurred with the NPS on its determination of “may affect but is not likely to adversely affect” the northern long-eared bat and Indiana Bat.

The NPS will continue to work with MDE and MDNR to address any issues or concerns.

## Section 106 of the National Historic Preservation Act Consultation

Section 106 of NHPA requires that federal agencies take into account the effect of any proposed undertakings on properties that are listed or eligible for listing in the National Register.

The NPS sent a letter to the State Historic Preservation Office at MHT on January 25, 2018, initiating consultation with a request to review the draft *HAER Documentation, Chesapeake and Ohio Canal, McMahon’s Mill to Lock 42*. The park received a letter from the NPS Heritage Documentation Programs on July 24, 2018 stating that the HAER documentation was complete. The final HAER has been submitted to MHT and the Library of Congress. A separate assessment of effects table has been prepared (appendix B) and a new memorandum of agreement (MOA) would be executed. Any changes identified for the project as a result of the consultation will be incorporated to the project as necessary.

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## APPENDIX A

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### PLANT LIST

Table A-1. Plants Identified during the 2017 Rare Plant Survey within the Project Area

Family	Scientific Name	Common Name	State Status	State Rank	Nonnative Species
Ferns					
Aspleniaceae	<i>Asplenium platyneuron</i>	Ebony Spleenwort			
Aspleniaceae	<i>Asplenium ruta-muraria</i>	Wall Rue		S3	
Aspleniaceae	<i>Asplenium trichomanes</i>	Maidenhair Spleenwort			
Dryopteridaceae	<i>Onoclea sensibilis</i>	Sensitive Fern			
Pteridaceae	<i>Pellaea atropurpurea</i>	Purple Cliffbrake			
Conifers					
Cupressaceae	<i>Juniperus virginiana</i>	Eastern Red Cedar			
Flowering Plants					
Commelinaceae	<i>Commelina communis</i>	Asiatic Dayflower			X
Cyperaceae	<i>Carex grayi</i>	Gray's Sedge			
Poaceae	<i>Dactylis glomerata</i>	Orchard Grass			X
Poaceae	<i>Danthonia spicata</i>	Poverty Oatgrass			
Poaceae	<i>Elymus hystrix</i>	Eastern Bottlebrush Grass			
Poaceae	<i>Elymus repens</i>	Quackgrass			X
Poaceae	<i>Microstegium vimineum</i>	Japanese Stiltgrass			X
Poaceae	<i>Phalaris arundinacea</i>	Reed Canarygrass			X
Poaceae	<i>Poa compressa</i>	Canada Bluegrass			X
Poaceae	<i>Poa pratensis</i>	Kentucky Bluegrass			
Poaceae	<i>Poa trivialis</i>	Rough Bluegrass			X
Poaceae	<i>Schedonorus arundinaceus</i>	Tall Fescue			X
Poaceae	<i>Schizachyrium scoparium</i>	Little Bluestem			
Poaceae	<i>Tridens flavus</i>	Purpletop Tridens			
Asparagaceae	<i>Polygonatum biflorum</i>	Solomon's Seal			
Amaryllidaceae	<i>Allium vineale</i>	Field Garlic			X
Iridaceae	<i>Iris versicolor</i>	Harlequin Blueflag			
Smilacaceae	<i>Smilax hispida</i>	Bristly Greenbrier			
Smilacaceae	<i>Smilax rotundifolia</i>	Roundleaf Greenbrier			
Cannabaceae	<i>Celtis occidentalis</i>	Common Hackberry			
Asteraceae	<i>Ageratina altissima</i>	White Snakeroot			
Asteraceae	<i>Artemisia annua</i>	Sweet Sagewort			X
Asteraceae	<i>Artemisia vulgaris</i>	Common Wormwood			
Asteraceae	<i>Brickellia eupatorioides</i>	False Boneset			
Asteraceae	<i>Cichorium intybus</i>	Chicory			X
Asteraceae	<i>Conoclinium coelestinum</i>	Blue Mistflower			
Asteraceae	<i>Erigeron philadelphicus</i>	Common Fleabane			
Asteraceae	<i>Eupatorium altissimum</i>	Tall Thoroughwort		S3	
Asteraceae	<i>Eupatorium perfoliatum</i>	Common Boneset			

Family	Scientific Name	Common Name	State Status	State Rank	Nonnative Species
Asteraceae	<i>Eupatorium serotinum</i>	Late Flowering Boneset			
Asteraceae	<i>Helianthus decapetalus</i>	Thin-leaved Sunflower			
Asteraceae	<i>Helianthus divaricatus</i>	Woodland Sunflower			
Asteraceae	<i>Packera aurea</i>	Golden Ragwort			
Asteraceae	<i>Polymnia canadensis</i>	White-flowered leaf-cup			
Asteraceae	<i>Rudbeckia laciniata</i>	Cut-leaved Coneflower			
Asteraceae	<i>Senecio vulgaris</i>	Common Groundsel			X
Asteraceae	<i>Silphium trifoliatum</i>	Whorled Rosinweed		S3	
Asteraceae	<i>Solidago flexicaulis</i>	Zigzag Goldenrod			
Asteraceae	<i>Solidago gigantea</i>	Giant Goldenrod			
Asteraceae	<i>Solidago nemoralis</i>	Gray Goldenrod			
Asteraceae	<i>Solidago rugosa</i>	Wrinkle-leaved Goldenrod			
Asteraceae	<i>Symphyotrichum shortii</i>	Short's Aster		S3/S4	
Asteraceae	<i>Taraxacum officinale</i>	Common Dandelion			X
Asteraceae	<i>Verbesina alternifolia</i>	Wingstem			
Adoxaceae	<i>Viburnum prunifolium</i>	Blackhaw			
Caprifoliaceae	<i>Lonicera japonica</i>	Japanese Honeysuckle			X
Caprifoliaceae	<i>Lonicera morrowii</i>	Morrow's Honeysuckle			X
Apocynaceae	<i>Cynanchum laeve</i>	Honey Vine			
Boraginaceae	<i>Hackelia virginiana</i>	Virginia Stickseed			
Boraginaceae	<i>Hydrophyllum virginianum</i>	Eastern Waterleaf			
Boraginaceae	<i>Mertensia virginica</i>	Virginia Bluebells			
Lamiaceae	<i>Glechoma hederacea</i>	Ground Ivy			X
Lamiaceae	<i>Lamium amplexicaule</i>	Henbit			X
Lamiaceae	<i>Lamium purpureum</i>	Purple Deadnettle			X
Lamiaceae	<i>Perilla frutescens</i>	Beefsteak Plant			X
Lamiaceae	<i>Teucrium canadense</i>	American Germander			
Verbenaceae	<i>Verbena urticifolia</i>	White Vervain			
Verbenaceae	<i>Veronica officinalis</i>	Common Speedwell			X
Rubiaceae	<i>Cephalanthus occidentalis</i>	Common Buttonbush			
Rubiaceae	<i>Galium aparine</i>	Cleavers			
Acanthaceae	<i>Justicia americana</i>	American Water-willow			
Acanthaceae	<i>Ruellia humilis</i>	Fringed-leaved Wild Petunia			
Acanthaceae	<i>Ruellia strepens</i>	Limestone Wild Petunia		S2/S3	
Bignoniaceae	<i>Campsis radicans</i>	Trumpet Creeper			
Oleaceae	<i>Fraxinus americana</i>	White Ash			
Oleaceae	<i>Fraxinus pennsylvanica</i>	Green Ash			
Oleaceae	<i>Ligustrum spp.</i>	Privet			X
Scrophulariaceae	<i>Verbascum thapsus</i>	Common Mullein			X



Appendix A

Family	Scientific Name	Common Name	State Status	State Rank	Nonnative Species
Polemoniaceae	<i>Phlox subulata</i>	Moss Phlox			
Solanaceae	<i>Physalis heterophylla</i>	Clammy Groundcherry			
Solanaceae	<i>Solanum carolinense</i>	Carolina Horsenettle			
Amaranthaceae	<i>Chenopodium album</i>	Missouri Lambsquarters			X
Caryophyllaceae	<i>Saponaria officinalis</i>	Bouncing Bet			X
Caryophyllaceae	<i>Stellaria media</i>	Common Chickweed			X
Phytolaccaceae	<i>Phytolacca americana</i>	American Pokeweed			
Portulacaceae	<i>Claytonia virginica</i>	Virginia Springbeauty			
Polygonaceae	<i>Fallopia japonica</i>	Japanese knotweed			X
Polygonaceae	<i>Persicaria longiseta</i>	Oriental Lady's Thumb			X
Polygonaceae	<i>Persicaria virginiana</i>	Virginia Jumpseed			
Polygonaceae	<i>Rumex crispus</i>	Curly Dock			X
Brassicaceae	<i>Alliaria petiolata</i>	Garlic Mustard			X
Brassicaceae	<i>Arabis lyrata</i>	Lyrate Rockcress			
Brassicaceae	<i>Arabis laevigata</i>	Smooth Rockcress			
Brassicaceae	<i>Cardamine concatenata</i>	Cut-leaved Toothwort			
Brassicaceae	<i>Cardamine pennsylvanica</i>	Pennsylvania Bittercress			
Brassicaceae	<i>Hesperis matronalis</i>	Dames Rocket			X
Brassicaceae	<i>Thlaspi arvense</i>	Field Pennycress			X
Malvaceae	<i>Tilia americana</i>	American Basswood			
Primulaceae	<i>Lysimachia nummularia</i>	Moneywort			X
Betulaceae	<i>Ostrya virginiana</i>	Hophornbeam			
Fagaceae	<i>Quercus muehlenbergii</i>	Chinkapin Oak			
Fagaceae	<i>Quercus rubra</i>	Northern Red Oak			
Fagaceae	<i>Quercus velutina</i>	Black Oak			
Platanaceae	<i>Platanus occidentalis</i>	American Sycamore			
Juglandaceae	<i>Carya cordiformis</i>	Bitternut Hickory			
Juglandaceae	<i>Carya tomentosa</i>	Mockernut Hickory			
Juglandaceae	<i>Juglans nigra</i>	Black Walnut			
Moraceae	<i>Morus alba</i>	White Mulberry			X
Ulmaceae	<i>Ulmus americana</i>	American Elm			
Ulmaceae	<i>Ulmus rubra</i>	Slippery Elm			
Urticaceae	<i>Boehmeria cylindrica</i>	Small-spike False Nettle			
Urticaceae	<i>Laportea canadensis</i>	Canadian Wood Nettle			
Urticaceae	<i>Urtica dioica</i>	Stinging Nettle			*
Aristolochiaceae	<i>Isotrema macrophyllum</i>	Dutchman's Pipevine	T	S2	
Lauraceae	<i>Lindera benzoin</i>	Spicebush			
Lauraceae	<i>Sassafras albidum</i>	Sassafras			
Annonaceae	<i>Asimina triloba</i>	Pawpaw			
Papaveraceae	<i>Dicentra cucullaria</i>	Dutchman's Breeches			

Family	Scientific Name	Common Name	State Status	State Rank	Nonnative Species
Berberidaceae	<i>Podophyllum peltatum</i>	Mayapple			
Menispermaceae	<i>Menispermum canadense</i>	Moonseed			
Ranunculaceae	<i>Aquilegia canadensis</i>	Red Columbine			
Ranunculaceae	<i>Clematis viorna</i>	Vasevine		S3	
Ranunculaceae	<i>Delphinium tricornis</i>	Dwarf Larkspur		S3	
Ranunculaceae	<i>Ranunculus abortivus</i>	Little-leaved Buttercup			
Apiaceae	<i>Sanicula odorata</i>	Clustered Blacksnakeroot			
Apiaceae	<i>Taenidia integerrima</i>	Yellow Pimpernel			
Araliaceae	<i>Hedera helix</i>	English Ivy			X
Celastraceae	<i>Celastrus orbiculatus</i>	Oriental Bittersweet			X
Celastraceae	<i>Euonymus alatus</i>	Winged Euonymus			X
Celastraceae	<i>Euonymus fortunei</i>	Winter Creeper			X
Euphorbiaceae	<i>Acalypha rhomboidea</i>	Common Three-seeded Mercury			
Fabaceae	<i>Cercis canadensis</i>	Eastern Redbud			
Fabaceae	<i>Desmodium canescens</i>	Hoary Tick-trefoil			
Fabaceae	<i>Desmodium paniculatum</i>	Panicleleaf Tick-trefoil			
Fabaceae	<i>Gleditsia triacanthos</i>	Honey Locust			
Fabaceae	<i>Lespedeza cuneata</i>	Chinese Lespedeza			X
Fabaceae	<i>Medicago lupulina</i>	Black Medic			X
Fabaceae	<i>Melilotus albus</i>	White Sweetclover			X
Fabaceae	<i>Trifolium repens</i>	White Clover			X
Balsaminaceae	<i>Impatiens capensis</i>	Orange Jewelweed			
Balsaminaceae	<i>Impatiens pallida</i>	Yellow Jewelweed			
Oxalidaceae	<i>Oxalis stricta</i>	Common Yellow Woodsorrel			
Onagraceae	<i>Oenothera biennis</i>	Common Evening Primrose			
Vitaceae	<i>Parthenocissus quinquefolia</i>	Virginia creeper			
Grossulariaceae	<i>Ribes cynosbati</i>	Eastern Prickly Gooseberry		S3	
Rosaceae	<i>Duchesnea indica</i>	Indian Strawberry			X
Rosaceae	<i>Geum canadense</i>	White Avens			
Rosaceae	<i>Prunus serotina</i>	Black Cherry			
Rosaceae	<i>Rosa multiflora</i>	Multiflora Rose			X
Rosaceae	<i>Rubus hispidus</i>	Bristly Blackberry			
Rosaceae	<i>Rubus occidentalis</i>	Black Raspberry			
Rosaceae	<i>Rubus pensilvanicus</i>	Pennsylvania Blackberry			
Rosaceae	<i>Rubus phoenicolasius</i>	Wineberry			X
Saxifragaceae	<i>Heuchera americana</i>	American Alumroot			
Anacardiaceae	<i>Rhus aromatica</i>	Fragrant Sumac			

## Appendix A

Family	Scientific Name	Common Name	State Status	State Rank	Nonnative Species
Anacardiaceae	<i>Toxicodendron radicans</i>	Poison Ivy			
Rutaceae	<i>Ptelea trifoliata</i>	Common Hoptree		S3	
Sapindaceae	<i>Acer negundo</i>	Boxelder			
Sapindaceae	<i>Acer rubrum</i>	Red Maple			
Sapindaceae	<i>Acer saccharinum</i>	Silver Maple			
Simaroubaceae	<i>Ailanthus altissima</i>	Tree of Heaven			X
Staphyleaceae	<i>Staphylea trifolia</i>	Bladdernut			

Source: 2017 Plant Survey (Normandeau 2017a)

\* *Urtica dioica gracilis* is a native species in Maryland, and *Urtica dioica dioica* is nonnative in Maryland. This plant was not identified to the subspecies level during the 2017 plant survey.

State Status Definitions: E = Endangered – a species whose continued existence as a viable component of Maryland's flora is determined to be in jeopardy; T = Threatened – a species that appears likely, within the foreseeable future, to become endangered in Maryland.

State Rank Definitions: S1 = Critically Imperiled/Highly State Rare – At very high risk of extinction or extirpation due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.

Typically occurring in five or fewer populations; S2 = Imperiled/State Rare – At high risk of extinction or extirpation due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors. Typically occurring in 6-20 populations; S3 = Vulnerable/Watchlist – At moderate risk of extinction or extirpation due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors. Typically occurring in 21-80 populations; S4 = Apparently Secure – At fairly low risk of extinction or extirpation due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors

## APPENDIX B

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### ASSESSMENT OF EFFECTS TABLE

## Appendix B

Table B-1. Assessment of Effects Table for the Project to Reconstruct and Stabilize the Historic Stone Wall and Towpath of the Chesapeake and Ohio Canal National Historical Park from McMahon's Mill to Lock 42

Historic District Feature	Description	No Action	Preferred Alternative
Features Associated with Canal Construction and Use			
Towpath	A 1-mile section of gravel path, approximately 6 to 15 feet wide. The gravel is on top of 4 to 12 feet of historic fill over limestone bedrock. Most of the canal towpath between McMahon's Mill to Lock 42 is relatively level between 331 to 333 feet above mean sea level (amsl) from east to west. However, there are several areas that dip as much as 4 to 5 feet in height. These undulations are unique along this section of the towpath.	Periodic flooding would continue to erode the towpath and ultimately result in the loss of this feature. No change.	The overall alignment would be reserved. A few segments would be moved inland toward the cliffs. The towpath would be widened and made more consistent, except in a few places where the cliffs prevent widening. The towpath height would be raised, and the undulations would be decreased with minor grade changes. This would reduce a historic and unique characteristic of this segment of the towpath and diminish the historic feel. Adverse effect
45-degree angle retaining wall	Located along the scour side of the river in a steep bend. The stone retaining wall adjacent to the towpath includes both mortared and un-mortared (dry laid) sections.	Periodic flooding would continue to erode the stone retaining wall and ultimately result in the loss of this feature. No change.	The towpath would be moved inland to allow reconstruction of 45-degree angled wall. Stones would be added to the top of the historic wall to achieve desired height introducing modern materials. Adverse effect
Vertical retaining wall	The stone retaining wall adjacent to the towpath and river; includes both mortared and un-mortared (dry laid) sections.	Periodic flooding would continue to erode the stone retaining wall and ultimately result in the loss of this feature. No change.	Rip rap would be placed at base of wall and collapsed walls would be reconstructed. Stones would be added to the top of historic wall to achieve desired height, introducing modern materials where use of historic material is not available or feasible. Adverse effect

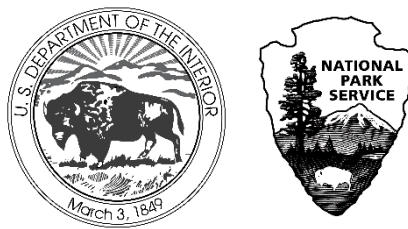
Historic District Feature	Description	No Action	Preferred Alternative
Two stone culvert inflow headwalls	Approximately 2.5-foot-wide stone headwall	No effect	New pipe added to culvert. No change to stone headwall. Effect, no adverse effect.
McMahon's Mill Culvert No. 138 (Downey Branch Culvert)	Concrete and stone culvert associated with the McMahon's Mill	No effect	No change / No effect
20 <sup>th</sup> century concrete bridge (construction date unknown) over the McMahon's Mill Culvert No. 138 (Downey Branch Culvert)	Flat slab concrete bridge over culvert where Downey Branch Creek empties into the Potomac River	No effect	No change / No effect
Landscape feature	Seven clusters of rope burns that vary in length and are 0.5-inch diameter. They are located from approximately 1.5 to 3.5 feet above the present grade of the towpath.	These features may be obscured from view seasonally due to vegetation growth. No adverse effect	Towpath elevation would be raised, burying the rope burns. Visitors would no longer see the markings; however, the markings would be preserved in place. Effect, no adverse effect.
Landscape feature	Natural caves	No effect	No change / No effect
Landscape feature	Potomac River and bend in river – relatively calm section of the Potomac River with a large bend	No effect	No change / No effect
Landscape feature	Galloway's Cliffs – steep limestone cliffs	No effect	No change / No effect
Landscape feature	Trees and other vegetation lining path	No effect	The visual corridor would be widened with removal of the trees lining towpath, restoring the historic landscape. Effect, no adverse effect

Appendix B

Historic District Feature	Description	No Action	Preferred Alternative
Landscape feature	Viewshed – rural, woods, river, farms, and docks	No effect	The visual corridor would be widened and the viewshed expanded with removal of the trees lining the towpath, restoring the historic landscape and viewshed. Effect, no adverse effect
Structures in the Vicinity of the Proposed Project			
Lockhouse and Lock 41	The stone foundation of the former lockhouse (built in 1836) is located above the upper end of the lock and on the berm side. The overall dimensions are 16 by 28 feet. There are several other unidentified foundations in the nearby area.	No effect	No change / No effect
Lock 42	A poor-quality local gray-blue limestone was used on this lock. The breast wall was flush with the upper end of the upper lock gate pockets. Around 1900, the breast wall from mid-lock down was removed, stones piled beyond the towpath (where they remain) and replaced by concrete. Much of the remaining stone is deteriorated and some are missing. The lock is generally in poor condition. The current bridge is a modern replacement.	No effect	No change / No effect
McMahon's Mill	Dating from 1778, the mill is a large frame gambrel-roofed structure on a high fieldstone foundation, which forms the first story on the west side, where the mill wheel is located. The wooden overshot wheel was replaced by a steel wheel in the 1920s. Condition of the structure is fair.	No effect	The visual corridor would be widened, and the views expanded with removal of trees lining the towpath, restoring historic landscape and views. Effect, no adverse effect.



Historic District Feature	Description	No Action	Preferred Alternative
Features Associated with the Post-Canal Use Period			
Braided metal cable and associated stone structure	Approximately 0.25-inch diameter, part of a social trail	This feature may be obscured from view seasonally due to vegetation growth. No adverse effect	Features would be buried. No adverse effect to post-canal use period.
Corrugated steel culvert	Corrugated steel measuring 15 by 18 inches in diameter, stone headwall, integrated into the existing stone retaining wall of the towpath	This feature may be obscured from view seasonally due to vegetation growth. No adverse effect	Pipe would be replaced; however, pipe is not historic. No adverse effect to post-canal use period.
Two 1-inch 20 <sup>th</sup> century iron pipes embedded in towpath adjacent to cliff face;	Two 1-inch iron pipes embedded in cliff face; likely for access to top of cliff	This feature may be obscured from view seasonally due to vegetation growth. No adverse effect	Features would be buried. No adverse effect to post-canal use period.
Braided metal cable embedded in tree	Approximately 0.25-inch diameter, likely used for boat mooring	This feature may be obscured from view seasonally due to vegetation growth. No adverse effect	Features may be removed during vegetation clearing. Adverse effect to post-commercial period.
Metal pipe embedded into cliff face	Iron pipe likely used for access to top of cliff	This feature may be obscured from view seasonally due to vegetation growth. No adverse effect	No effect
One 1-inch 20 <sup>th</sup> century rebar imbedded in towpath	Approximately 1-inch diameter, likely used for boat mooring	This feature may be obscured from view seasonally due to vegetation growth. No adverse effect	Features would be buried. No adverse effect to post-canal use period.
Two angle iron sections embedded into towpath	Likely used for boat mooring	This feature may be obscured from view seasonally due to vegetation growth. No adverse effect	Features buried. No adverse effect to post-canal use period.
Two iron pipes embedded into towpath	Likely used for boat mooring	This feature may be obscured from view seasonally due to vegetation growth. No adverse effect	Features buried. No adverse effect to post-canal use period.



As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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