National Park Service
U.S. Department of the Interior

Cuyahoga Valley National Park
Peninsula, Ohio

WETLAND STATEMENT OF FINDINGS FOR
EXECUTIVE ORDER 11990 WETLAND PROTECTION

Stabilize Riverbank at Towpath Mudcatcher (STA 758) along the Cuyahoga River
Cuyahoga Valley National Park Peninsula, Ohio

Recommended

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Superintendent, Cuyahoga Valley National Park Date

Certified for Technical Accuracy and Service wide Consistency

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Chief, National Park Service Water Resources Division Date

Approved

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Director, Interior Region Date

## Introduction

This Wetlands Statement of Findings (WSOF) characterizes the wetland resources that occur within the Towpath Mudcatcher project site along the Cuyahoga River, Cuyahoga National Park, Cuyahoga and Summit Counties Ohio. The WSOF describes the impacts the project will likely have on the aquatic resources and documents the steps the National Park Service (NPS) will take to avoid, minimize, and offset these impacts.

The NPS proposes to implement riverbank stabilization measures at Towpath Mudcatcher (STA 758) along the Cuyahoga River. The Towpath Mudcatcher project site is located just south of River Mile (RM) 20 on the east bank of the river (Figure 1). At this location, the top of the bank has encroached within two and a half feet of the Ohio & Erie Towpath Trail (Towpath Trail) due to erosion (Figure 2). Towpath Trail is one of the most significant linear cultural and recreational resources within the park and sits adjacent to segments of the historic Cuyahoga Valley Scenic Railway (CVSR). The proximity of the Towpath Trail to the Cuyahoga River and its tributaries results in instances where the Towpath Trail is in jeopardy of being damaged or destroyed by river flows. Action is needed because the riverbank instability is threatening the integrity, visitor and NPS staff safety, and continued viability of the Towpath Trail. Tripping and falling hazards can develop quickly along the severely eroding bank, and excessive settling due to erosion along the Towpath Trail can result in trail erosion and closures to the resource.

Because the proposed action would include work in wetlands, this Wetlands Statement of Findings is required to comply with NPS Director's Order #77-1: Wetland Protection, which establishes the policies, requirements, and standards for implementing Executive Order 11990 (Protection of Wetlands). This Statement of Findings:

- Presents the rationale for implementation of the project with regards to wetlands and documents the anticipated effects on wetland resources
- Describes the effects on wetland values associated with the proposed action
- Provides a description of mitigation measures
- Ensures "no net loss" of wetland functions or values

A Programmatic Environmental Assessment (EA) was developed in 2003 (NPS 2004) to evaluate the potential environmental impacts of the proposed Riverbank Management Program as compared to the existing Riverbank Stabilization Program in accordance with the requirements of the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations of 1978, NPS Management Policies, and NPS Director's Order #12.

## The Purpose and Need for the Action

The purpose of the Proposed Action is to stabilize a section of the Cuyahoga riverbank for the protection of cultural resources and improve visitor experience through maintaining infrastructure and providing educational and recreational opportunities. The need for the Proposed Action is for the protection of the historic, cultural, and recreational resources, and to protect employees and the public from the erosional effects resulting from the fluvial processes of the Cuyahoga River and its tributaries within Cuyahoga Valley National Park (CUVA).

Bank erosion has accelerated in recent years along the Ohio & Erie Canal Towpath Trail (Towpath Trail). The rate of road movement within the towpath project area has evolved along this stretch of the river and monitoring by CUVA staff indicated that project area will continue to degrade and further acceleration is likely in the near future because of the already impacted towpath structure. The increasing erosion results in an increased risk of slope destabilization and loose material falling into the river. The current conditions require enhanced safety protocols to protect visitors using the trail, reactive temporary maintenance and potential short-term impacts to river water quality. While temporary repairs to the Towpath Trail have been challenging, they are no longer manageable with the increased rate of loss. This bank destabilization is larger associated with climatic changes. The area has been subject to an increase of more than 3 inches of rain per year over the last two decades with expectations that this rate of precipitation will continue and will result in river widening and further bank destabilization.

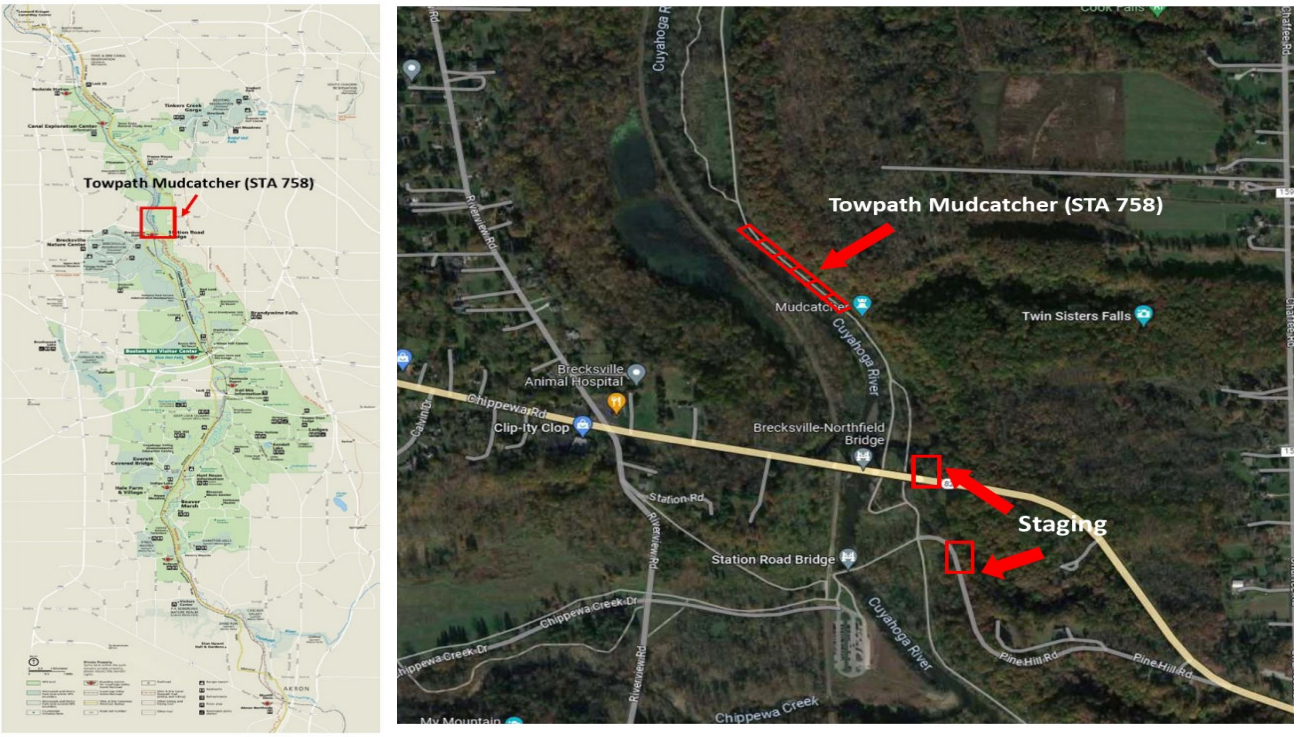


Figure 1. Cuyahoga Valley National Park Map, Towpath Mudcatcher project site and staging areas.

The Towpath Trail is one of the most significant linear cultural and recreational resources within the park. The Towpath Trail are important resources because they are frequently used by the public, are located within protected historic districts, and a portion of the Towpath Trail (elsewhere, not the project site) is a National Historic Landmark. The towpath is the primary means by which most visitors experience CUVA. Most park visitors use the towpath and visitors are forced to navigate along the impacted trail , subject to tripping and loss of footing. Without the stabilization, the Towpath trail would be at risk and as a result, many visitors would lose the opportunity to experience the iconic views and recreational opportunities offered along the trail and adjacent to the historic Cuyahoga Valley Scenic Railway (CVSR). Providing safe access through the Towpath Trail by stabilization of the adjacent stream bank would ensure access along a primary overland route adjacent to the river and allow visitors to continue experiencing and enjoying the entirety of the park and the access it provides to other areas of the park.

Figure 2. Shoreline next to the towpath.

## Proposed Action

The NPS proposes to implement riverbank stabilization measures at Towpath Mudcatcher along the Cuyahoga River. A hybrid riprap solution that includes live plant staking and seeding along the upper portion of the fill along the Cuyahoga River was chosen as the preferred alternative. Alternative solutions for bank stabilization were analyzed during the Value Analysis Workshop in June 2021 and memorialized in the final Value Analysis Report from October 2021 (see Section 4.0 below for more details). Structural, bioengineering (green), and a combination of structural and bioengineering measures were considered in the design of bank stabilization at Towpath Mudcatcher.

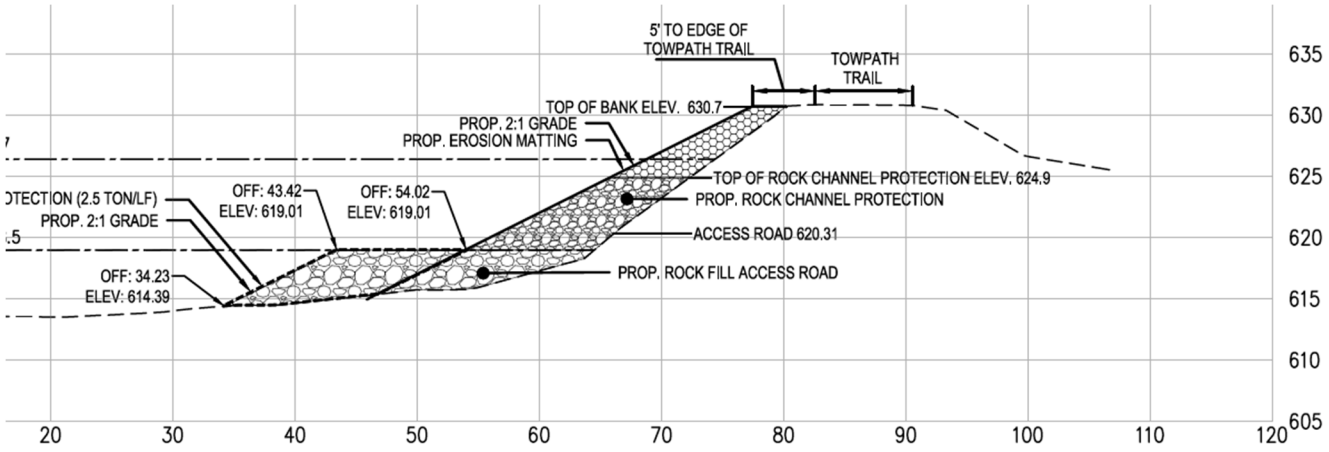


Figure 3. Selected alternative, typical section of the proposed armoring treatment. The fill above the rock channel protection will be soil, planted and seeded with native plant species.

The design for Towpath Mudcatcher was developed as a bank infill project to restore appropriate bank slope for stability and re-establish a 5' minimum width shoulder along the Towpath Trail. Currently, the Towpath Trail comes within 2.5 feet of the bank slope (Figure 3). The stabilization design for Towpath Mudcatcher includes installation of Longitudinal Fill Stone Toe Protection (LFSTP) along the toe of slope, bank infill with rock armored bank slope, and bioengineered soil fill with native plantings along the upper bank (for a length of approximately 1,400 feet, Figure 4).

The armoring fill could extend out to 45 feet (perpendicular) from the bank. The predicted scour depth is in the range of 4.8- to 18.1-feet. However, based on the subsurface investigation, bedrock is estimated at a depth 5-feet to 7-feet below the bank toe and is considered as the limiting scour depth. Therefore, the design includes a 2.5-ton per linear foot of LFSTP measured along the toe for the full project length to counteract potential for up to 7-feet of predicated scour depth.

Trenched keys are also called for at the upstream and downstream extents and spaced throughout the project reach. Based on the Slope Stability analysis the infill shall be sloped no steeper than 2H:1V to the proposed toe of slope along the channel bed. The LFSTP uses a stone mass placed in front of the proposed bank toe to provide suitably sized stone material designed to launch into expected channel scouring along the bank toe. The LFSTP material is sized based on predicted scour depth and the volume of material needed to reinforce the slope toe and maintain bank stability. The site was designed to a stone volume of 1-ton per 3- feet of predicted scour depth.

The Towpath Mudcatcher site includes implementation of a series of three shallow rock bendway weirs at the upstream extent of the project reach along the meander bend most subjected to direct flow forces. Bendway weirs are focused at the beginning of the project site in conjunction with the geometry and with intention to prevent flanking behind the stabilization area. Bendway weirs are an effective method to mitigate scour and erosion along the streambank by training the river thalweg (i.e., deepest part of river) to adjust further from the riverbank. The bendway weirs work to retrain the river thalweg and shift the scour forming energy just beyond the end of bendway weirs more toward river center, where paddlers would have sufficient draft depth to float through the stabilized project reach. The bendway weirs have been located primarily on outside meander bend locations where the

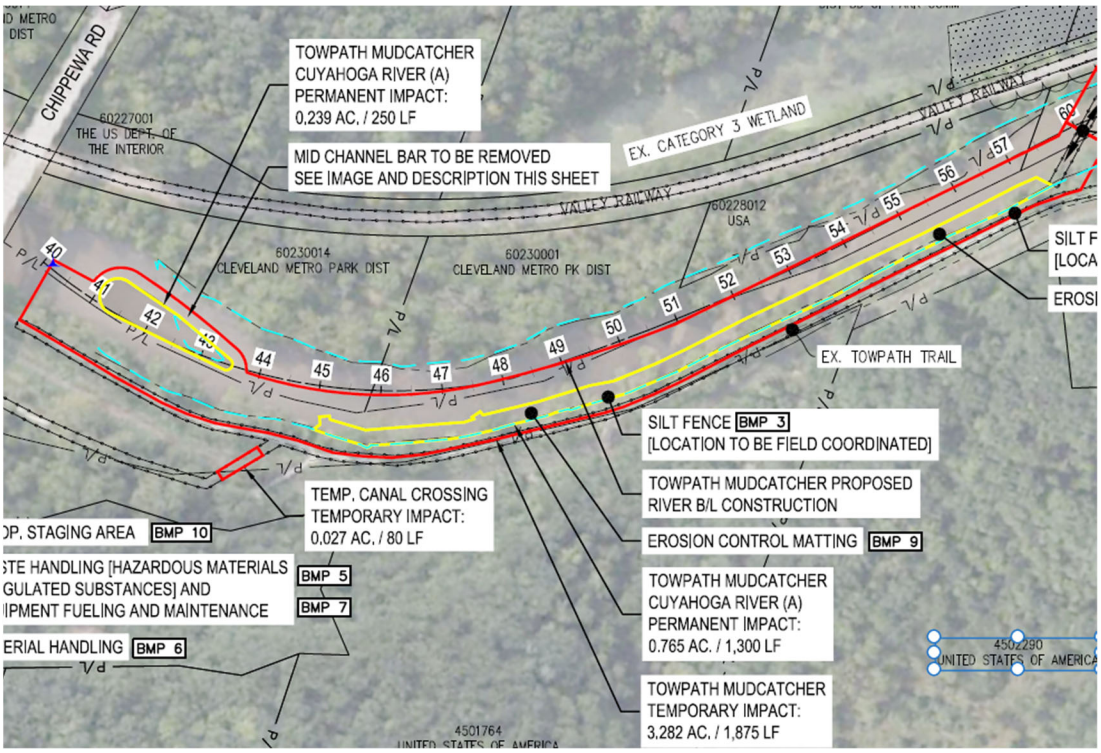


Figure 4. Towpath Mudcatcher temporary and permanent riverine wetland impacts (within the red lines).

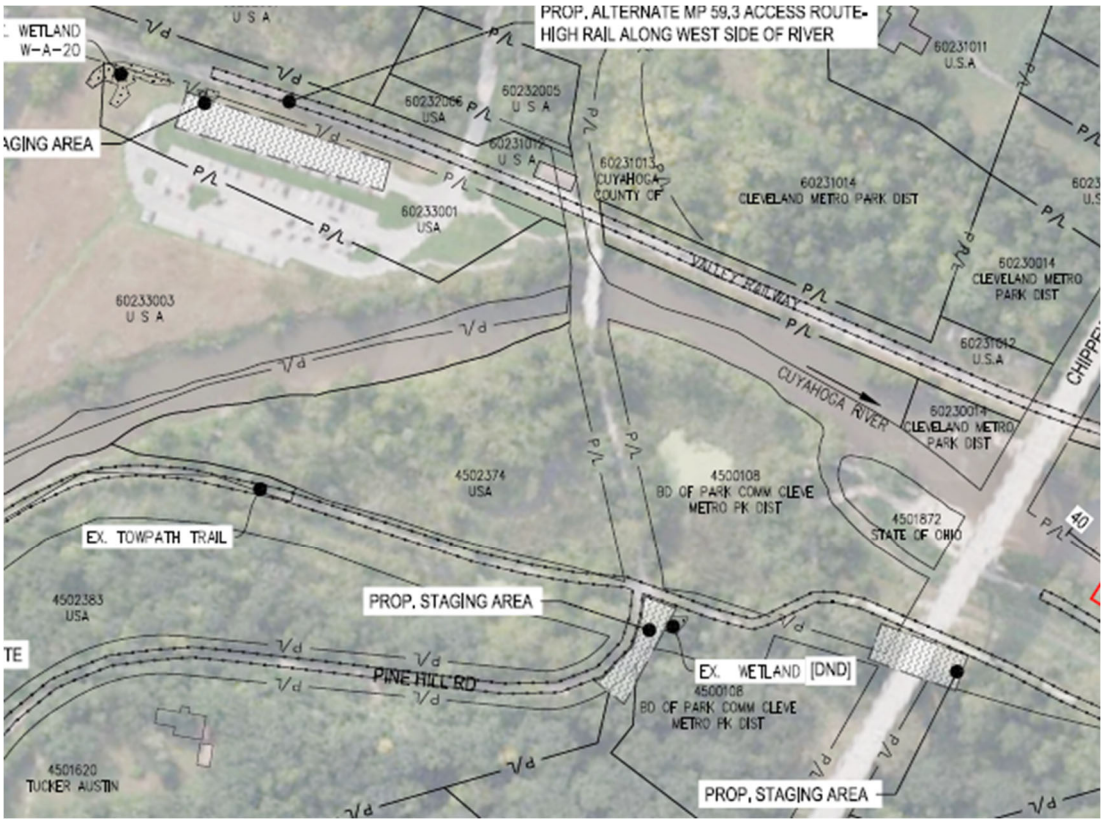


Figure 5. Towpath Mudcatcher three staging areas and one alternate area

river thalweg is currently shifted along the outside edge of the channel and attacking the bank toe. Each rock bendway weir is established to extend a minimum of 15- feet (up to 30-feet in select locations) and positioned at a 70- degree angle upstream from the new bank. The crest of bendway weir is designed 10-feet wide and set at an elevation approximately 1-foot above the base flow water surface. The placement of bendway weirs allows reduction of launch stone (i.e., LFSTP) placement for the new bank reach between bendway weirs and for a select distance (approximately 50') downstream of the bendway weirs. It is acceptable to reduce the stone volume for longitudinal bank armoring since the bank segments in between the bendway weirs typically become depositional and would not be subjected to scour forces along the bank toe.

Additionally, wood sourced from leaning trees or deadfall in the area may be utilized for incorporation into the stabilization for lock log features between bendway weirs (location and installation of these features would be field designed as directed by the design team). Wood sourced from the project site would maintain the root ball left in place within the riverbank. These added bio-engineered features provide increased hydraulic roughness and aquatic habitat.

The preferred alternative also incorporates work within the reach just upstream of the bank stabilization area where there is an existing mid-channel sand-gravel bar formation. Mid-channel bars can have a negative impact on river systems as they occupy important cross-sectional area for sediment transport competency and overall stability of a reach. This loss of a central channel area forces a bifurcation of river flow as well as a narrowing of flow width (please see Figure 4). The combination of this split flow along with the narrower flow passage promotes erosion and scour on either side of a mid-channel bar and lateral widening. The sediment that creates mid-channel bars is constantly being replaced as a result of hydraulic and geomorphological processes which are present on other reaches of the Cuyahoga and the replacement is constant.

The constant development processes of the subject sand bar, and the consequential lateral erosion, are likely influenced by the Brecksville-Northfield Road (route 82) bridge abutments located just upstream. Evaluation of time-lapse aerial photography shows that the lateral erosion has lengthened the distance between the banks over time up to 2020. Since 2020 the distance between banks has remained at 176 feet. If removed, the sand bar will be replaced by the bed-load transport process. The opportunity to remove this mid-channel bar upstream of Towpath Mudcatcher is well-timed and a "win-win" to temporarily reduce the likelihood of additional lateral erosion widening to this reach. Removing part of the natural transporting sediment load will create higher energy flows through that area and impacts to the sediment load downstream. The bar material can be re-used in the project as a bank run material source and will be tested (as needed) to be utilized for subgrade fill along the infill project. Long-term alternative solutions were not considered such as armoring the bank to protect the towpath from erosion once the sand bar redevelops.

The design team believes that the mid-channel sediment bar removal and modification at the upstream limit of the Towpath Mudcatcher site is necessary. However, the following assumptions were not substantiated with interpretation or modelling by a qualified stream restoration geomorphologist or hydrologist. The mid-channel sediment deposition occupies the cross-sectional area in the center of the river channel and is not likely to remobilize solely by natural means as the river has already widened at this location to a point that the areas would not be subject to scour from normal flows. This bar was present prior to the Route 82 dam (located just above the bridge and

project area) removal and may have accumulated due to the scour associated with water overtopping the dam. With the dam removed, bedload sediment transport from upstream of the Route 82 dam could potentially accumulate where the bar is excavated which could result in additional widening of the river reach. The Towpath Mudcatcher project site will incorporate the dredged material into the armoring area thus improving the stabilization project costs and efficacy.

The longitudinal fill stone and bank stabilization installation process will be performed using a 4-phased approach via access to the toe of bank slope. First, a stone access road approximately 15- to 20-feet wide and 2-feet thick will be built from upstream to downstream along the 1,400-foot length of armoring portion of the project; this material will remain and form the base of the new bank infill. The second phase will involve placement of the longitudinal fill stone overtop and adjacent to the river side of the access road. The third phase includes dredging of the sand bar, construction of the 2H:1V bank infill, live stake layer, and bank armor stone. And the fourth phase includes the remaining backfill to reach final grade using bioengineering techniques consisting of soil fill armored with a coconut fiber erosion control mat and native seed mix. Phases 2 through 4 will be conducted from downstream to upstream, working back out along the constructed access road. More specific details follow:

*Phase I – Access & Staging*

Mobilization to the site will begin with staging located under the Route 82 bridge south of the Towpath Mudcatcher project site (Figures 6, 7 and 8). The existing Towpath Trail system will be used as access for material and equipment. An additional staging for office trailer and parking may be setup at the corner of the maintenance road and trail intersection leading to the proposed primary staging area. All staging areas avoid wetlands and employ stormwater protection and erosion protection measures, including silt fencing which will be installed to protect wetlands that may be close to a staging location (Figures 5). Orange 4-foot-high construction fencing will be used to delineate the staging area limits of disturbance that are close to palustrine wetland areas that should not be disturbed.

Access to the project area will follow the Towpath Trail alignment north to the project site. A temporary crossing will be built over the canal. River access points will be established on the upstream and downstream limits of the Towpath Mudcatcher project area for access to the toe of streambank. Minor clearing and grubbing will occur as necessary to establish access. Material will be imported to build a work platform at the bottom of the bank stabilization work area to support construction activities.

Imported backfill would be placed up to subgrade elevation for the rock bank protection. Site preparation and bank stabilization activities would start at the upstream extents of the project area and continue towards the downstream extents. A stone access road approximately 15 to 20 feet wide and 2 feet thick would be built from upstream to downstream along the length of the project. Material would remain and form the base of the new bank infill.

The source of any material that is imported from outside the park will be from a location that has been tested to be free of any contaminants above state threshold limits and free of any non-native plant

parts or seeds.

*Phase II – Site Preparation*

Once access and staging has been completed, additional clearing and grubbing of trees/plant material will occur along the project area bank and a rough subgrade will be established to remove any loose or unsuitable material. Imported backfill will be placed up to subgrade elevation for the rock bank protection.

*Phase III – Bank Stabilization*

Banks stabilization activities include placing imported sandstone material along the bank and choking the area with excavated material cut from the mid- channel bar. Imported bank run/fill soil material will be placed in a 6-inch lift above the rock bank protection, with limited use of on-site materials. Bank run/topsoil is to be wrapped in a coir erosion control fabric and planted with native vegetation during Phase IV activities. The balance of any additional LFSTP rock will then be placed along the base as the construction crews proceed to work their way back along the restored bank toward the upstream staging area. The source of any material that is imported from outside the park will be from a location that has been tested to be free of any contaminants above state threshold limits and free of any non-native plant parts or seeds.

*Phase IV – Site Restoration*

Site restoration activities will include seeding and planting disturbed areas with park-approved native plant species. Live stakes or other planting material will be planted along the restored bank during the seasonally appropriate planting window. The project schedule should provide for revegetation immediately after completion of construction.

The temporary fill for the access road to the point bar will be removed and the original ground surface and elevations will be restored to the elevations and conditions prior to disturbance.

**Preferred Alternative Design**

The preferred alternative was designed to minimize wetland impacts to the greatest extent practicable. The Bendway weirs are focused at the beginning of the project site in conjunction with the geometry and with intention to prevent flanking behind the stabilization area. Bendway weirs will reduce scour and erosion along the streambank by training the river thalweg to adjust further from the riverbank. The geometry of the proposed floodplain excavation has been shaped with the intent to minimize change to the base flood elevation, thus reducing loss of connectivity to existing wetland features. Segments between Bendway weirs normally become sediment traps which will further protect the bank and reduce introduction of addition sediment to downstream wetland features from other areas of instability.

The removal of the mid channel sediment bar will temporarily redirect flows through a more centered

channel initially and temporarily decrease velocities that impact the streambanks adjacent to the sand-bar site that can be compromised by additional erosion and temporarily reduce the potential for additional river widening. Use of bioengineered techniques reduces the speed of high-water flow along the top of the armored bank (plants increase friction) along an otherwise armored reach (rip rap alone tends to increase speed of water flow). The remainder of wetland impacts are temporary or are compensated by enhancement restoration, and ensuring contractors are aware of limits of disturbance locations in the riverine wetland as noted on the construction drawings Figure 4.

**Other Alternatives Considered**

The Cuyahoga Valley National Park's founding legislation states that the park exists "for the purpose of preserving and protecting for public use and enjoyment, the historic, scenic, natural, and recreational values of the Cuyahoga River and the adjacent lands of the Cuyahoga Valley." The Organic Act, NPS 2006 Management Policies, Director's Order #77-1: Wetland Protection, and Executive order also mandate that the park preserve, protect, manage, and restore wetlands and other natural systems. However, the Towpath Mudcatcher site is of high priority to the park to stabilize the shoreline to maintain safe access for the public and NPS employees.

During the Value Analysis Workshop in June 2021, alternative design approaches were considered for Towpath Mudcatcher in addition to the preferred alternative of a Hybrid Riprap approach (Proposed Action described above). The other alternatives included a No Action alternative, Brush Mattress alternative, and Durable Riprap alternative. Additionally, the design considered an alternative where the mid-channel sediment bar is not removed. A summary of each dismissed alternative is described below.

*Alternative 1: No Action Alternative*

Under the No Action Alternative, the bank adjacent to the Towpath Trail would not be stabilized. The threat of riverbank erosion to the Towpath Trail would continue and would not be addressed. . The NPS would attempt to address losses to the Towpath Trail within this segment, but no action may result in closures of the Towpath Trail altogether or rerouting of the trail. Rerouting of the trail may be disrupt adjacent undisturbed habitats, including the removal of healthy hardwood trees and shrubs. This alternative would not include indirect measures to address potential future threats from riverbank erosion. Other cultural features, including archaeological sites would not be protected. A delay in the stabilization of the riverbank at this site could necessitate an emergency stabilization and further risk natural and cultural resources, and human health and safety of NPS employees, and the public. This alternative was dismissed because it would not protect the Towpath Trail, erosion of the streambank would continue to occur, and it would not address the purpose and need for the project.

*Alternative 2: Brush Mattress*

A brush mattress alternative was considered for Towpath Mudcatcher through the Value Analysis workshop in June 2021. This alternative included a layer (mattress) of interlaced live branches placed on the bank face, bendway weirs, and rock armoring at the base of the bank. The brush mattress has the potential to immediately slow velocities along the bank and accumulate sediment. Together with

the sprouting plants, the brush mattress should overtime develop a strong network of interlocking roots and plant stems. The impacts to wetlands would be the same as the preferred alternative. Although this alternative included the "greenest" bioengineering techniques between the alternatives, brush mattresses were ultimately dismissed through the value analysis process as this engineering technique would provide the least amount of protection, would have the shortest life cycle, and would not withstand the impacts of future surrounding development and climate change (NPS 2021). For these reasons, this alternative was not selected.

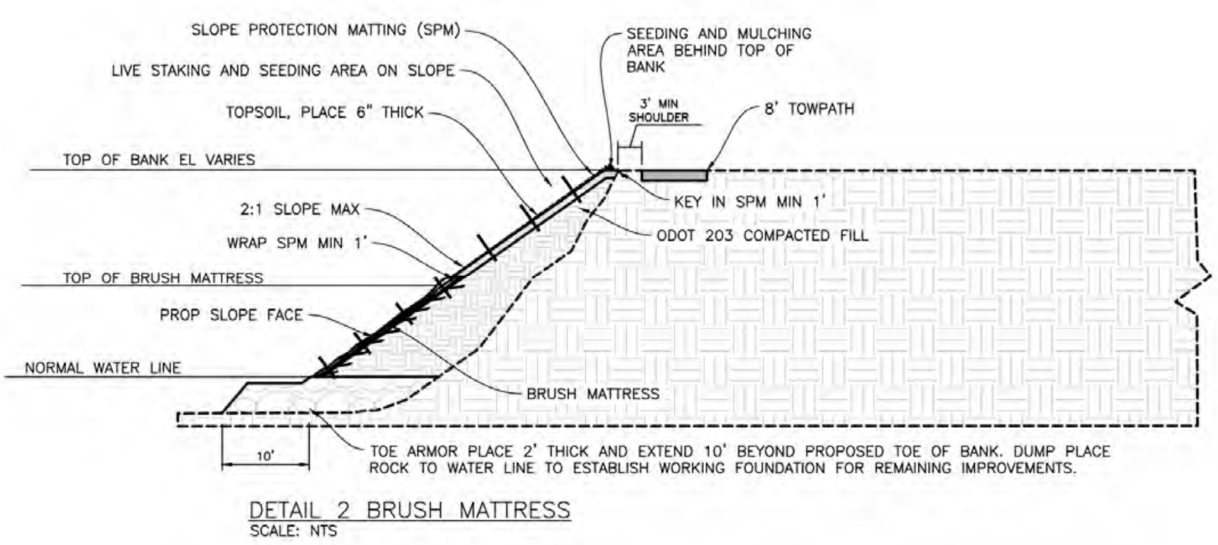


Figure 6: Brush Mattress Alternative

*Alterative 3: Durable Riprap*

The durable riprap alternative that was considered for Towpath Mudcatcher, included the hardening of the riverbank with rock riprap. This alternative did not include bioengineering techniques which would provide inclusion of natural materials.

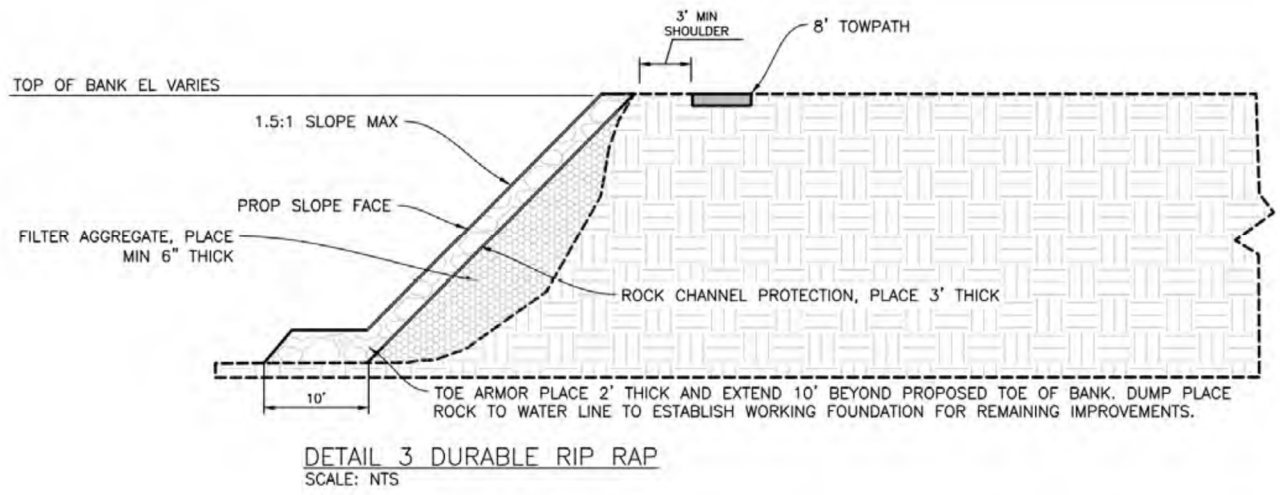


Figure 7: Durable Riprap Alternative

The durable riprap alternative does not provide for the inclusion of bioengineering, like live staking or seeding, which was a design criterion requested by the NPS. Natural materials to improve appearance, live staking and seeding of the riverbank provides for improved habitat and some improved ecological value. Rip rap alone can result in increased water velocities along the armored reach and can deflect flows to other points in the river. Bioengineered features cause frictional losses that slow that velocity and without that bio component, impacts at downstream locations may be observed. In addition, riprap as the only form of riverbank stabilization results in a uniform, smooth channel, with no complexity, limiting its ecological values further. So, while the impacts to wetlands in the installation and construction would be roughly the same as the preferred alternative, the other aspects listed herein make a durable riprap alternative less appropriate in preserving ecological values. The durable riprap alternative did not provide an advantage to the protection of natural resources or meet the NPS design criterion. Because of this, the durable riprap alternative was dismissed.

*Alternative 4: No Action Related to the Mid-Channel Sediment Bar*

An alternative where no alteration of the mid-channel sediment bar was considered. Under this alternative, it is assumed streambank stabilization work would still occur at Towpath Mudcatcher. If the mid-channel sediment bar was to remain within the Towpath Mudcatcher reach, the river would remain bifurcated. The bifurcation results in narrower flow passages on either side of the mid-channel sediment bar and may exacerbate erosion and scour on the outer riverbanks. The midchannel sediment bar directs flows to either side of the bar forcing river velocities toward the bank of the river. Without removal, the bar would potentially continue to persist through the accumulation of sediment and may result in creating addition upstream or downstream impacts to the riverbank. For these reasons, the NPS dismissed this alternative in favor of an approach that proactively addresses the issues associated with the mid-channel sediment bar. However, no hydraulic or geomorphological analyses or modeling have been produced to justify these assumptions for this Statement of Findings.

**Site Description - Wetlands**

Director's Order #77-1: Wetland Protection requires parks to avoid, to the extent possible, adversely impacting wetlands. All NPS activities that have the potential to have adverse impacts on wetlands be conducted in a manner consistent with the goal of no net loss of wetlands. Procedural Manual #77-1: Wetland Protection provides guidelines for NPS implementation.

*Wetland Delineation*

All wetlands impacted by this project are riverine. The boundaries were defined as the ordinary high-water mark along the bank. The wetlands in the study area around the construction zone were delineated using the methods described below.

A wetland delineation was completed in 2021 using the routine methodology as outline in the 1987 U.S. Army Corps of Engineers' Wetlands Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, Version 2.0 (U.S. Army Corps of Engineers, 2012). Guidance within the NPS Procedural Manual #77-1: Wetland Protection was also followed for delineating and mapping wetlands to meet NPS requirements. All the wetlands identified within the project area met NPS requirements for delineation.

Study area field-survey limits extend 25 feet riverward and 100 feet landward, or to the nearest edge of the CVSR or Towpath Trail, of the Ordinary High-Water Mark (OHWM) along each side of the Cuyahoga River from river mile 14 - 29 (Study Area). HDR (HDR, Inc. 2022), an environmental consulting company, completed the field work for the wetland delineation in August and October 2021. During November and December 2022, EnviroScience (ES) (EnviroScience 2023), an environmental consulting company, performed a supplemental wetland investigation and delineation within the proposed construction limits, which included construction, staging, and access areas. The field work was completed by qualified wetland delineators, including two Certified Professional Soil Scientists (CPSS), a botanist, and a biologist. Described below are the wetlands identified in the vicinity of project site Towpath Mudcatcher, of which, most will be avoided by the design and construction of the bank stabilization.

*Wetland Communities*

Two riverine wetlands will be impacted by the project and are described below. Several other wetlands were identified adjacent to the staging areas. Staging area wetlands will be protected and will not be impacted.

*Cuyahoga Riverine Wetland*

Cuyahoga River is a National Wetlands Inventory (NWI)-mapped perennial waterway located within the Towpath Mudcatcher construction limits. Stream B11 is in the Willow Lake – Cuyahoga River HUC 12 sub-watershed (041100020505). No activities or structures negatively impacting the stream were observed. The riverine wetland is comprised of a well-defined channel. Substrate within the river reach includes gravel, boulders, boulder slabs, cobbles, sand and silt. The riverine habitat is

classified as a lower perennial riverine system with an unconsolidated bottom that is permanently flooded (R2UBH).

*Ohio and Erie Canal Riverine Wetland*

The Ohio and Erie Canal is a historical, man-made channel connecting the Ohio River with Lake Erie, and was used for the purposes of transporting resources inland. The Cuyahoga River was an integral part of this canal system from the City of Akron to its mouth at Lake Erie. The Ohio and Erie Canal is classified as a lower perennial riverine system with an unconsolidated bottom that is permanently flooded (R2UBH). No stream assessments were conducted on the Ohio and Erie Canal; however, it is within the construction limits of the project.

**Function Assessment**

*Biotic Functions*

Stabilization of the shoreline at Towpath Mudcatcher would result in minor, localized, direct impacts on aquatic species and habitats. There would be a permanent and temporary loss of 4.3 acres of wetland habitat. A temporary loss of function would occur during the construction period with an estimated one-month duration. The loss of habitat occurs along a narrow strip adjacent to the bank of the river. The riverbank wetlands up and down stream of the project area would continue to provide the same wildlife habitat within the Cuyahoga River Watershed.

Three federally protected species are known to be in the area of the project site. No state or federally listed plant species were observed. Suitable habitat for the Indiana bat, northern long-eared bat, and tricolored bat is found within the project limits. To avoid impacts to these species, no trees would be cut during the roosting season (April 1 to September 30).

Upland vegetation surveys yielded communities consistent with the Cuyahoga region. The common (dominant) trees included sycamore (*Platanus occidentalis*), box elder (*Acer negundo*), and black locust (*Robinia pseudoacacia*). Shrubs were primarily bush honeysuckle species (*Lonicera* spp.), Japanese knotweed (*Reynoutria japonica*), and blackberry/raspberry species (*Rubus* spp.). Common vines were riverbank grape (*Vitis riparia*), Virginia creeper (*Parthenocissus quinquefolia*), and poison ivy (*Toxicodendron radicans*). Common riparian invasive herbaceous species in the areas included reed canarygrass (*Phalaris arundinacea*), creeping jenny (*Lysimachia nummularia),* and Japanese knotweed (*Polygonum japonicum*).

In September 2021, a submerged aquatic vegetation (SAV) was conducted for the project reach of the river. Generally, the riparian community was typical of those associated with large waterways in Ohio. SAV may exist along the river, but they are most likely found in slow, backwater channels where the current is not strong and therefore were not noted in the riparian project area. Curly pondweed (*Potamogeton crispus*), a non-native species to Ohio and North America, was located near the opposite bank of Towpath Mudcatcher.

Ohio Environmental Protection Agency (Ohio EPA) has established a Qualitative Habitat Evaluation

Index (QHEI) as a method for evaluating stream habitat quality. The index provides a measure of habitat that generally corresponds to physical factors that affects fish and other important aquatic life including invertebrates. Using the QHEI (OEPA 2006), Stream B11 (the project area) scored 68.75 currently and assessed within the range 'Good' Warmwater Habitat. This is comparable with other studies completed along this stretch of the river by the Ohio Environmental Protection Agency and Northeast Ohio Regional Sewer District (NEOSD). In 2017 and 2018, the Ohio EPA sampled the Cuyahoga River and 67 tributaries at 140 sites for chemical, physical, and biological monitoring. Sampling included River Mile (RM) 20.5 where Towpath Mudcatcher is located, and the Cuyahoga River was deemed in full attainment, with no listed impairments. This stretch of the river has a designated aquatic life use (ALU) of warmwater habitat (WWH), an Index of Biological Integrity (IBI) score between 42 to 50 (indicating excellent stream condition), an Invertebrate Community Index (ICI) of 42 to 52 (marginally good to very good), and a QHEI of 75.50 to 82.00 (good to excellent range) (Ohio EPA 2023). In 2021, NEOSD conducted river sampling along the same stretch of the Cuyahoga and yielded similar results. NEOSD determined full attainment status, with a IBI score of 40, an ICI score around 48, and a QHEI score between 76.00 and 77.50 (NEOSD 2022).

In terms of macroinvertebrate sampling closest to RM 20.05 at RM 20.67, the most commonly captured aquatic invertebrate species by Ohio EPA were those considered intolerant to moderately intolerant to pollution which includes sediment deposition (Ohio EPA 2023). Invertebrate species that are intolerant of poor water quality are surviving in the river suggests that the water quality (which includes eroded soil as suspended solids) is good to excellent. Identified species included baetids which are considered pollutant intolerant species. Other species captured included *Rheotanytarsus* spp. and *Polypedilum* midges, and *Hydropsychids* all of which are considered moderately intolerant to pollution. The 2017-18 survey results from the downstream Gorge Dam (RM 44.5) to the mouth showed improvement compared to previous surveys conducted in the 1980s. Improvements to industrial facilities along the waterway, and reducing combined sewer overflows (CSO) inputs, has improved the macroinvertebrate community quality (Ohio EPA 2023). The 2021 evaluation of macroinvertebrates along RM 20.00 by NEOSD yielded similar results. A total of 60 qual taxa were collected including 16 Ephemeroptera, Plecoptera, Trichopteran (EPT) taxa and 17 sensitive taxa, and two rare and sensitive macroinvertebrates (*Ceraclea sp. a*nd *Leuchotrichia pictipes)* yielding an "Exceptional" ICI score (NEOSD 2022).

Through water quality monitoring efforts, Ohio EPA found total dichloro-diphenyl-trichloroethane (DDT) and total polychlorinated biphenyl (PCBs) above the Sediment Quality Guidelines (SQGs) and concentrations above threshold effect (TEC), while NEOSD noted over enriched conditions relating to total Kjeldahl nitrogen (TKN), Nitrate-Nitrite, and Total Phosphorus (NEOSD 2022). Within the lower Cuyahoga River, three mainstem locations, including 20.5, Ohio EPA found minimum Dissolved Oxygen (DO) exceedances. These results indicate historic contaminant inputs (e.g., DDT, PCB) and ongoing anthropogenic inputs (e.g., nutrients) within the system.

No living mussels were found at Towpath Mudcatcher project area during a September 2021 survey. Asian clams (*Corbicula* sp.) were present in the substrate. *Corbicula* are one of the most common aquatic invasive species to North America. Mussel shell fossils were found during the survey but were too degraded to be identified. Many segments of the river are being considered for native mussel restoration based on the historic distribution of mussels from these surveys.

*Hydrologic Functions*

Wetlands are important in supporting a suite of physical and biological functions including flow attenuation, sediment control, nutrient retention and habitats for a variety of wetland dependent species. Hydrologic conditions generally impact the structure and function of riparian and upland systems. Hydrologic regimes influence the relationship between upland areas and the river and changes to the hydrology can result in geomorphic alterations and structure which will translate to changes in wetland vegetation and degradation of riverine and floodplain habitat.

A general fluvial geomorphology assessment of the entire Cuyahoga River was conducted in 1997. The river was classified using the Rosgen Classification System, which quantifies a stream's variables, or morphologic characteristics, in varying levels of resolution from broad characterizations to site specific descriptions. The key variables used in the analysis include gradient, bank full width and depth, sinuosity, valley confinement, and particle size. Bank full refers to the discharge that fills a stable alluvial channel up to the elevation of the active floodplain (NPS 2004). These geomorphological features have direct bearing on the hydrologic activity of the Cuyahoga River.

Based on this analysis, the Cuyahoga River is generally classified as a system that has a high sensitivity to disturbance (including increases to stream flow and timing and/or sediment increases), a fair recovery potential (assumes natural recovery once cause of instability is corrected), a very high sediment supply, high streambank erosion potential, and very high vegetation controlling influence, which are all natural conditions for this class of river. This assessment reflects the hydrogeology at Towpath Mudcatcher in terms of active bank erosion present and associated limited vegetative communities which will be completely eliminated with the placement of the armoring rockfill.

*Cultural Values*

The Ohio & Erie Canal Towpath Trail (Towpath Trail) and Cuyahoga Valley Scenic Railway (CVSR) are the most significant linear cultural and recreational resources within the park. Both the Towpath Trail and the CVSR are important resources because they are frequently used by the public, are located within protected historic districts, and a portion of the Towpath Trail (elsewhere, outside this project site) is a National Historic Landmark. The Towpath Trail and CVSR occupy the same valley as 22 miles of the meandering Cuyahoga River and its tributaries. The Towpath Trail runs along the east riverbank and the CVSR along the west bank of the river. The Towpath Trail follows the historic route of the Ohio & Erie Canal (built 1825-1832). The Towpath Trail is a shared recreational trail. It is open to walkers, joggers, bicyclists, and (in some sections) horse riders. Along the trail and at key visitor centers, visitors can learn more about the cultural, historic, natural and recreational resources being preserved and celebrated along the Ohio & Erie Canal Towpath Trail. The Towpath Trail is one of the most used resources by the visiting public within the park.
The Cuyahoga Valley Scenic Railway's history began more than 100 years ago. In 1880, the Valley Railway began operations, transporting coal to Cleveland, Akron, and Canton from the Tuscarawas River Valley. It also provided passenger service. For people living in the industrial cities, leisure excursions into the countryside provided relief from the pressures, pollution, and crowding of urban life. Today, a ride on the scenic railway is a unique way for the public to experience all that Cuyahoga Valley National Park has to offer.

The project design will ensure the continued protection of the cultural values of the park by maintaining safe access and use of the Towpath Trail.

*Research and Scientific Values*

There are numerous scientific and research projects associated with the park and that have been conducted along the Cuyahoga River. Most projects are associated with understanding the conditions of natural and cultural resources. Over the past five years, most research activities have focused on plant and animal monitoring, ranging from invasive plants to breeding bird populations. Cultural resource inventories and museum collections have also been researched and documented. The proposed riverbank stabilization and associated loss of riverine wetland would not significantly affect the environment as it relates to research and scientific values of the park. This disturbance area is relatively small in comparison to Cuyahoga River as a whole however, this represents a significant impact to the riverine functions when you consider the impacts the completion of eight additional armoring projects that are planned for construction. The riverbank stabilization provides for additional research opportunities to assess the pre and post construction impacts on permanently removing tree and shrub shoreline vegetation that provided overhang shade to reduce water temperatures and the loss of organic input. monitor the effectiveness of streambank stabilization methods, monitor the adverse effects of reducing sediment input into the sediment transport budget including the resultant increase of hydraulic energy and it's impacts downstream, how live stakes and seeding of the top edge of the armored bank establish terrestrial habitat, and impacts to fish and wildlife use of the area in the future.

*Economic and Recreational Values*

Cuyahoga Valley National Park has seen an increase in visitation, making it the ninth most visited national park in 2022 with nearly 3 million recreational visits. While the entire national park system experienced a dip in visitation during the pandemic, CUVA saw a marked increase in 2020. Visitation numbers this past year have surpassed 2020. In the park's early years, most CUVA recreational visitors were local. Visitor studies, as well as anecdotal observations of staff, indicate the number of visitors from outside the local area is increasing. Since CUVA does not charge an entrance fee and can be accessed from all directions, visitation is determined by traffic counters in parking lots. People seek an experience in CUVA for a variety of reasons that include learning about history and nature, boosting physical and mental health, joining a guided activity, or finding solitude. Additionally, the gateway communities, especially those along railway stops and Towpath Trail access, benefit economically from the increase in visitation. The Towpath Trail is an important asset to the economic and recreational values of the park and its visitors. Preservation of the wetland values within the park are also a primary focus as many recreational activities prosper from a healthy ecosystem.

The balance between all these value components is important in developing the design to best to support these intermingled values (Table 1).

Table 1: Baseline Wetland Functions and Values

| Feature ID | Habitat Description | Contiguity | Vegetative | Habitat | Hydrologic | Public Use | Economic / |
|---|---|---|---|---|---|---|---|

| | | | Structural Diversity | (Biotic) Value | Function | | Recreational Values |
|---|---|---|---|---|---|---|---|
| *Cuyahoga River – Riverine Stream B11* | Perennial waterway located within the Towpath Mudcatcher construction limits. Stream B11 is in the Willow Lake – Cuyahoga River HUC 12 sub-watershed (041100020505) | Cuyahoga River | Generally, unvegetated streambed with unconsolidated channel bed | Provides habitat for aquatic invertebrates and vertebrates and terrestrial species uses water for forage /habitat | Provides sediment stabilization, and groundwater recharge or discharge area. | May provide recreational use for wildlife viewing or for canoeing and kayaking. | Surrounding land use includes the Towpath Trail and the River itself for based water recreation |
| *Ohio and Erie Canal* | Lower perennial riverine system with an unconsolidated bottom that is permanently flooded (R2UBH) | Adjacent to the Cuyahoga River. Historical, man-made channel connecting the Ohio River with Lake Erie | Generally, unvegetated streambed with unconsolidated channel bed | Provides habitat for aquatic invertebrates and vertebrates and terrestrial species uses water for forage /habitat | Provides sediment stabilization, and groundwater recharge or discharge area. | May provide recreational use for wildlife viewing | Surrounding land use includes the Towpath Trail and the canal itself for marginal based water recreation |

**Proposed Project Impacts on Wetlands**

The *proposed* action will impact 4.3 acres of riverine wetlands considered to have moderate to high functional value (see table 1).

*Cuyahoga River Riverine Wetland*

Implementation of the Proposed Action will result in the temporary and permanent impact to 4.3 acres of riverine wetland. The permanent placement of rock revetment embankment fill and the excavation of the mid-channel bar material will have permanent and temporary impacts in the riverine wetland (please see the red polygons on Figure 4). The total length of the riverine impact zone parallel to the riverbank measures over 1,900 feet. The typical cross section (please see Figure 3) shows fill 45 feet out into the river, perpendicular to the bank and from the top of bank.

Permanent impact to the Cuyahoga River would be the result of construction from:

- Placement of the LFSTP on the right descending bank (below the ordinary highwater mark)
- Excavation of river sediment deposition of a mid-channel bar upstream of the project.
- Loss of woody vegetation along the shoreline immediately adjacent the ordinary high-water level.

The now stabilized bank will have the following effects to the riparian system:

- Potential for bank erosion would be reduced in this location.
- Suspended solids contributed to the natural bedload transport system will be reduced, and significantly reduced once all nine armoring projects are in place. Note: Based on the Rosgen channel assessment performed as part of the 2004 Programmatic Environmental Assessment (NPS 2004), the Cuyahoga River generally has very high sediment supply. Reduction of the

naturally occurring sediment load may have long-term adverse impacts to the river sediment load contribution and transport, and the width to depth ratio, which may adversely affect the hydraulic energies throughout the system and downstream.

- The bioengineering component (i.e., live planting and seeding along the top edge of the armoring) would provide some vegetative cover/biological refugia within the upland riparian zone. The armored portion of the bank will eliminate the possibility of woody plant species colonization that could provide shade to lower water temperatures and leaf fall and other carbon or detritus-forming material input.

The following changes in the riparian system would be observed in association with the mid-channel bar removal:

- The mid-channel sand bar removal will result in a flat channel bottom surface and an appropriate river width and depth at this location. The flows will temporarily concentrate through the area where the bar is removed.
- Concentrated flows will help facilitate immediate sediment transport moving through this location and continuing down river as natural processes recreate the bar. The natural bed-load transport processes that formed the bar will likely continue and the bar will eventually be replaced. The lateral hydraulic conditions that cause bank erosion will be temporally reduced until the bar reforms.

Temporary impacts to the Cuyahoga River would occur during construction in two ways:

- Temporary sediment disturbance would occur due to temporary soil surface disturbance during construction and storm events. Sediment disturbance during in-water/near water work would be short term in nature but would be unavoidable during these in-water work events. In water work includes:
    - Construction of LFSTP
    - Excavation of mid-channel bar

As indicated, the Rosgen channel assessment for Cuyahoga River maintains a naturally high sediment supply. As a measure of river health, numerous studies of biological indicators identified that the current river function is good to excellent under the very high sediment load. Therefore, the short-term impacts on Cuyahoga River function due to the potential for increased sediment during construction is anticipated to be moderate and short term. Areas disturbed by construction activities are susceptible to erosion during precipitation events. Due to the implementation of best management practices during construction (see Mitigation Actions section), short-term impacts on wetland function will be minimal. The Cuyahoga River watershed is approximately 700-square miles at the project site. As the majority of the proposed improvements for this particular project are in the channel, and this individual project size is small relative to the surrounding watershed, there would be no large-scale change in the hydrology or flow regime through the channel and continuing downstream. Bank stabilization in just this one location could cause some deflection of river velocity or flow but that would likely be absorbed within the larger flow dynamics. However, the same claim can be made for each of the eight other individual bank stabilization projects to be implemented in the river when evaluated separately. There has been no consideration of the cumulative effects of armoring of over 17,000 feet (3.2 miles) of the riverbank in the park. It is very likely that the hydraulics will be significantly altered with the completion of all nine armoring projects.

*Ohio and Erie Canal Riverine Wetland*

A total of 0.027 acres temporary impact to wetlands within the Ohio and Erie Canal wetland systems resulting from a temporary canal crossing to provide equipment access to the mid- channel bar dredging operation. This temporary canal crossing will be regraded and revegetated to restore the site.

In summary, the bank stabilization and mid-channel bar removal will result in a permanent loss or damage of 4.3 acres within the riverine wetland complex.

**Mitigation Actions**

*Avoidance and Minimization and Best Management Practices*

The proposed streambank stabilization at Towpath Mudcatcher was designed to avoid impacting wetlands as much as possible by limiting the footprint of the stabilization in the riverine system as much as possible, while providing adequate long-term stabilization and protection of the riverbank and Towpath Trail. There is no practicable alternative that would avoid wetland and waterway impacts entirely. The project is situated along the bank of the Cuyahoga River. Not taking any action to stabilize the river's bank would result in further streambank degradation and continued threat to cultural resources.

The staging areas were placed in previously disturbed industrial areas and on hardened surfaces to avoid any additional impacts to the environment. Staging areas and limits of disturbance are provided in Figures 5. No wetlands adjacent to the staging areas will be impacted.

The park places strong emphasis on avoiding, minimizing, and mitigating potentially adverse environmental impacts. To help ensure the protection of natural and cultural resources and the quality of the visitor experience; the park, in cooperation with contractors, would implement the following typical measures as part of the preferred alternative. The items in this section have been considered during the design process. Specific stipulations and mitigations would be created as the final engineering plans are developed and monitored throughout construction. The list below is a general representation of efforts that would be implemented to minimize resource disturbance.

*General*

- Stormwater Management Best Management Practices (BMPs) would be applied to the site and include temporary seeding, permanent seeding, silt fence, stabilized construction entrance, designated waste disposal areas, material handling, equipment fueling and maintenance requirements, stream bank erosion control matting, placing 4-foot-high construction fencing, and the use of wooden construction pallets to support equipment that must drive through palustrine wetlands.
- Live native plant staking and native herbaceous seed mixture shall be approved by CUVA to ensure proper native species are used.
- Additional BMPs in the form of silt fence, geotextile fabric hay bales, or an equivalent would be placed around the canal crossing to prevent erosion and introduction of sediment into the

adjacent aquatic resources. If a crossing is damaged, it shall be repaired before subsequent use.

- No equipment would disturb wetland areas beyond the limits of disturbance identified in Figure 4.
- Wetland boundaries would be delineated with four-foot-high orange construction fencing to designate the no-cross boundaries for contractors and eliminate potential for accidental damage.
- Site inspections would be completed weekly and after rainfall events exceeding 0.5-inch of rainfall. All necessary repairs would be implemented immediately after such inspections.
- Removal of woody vegetation and trees shall be done outside the local avian breeding season to prevent impacts to nesting birds protected under the Migratory Bird Treaty Act [16 USC 703] from March 15 through November 15.
- Removal of woody vegetation and trees shall be removed outside of the bat roosting and breeding time of year windows which is from March 15 through November 15.
- A park staff member or a third-party representative familiar with riverine wetlands and riverbank armoring construction processes will be onsite during all construction activities to monitor compliance with the above BMP's.
- The source of any material that is imported from outside the park will be from a location that has been tested to be free of any contaminants above State threshold limits and free of any non-native plant parts or seeds.

*Visitor Use and Park Operations*

- The park and construction team will work together to notify the public of potential Towpath Trail closures up to one month before closures are anticipated. Park-approved signage will be produced, and notifications posted online and on park social media accounts.
- Rerouting shall be considered to keep the trail open, where possible. No weekend work will occur, providing public access to the Towpath Trail on the weekends.

*Wetland Impacts*

The Proposed Action would result in a total of 4.3 acres of riverine wetland impacts (please see Figure 4). Permanent impacts would be from dredging the mid-channel sediment bar, and the placement of an engineered rock and soil structure into the river for a distance from the shoreline of approximately 45 feet out into the riverine wetland and perpendicular to the shoreline.

Temporary impacts are anticipated and include destruction of aquatic organisms including invertebrates from equipment driving in the riverine wetland and increased turbidity to water quality during construction. Silt curtains were not considered for use in the river and will not be used. It is anticipated that post-construction benthic invertebrates and other mobile species will repopulate the channel bottom adjacent to the shoreline stabilization and the mid-channel sediment bar removal areas.

The Proposed Action will result in a loss or damage of moderate to high functions and values provided by the riverine wetland system. The reduction in sediment supply because of bank stabilization would reduce the persistent erosion and ultimately impact the sediment transport of bank material during

high water events downstream. The bioengineering elements of the Proposed Action benefit the functions and values of the Cuyahoga River floodplain upland system at this location by replacing lost vegetation along the top of the armoring.

**Compensatory Mitigation Plan**

The Proposed Action would result in a total of 4.3 acres of riverine wetland impacts. The NPS preferred type of compensation is to restore degraded riverine or palustrine wetlands elsewhere in the park. However, when asked park staff did not identify any degraded wetlands in the park that could be restored as compensation for the project impacts. Consequently, compensatory mitigation for the Proposed Action will be accomplished by enhancing at least 129 acres of existing degraded palustrine emergent wetlands on NPS property within the Cuyahoga Valley National Park Central Valley (Figure 8).

The compensation ratio of 30 acres of non-native plant removal enhancement for every acre of riverine wetland impacted (30:1) was calculated based on consultation with NPS Water Resources Division assuming the enhancement areas will be seeded with native plant species after the non-native plants are eradicated. The ratio of 30:1 is standard servicewide requirement when the impacted wetlands are of medium to high overall functional value and the proposed compensation is a palustrine wetland non-native plant removal enhancement that will be seeded with native plant species after the non-native plants are eradicate.

Figure 11 depicts the proposed mitigation area. The proposed mitigation area is located centrally within Cuyahoga Valley National Park between Boston Mills Road to the south and Vaughn Road to the north. The park has identified this area as a target for removal of invasive species with approximately 760 acres available for restoration. Currently, other invasive species removal projects are occurring within the 760 acres originally targeted, leaving 520 acres available for compensation for this project (anticipated at 129 acres). The mitigation area was originally part of the Cuyahoga River floodplain but was separated from the river in the 1820s due to construction of the Ohio and Erie Canal. During canal construction, a local creek, Standford Run, was placed into a culvert, which eventually failed. This failure resulted in further degradation of the compensation project area, which has been compounded in recent decades by increased precipitation, human- induced development, and the spread of invasive plants within the watershed.

Dominant habitats in the mitigation area include palustrine emergent wetlands, shrub wetlands, and bottomland / riparian forests. Existing vegetation in the palustrine wetlands includes invasive reed canarygrass (*Phalaris arundinacea),* common reed (Phragmites australis), and narrow-leaf cattail (*Typha angustifolia*). Few native trees are dispersed throughout the herbaceous wetland areas, including eastern cottonwood (*Populus deltoides*) and black willow (*Salix nigra*). Surrounding vegetation at higher elevations generally supports second- growth forests dominated by a variety of oaks, hickories, and maples with understories of nonnative shrubs.

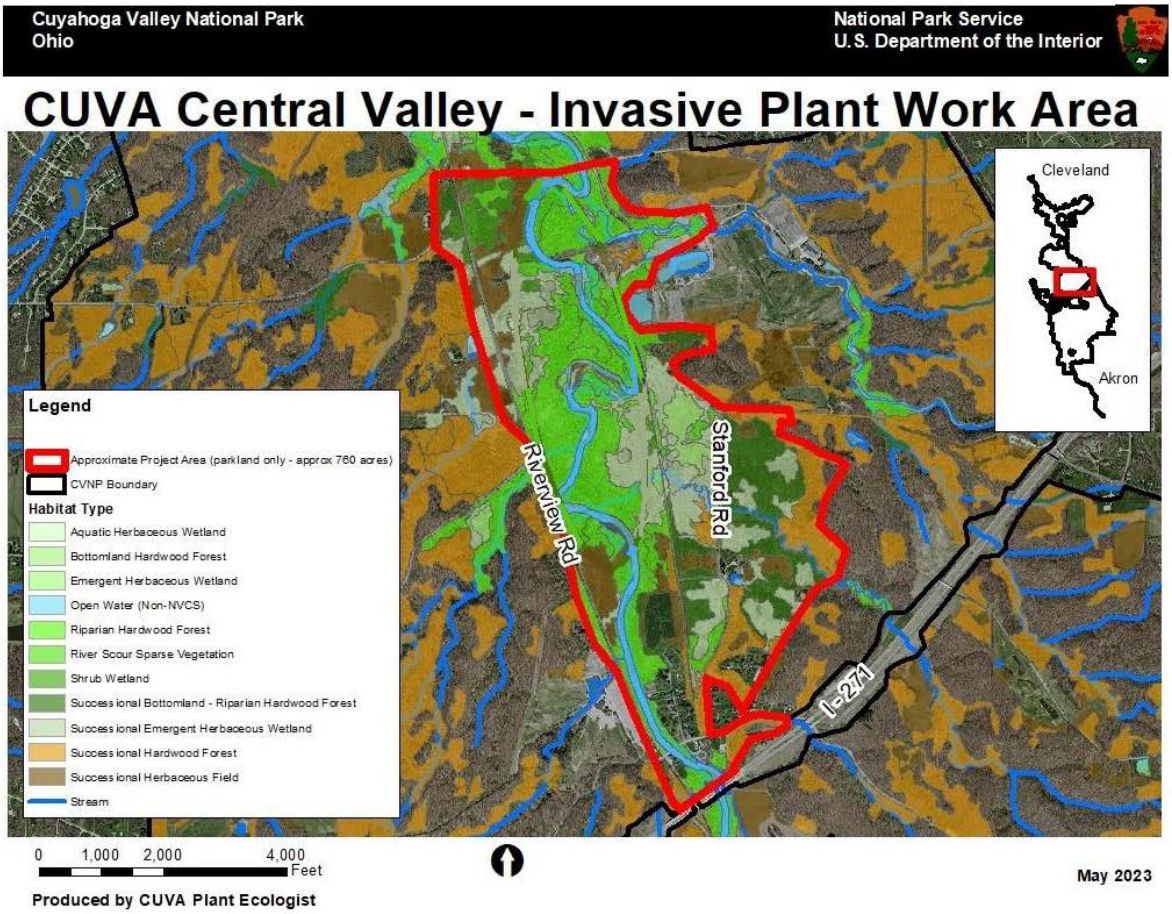


Figure 8. Proposed area location for wetland compensation, non-native plant species removal

To date, Cuyahoga Valley National Park staff have restored approximately 2,200 linear feet of Standford Run and five acres of riparian forest in the middle of the compensation area. These areas indicate the success of restoration efforts within the watershed but would not be included in the mitigation acreage associated with Towpath Mudcatcher. Enhancement of degraded wetland areas would be accomplished by 1) managing invasive plants of 129 acres and 2) lightly reseeding managed areas with a native mix of emergent wetland plants.

1) Invasive Plant Management: Invasive plants would be managed in the mitigation area for at least three years to transition vegetation from patchy monocultures of non-native species to a mix of native plants. Species of primary concern in the mitigation area include reed canarygrass, common reed, and narrow-leaf cattail. Other non-native species of concern scattered throughout the area include Canada thistle (*Cirsium canadensis*), autumn olive (*Elaeagnus umbellata*), and others. Initial treatment would include foliar spray of targeted species in targeted areas using a wetland approved, glyphosate-based herbicide, such as AquaNeat or similar. Subsequent treatments would include hand-wicking or cut-stump treatment of targeted species using a similar herbicide approved for use in wetland areas.

2) Reseeding Managed Areas: After controlling invasive plants in targeted areas, regeneration of

native, herbaceous, wetland plants would be accomplished by overseeding lightly with a mix of native species, including a variety of sedges, rushes, and forbs, such as marsh-marigold (*Caltha palustris*), swamp milkweed (*Asclepius incarnata*), and swamp mallow (*Hibiscus moscheutus*). Following management and seeding, park staff within the Resource Management Division would incorporate the mitigation areas into its annual work plan to monitor and subsequently re-treat non-native vegetation in future years to support continuity of high-quality wetlands in the mitigation area.

**Conclusion**

The NPS has identified a Proposed Action for stabilizing the Cuyahoga riverbank along the Towpath Trail at Towpath Mudcatcher. Wetland impacts have been avoided and minimized to the greatest extent practicable. The 4.3 acres of temporary and permanent wetland impacts will be compensated via non-native plant removal wetland enhancement over 129 acres (a ratio of thirty acres of restoration for every acre impacted). Therefore, the Proposed Action at Towpath Mudcatcher is consistent with E.O. 11990 and NPS Director's Order #77-1, including the NPS no-net-loss of wetlands policy.

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