APPENDIX N

DRAFT COMPENSATORY MITIGATION PLAN

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U.S. Department of Transportation
Federal Highway Administration

and

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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1 EXECUTIVE SUMMARY

The I-495 & I-270 Managed Lanes Study (MLS) is evaluating potential transportation improvements to portions of the I-495 and I-270 corridors in Montgomery and Prince George's County, Maryland, and Fairfax County, Virginia (**Figure 1-1**). The MLS identified six Build Alternatives (Alternative 8, 9, 9M, 10, 13B, and 13C) as potential transportation improvements in the DEIS. The No-Build Alternative (Alternative 1) and a one lane alternative (Alternative 5), which do not meet the purpose and need, were retained in the DEIS for comparison purposes but are not potential transportation improvements. Each Build Alternative would result in unavoidable impacts to regulated resources and require permits from the US Army Corps of Engineers (USACE), Maryland Department of Environment (MDE), and Virginia Department of Environmental Quality (VDEQ). This Draft Compensatory Mitigation Plan (Draft CMP) presents the compensatory mitigation approach for all of the DEIS Build Alternatives, and includes Phase I Mitigation Design Plans for permittee-responsible mitigation. Phase II Mitigation Design Plans will be developed for approved sites and included in the Final Compensatory Mitigation Plan (Final CMP).

Impacts were analyzed for each DEIS Build Alternative by resource type and watershed. In Maryland, DEIS Build Alternative impacts range from 16.08 to 16.52 acres of wetlands, and 151,880 to 153,635 linear feet of streams. Each alternative would permanently impact 1.48 acres of Palustrine Open Waters (POWs). These impacts occur in the following three federal HUC-8 watersheds: Middle Potomac-Anacostia-Occoquan, Middle Potomac-Catoctin, and Patuxent. In Virginia, each DEIS Build Alternative would impact a total of 0.05 acres of wetland and 3,349 linear feet of streams in the Middle Potomac-Catoctin watershed. Mitigation is required by the USACE, MDE and VDEQ for these unavoidable impacts to compensate for lost function and value, and to comply with the "no net loss" policy.

Wetland mitigation requirements in Maryland and Virginia were developed using standard practices of MDE and VDEQ, respectively. In Maryland, mitigation requirements vary due to differences in the DEIS Build Alternatives, ranging from 29.34 to 30.09 acres of wetland mitigation, and 99,456 to 100,982 linear feet of stream mitigation. Impacts not requiring mitigation range between 52,424 and 52,653 linear feet of existing bridge/culvert stream impacts, and 0.43 acres of POWs that will retain their function and value for all of the alternatives. In Virginia, the mitigation requirement for each DEIS Build Alternative is 0.10 acres of wetland mitigation and 729 linear feet of riverine mitigation. Several mitigation opportunities were explored including on-site mitigation for open channels, mitigation banking, in-lieu fee programs, and off-site permittee-responsible mitigation on public and private lands. Permittee-responsible mitigation sites were chosen for the Draft CMP based on their potential for functional uplift, watershed improvements, construction feasibility, proximity to the study area, mitigation credits, and replacement of lost functions and values resulting from roadway improvements.

In Maryland, proposed on-site stream mitigation credit for open channels that will remain or be relocated following construction ranges between 59,837 to 60,486 linear feet, resulting in a remaining off-site stream mitigation requirement of 39,619 to 40,496 linear feet. To ensure the compensatory mitigation package compensates for any of the DEIS Build Alternatives, the highest potential off-site mitigation requirement was selected to determine the off-site, permittee-responsible mitigation need. The highest potential off-site mitigation requirement in Maryland is referred to as the "MLS mitigation requirement" in this report, and includes 30.09 acres of wetland mitigation credits and 40,496 linear feet of stream mitigation credits.

The proposed permittee-responsible off-site mitigation in Maryland consists of 14 mitigation sites, including a total of 80.05 acres of potential wetland mitigation credits and 79,446 linear feet of potential stream mitigation credits. Phase I Mitigation Design Plans have been developed for each of the proposed sites and are included in **Appendices K and L**. Coordination with regulatory agencies and landowners is ongoing and will continue throughout the development of the Final CMP until concurrence on proposed mitigation is obtained. Phase II Mitigation Design Plans will be developed for sites approved by the agencies and included in the Final CMP. The 12 fundamental components of the Federal Mitigation Rule are discussed in **Section 6.3**, and will be developed in more detail in the Final CMP.

The Virginia mitigation requirement of 0.10 wetland mitigation credits and 729 riverine mitigation credits will be met by purchasing bank credits. Several mitigation banks sites were identified in the USACE's Regulatory In-Lieu Fee and Banking Information Tracking System (RIBITS) database that appear to have enough credits to meet these requirements. Bank credit purchases will be described in the Final CMP.

The MLS mitigation requirement in Maryland is summarized in **Tables 1-1** and **1-2**, and the Virginia credit requirements are summarized in **Table 1-3**. Summary tables for each of the DEIS Build Alternative impacts, impacts not requiring mitigation, proposed on-site stream mitigation, and off-site mitigation requirements are included in **Appendix A**.

Table 1-1: Maryland Wetland Mitigation Summary

Watershed	MLS Mitigation Requirement (ac)	Proposed Mitigation Sites	Proposed Mitigation Credit (AC)
Middle Potomac-Anacostia-Occoquan	18.53	4	50.70
Middle Potomac-Catoctin	2.51	4	20.17
Patuxent	9.05	1	9.18
Total	**30.09**	**9**	**80.05**

Table 1-2: Maryland Stream Mitigation Summary

Watershed	MLS Mitigation Requirement (LF)	Proposed Mitigation Sites	Proposed Mitigation Credit (LF)
Middle Potomac-Anacostia-Occoquan	20,045	7	42,321
Middle Potomac-Catoctin	15,134	5	18,412
Patuxent	5,317	2	18,713
Total	**40,496**	**14**	**79,446**

Table 1-3: Virginia Mitigation Summary

Watershed	Resource Type	Impacts	Credit Requirement	Proposed Bank Credits
Middle Potomac-Catoctin	Wetlands (AC)	0.05	0.10	0.10
	Waterways (LF)	3,349	729	729

Draft CMP Table Color Codes

Color	Description
	Existing Features & Impacts
	Mitigation Requirements
	On-Site Mitigation
	Off-Site Mitigation

Figure 1-1: MLS Corridor

2 INTRODUCTION

The Federal Highway Administration (FHWA), as the Lead Federal Agency, and the Maryland Department of Transportation State Highway Administration (MDOT SHA), as the Local Project Sponsor, are preparing an Environmental Impact Statement (EIS) in accordance with the National Environmental Policy Act (NEPA) for the I-495 & I-270 Managed Lanes Study (MLS). The purpose of the MLS is to develop a travel demand management solution(s) that addresses congestion and improves trip reliability on I-495 and I-270 within the study limits and enhances existing and planned multimodal mobility and connectivity. Efforts have been made throughout the planning process to avoid and minimize impacts to wetlands and waterways to the greatest extent practicable, while still achieving the goals of the MLS. Detailed information on avoidance and minimization of impacts for the MLS are included in the *Avoidance, Minimization, and Impacts Report* (AMR). Despite these efforts, impacts to streams and wetlands are unavoidable due to the extensive network of features that are located adjacent to and flow beneath the existing roadway.

As part of the MLS, six DEIS Build Alternatives (alternatives 8, 9, 9M, 10, 13B, and 13C) and one No-Build Alternative (alternative 5), are proposed. All of the DEIS Build Alternatives would result in unavoidable impacts to natural resources regulated by the USACE under Section 404 of the Clean Water Act, MDE under the Maryland Nontidal Wetlands Protection Act, and VDEQ under the Code of Virginia (VAC 62.1-44.15). The USACE Baltimore District will regulate Waters of the US within Virginia that are typically regulated by the Norfolk District. Permits will be required from the USACE, MDE and VDEQ for unavoidable impacts to regulated resources. For further information on the permits and DEIS Build Alternatives see the *Natural Resources Technical Report* (NRTR), and the *Alternatives Technical Report*.

The purpose of the Draft CMP is to present the mitigation approach for impacts associated with any of the DEIS Build Alternatives. The report begins with a summary of the existing conditions and impacts, followed by the mitigation requirements and the different types of proposed mitigation, including on-site mitigation, mitigation banking, and off-site permittee responsible mitigation on private and public lands. The report concludes with a discussion of the proposed permittee-responsible mitigation sites.

3 EXISTING CONDITIONS & IMPACTS

3.1 HUC-8 Watersheds

The MLS corridor is located within the following three federal HUC-8 watersheds: Middle Potomac-Anacostia-Occoquan, Middle Potomac-Catoctin, and Patuxent (See **Figure 5-1**). The Middle Potomac-Anacostia-Occoquan watershed drains approximately 1,276 square miles in Maryland and Virginia. The watershed drains to the Potomac River from the western boarder of Washington D.C. south to Potomac Heights, Maryland. The smaller MDNR 12-digit watersheds within the Middle Potomac-Anacostia-Occoquan that overlap with the MLS corridor include Rock Creek, Sligo Creek, Northwest Branch, Paint Branch, Little Paint Branch, Northeast Branch, Upper Beaverdam Creek, and Upper Henson Creek watersheds. Most of these watersheds are highly developed with fair to poor stream conditions, with the exception of the upper sections of Rock Creek, Northwest Branch, and Paint Branch in Montgomery County. Degraded streams in the lower watersheds in Montgomery County and throughout Prince George's County exhibit fair to poor fish and benthic macroinvertebrate communities, limited instream

habitat, poor water quality due to a lack or absence of stormwater treatment, moderate to severe bank erosion, insufficient riparian buffers and numerous fish blockages created by dams and old sanitary sewer pipes. The Upper Paint Branch is one of the least densely developed watersheds in the Anacostia drainage (Galli et al., 2010) and is renowned for its self-sustaining brown trout populations (MCDEP, 1999) and relatively un-impacted aquatic communities.

The Middle Potomac-Catoctin watershed drains approximately 1,227 square miles in Maryland and Virginia. The watershed drains to the Potomac River from Harpers Ferry, MD east to Washington D.C. The smaller watersheds within the Middle Potomac-Catoctin that overlap with the MLS corridor include Fairfax County Middle Potomac, Potomac River/Rock Run, Cabin John Creek, Watts Branch, and Muddy Branch. The dominant land use in the Fairfax County Middle Potomac consists of residential, open space/parks/recreational areas, road right-of-ways, and commercial. The 2008 Fairfax County Middle Potomac Watersheds Management Plan describes the majority of the in-stream habitat quality in the watershed as Fair with inadequate riparian buffers that are less than 100 feet wide or with non-native, non-diversified, or insufficient vegetation. In Maryland, most of the watersheds are highly degraded with several developed areas including the Potomac Village, City of Rockville, and City of Gaithersburg. Degraded streams in the Maryland watersheds exhibit highly eroded banks, over-widened stream channels, piped/straightened channels, limited instream habitat, insufficient riparian buffer, inorganic pollutants, and fair to poor biological communities.

The Patuxent watershed consists of 868 square miles in Maryland that drain to the Patuxent River from Lisbon southeast to the Chesapeake Bay. The smaller MDNR 12-digit watersheds within the Patuxent that overlap with the MLS corridor include Bald Hill Branch, Lower Southwest Branch, and Upper Southwest Branch. Most of these watersheds are moderately to highly developed with degraded streams that generally have poor fish and benthic communities, limited instream habitat, and numerous fish blockages. The northern portion of the Upper Southwest Branch watershed near MD 214 has the least degraded biological conditions and a fish community rating of Good (MDNR, 2003) and the mainstem of Bald Hill Branch was designated as Tier II (High Quality) waters in 2007, based on baseline data collected by MBSS in 1997.

One of the goals of the MLS mitigation package is to improve upon the ecological functions in these watersheds with a focus on the impaired conditions and needs that have been described above. For further details on existing watershed conditions see the MLS *Natural Resources Technical Report* (NRTR).

3.2 Existing Wetlands and Waterways

A total of 438 nontidal wetlands and 1,037 waterway features were delineated within the corridor study boundary[1]. One Traditional Navigable Waterway (TNW), the Potomac River, was identified within the corridor study boundary. All other perennial waters are classified as tributaries to the Potomac or Patuxent Rivers. The total number of features delineated by classification are provided in **Table 3-1** below.

[1] The corridor study boundary is a 48-mile-long and approximately 600-foot-wide area along the centerlines of I-495 and I-270, spanning two states and three counties. Corridor study boundary limits are displayed on the MLS JPA Impact Plates.

Detailed information on these features and their impacts can be found in the MLS *Wetland Delineation Memorandum* and *Natural Resources Technical Report* (NRTR).

Table 3-1: Total Delineated Features

Features		
Wetlands	**Total Number**	**Acres**
Palustrine Emergent (PEM)	134	13.56
Palustrine Forested (PFO)	283	56.72
Palustrine Scrub-Shrub (PSS)	21	2.98
Total	**438**	**73.26**
Waterways	**Total Number**	**Linear Feet**
Ephemeral	143	18,508
Intermittent	441	82,947
Perennial	453	139,879
Palustrine Open Water (POW)	12	2.85 AC
Total	**1,037**	**241,334**

3.3 Impact Summary

The DEIS Build Alternatives would impact USACE, MDE, and VDEQ regulated nontidal emergent, scrub-shrub, and forested wetlands, in addition to regulated Waters of the US other than wetlands. Unavoidable impacts associated with each DEIS Build Alternative have been calculated and described in the NRTR and AMR, and are based on the design details described therein. Regulatory jurisdiction under the CWA of 1972 differs from the Maryland Nontidal Wetlands Protection Act jurisdiction (COMAR 26.23.01), resulting in slightly different MDE and USACE impact quantities. To simplify reporting and ensure the mitigation requirement represents the total mitigation need for each agency, the highest impact quantity in each watershed and by each impact type was used to determine compensatory mitigation requirements. For example, if the MDE jurisdictional stream impact in the Patuxent watershed was greater than the USACE jurisdictional stream impact in the Patuxent watershed, the MDE impacts were used.

In Maryland, the permanent impacts for the DEIS Build Alternatives range from 16.08 to 16.52 acres of wetlands, and 151,880 to 153,635 linear feet of streams. Each of the DEIS Build Alternatives would permanently impact a total of 1.48 acres of POWs in Maryland. These impacts occur in the following three federal HUC-8 watersheds: Middle Potomac-Anacostia-Occoquan, Middle Potomac-Catoctin, and Patuxent. In Virginia, each of the DEIS Build Alternatives would impact a total of 0.05 acres of wetland and 3,349 linear feet of stream in the Middle Potomac-Catoctin watershed. Wetland and waterway impacts for each DEIS Build Alternative are displayed by state, HUC-8 watershed and resource type in **Appendix A**. Detailed information on avoidance and minimization of impacts is included in the *Avoidance, Minimization, and Impacts Report* (AMR).

3.4 Function & Value Impacts

Ecological functions and values lost due to the proposed impacts would vary based on several factors including the location, size, and quality of the existing resource and the level of disturbance. All wetlands and waterways that would be impacted by the DEIS Build Alternatives provide some level of ecological

function. Qualitative functions and values were assessed for each resource and reviewed by participating and concurring agencies, including USACE, MDE, U.S. Fish and Wildlife Service (USFWS), Maryland National Capital Park and Planning Commission (M-NCPPC), and Maryland Department of Natural Resource (DNR), and revised in some cases based on agency input.

Wetland functions and values were assessed using the USACE New England Method as presented in *The Highway Methodology Workbook Supplement – Wetland Functions and Values; A Descriptive Approach* (USACE, 1999). Wetland functions and values that would be lost due to the proposed roadway improvements would include the following: groundwater recharge/discharge, floodflow alteration, fish habitat, sediment/toxicant retention, nutrient removal, sediment stabilization, wildlife habitat, recreation, education/scientific value, uniqueness/heritage, and/or visual quality/aesthetics. Potentially impacted wetlands range from low quality wetlands with very limited ecological functions to high quality wetlands with numerous ecological functions. For example, highly-disturbed, small wetlands with extensive invasive plant species were considered to have a low function and value, while large floodplain or seep wetlands with diverse native vegetation were considered to have a high function and value.

Stream functions and values that would be lost by the proposed roadway improvements were determined based on several factors including the type of impact, size of the channel, bed and bank stability, floodplain connection, channel form and substrate, degree of channel alteration, in-stream habitat, watershed imperviousness, and riparian buffer conditions. The proposed impacted streams range from poor quality channels with low functions and values to good quality channels that provide high functions and values. Many of the channels along the study corridor were altered in the past by the construction of the highway and surrounding development in the watershed that have resulted in highly-degraded streams; however, some high-quality channels in certain locations remain and continue to provide numerous ecological functions. Streams that had a low function and value included channels that were highly unstable, disconnected from the floodplain, concrete or rip-rap lined, piped, straightened, or significantly altered by some other type of human disturbance. Thomas Branch is an example of a stream within the corridor that has a low function and value due to the majority of the channel being altered by prior relocations, concrete trapezoidal channels, rip-rap, sheet pile walls, and surrounding residential development. These conditions have created a highly unstable channel that provides limited functions and poor in-stream habitat. Streams with a high function and value included minimally altered channels with a floodplain connection, diverse in-stream habitat, stable geometry, and expansive forested buffers. Paint Branch is an example of a stream within the corridor that has a high function and value due to its diverse in-stream habitat, good water quality, relatively stable bed and banks, and intact forested buffer.

4 MITIGATION REQUIREMENTS

4.1 Determination of Mitigation Requirements

Compensatory mitigation for wetland and waterway impacts are determined based on a combination of factors including the function, value, and size of the resource. In Maryland, these mitigation requirements may be adjusted at the discretion of the USACE or MDE. Traditionally, wetland mitigation requirements under Section 404 are determined by the ratio of wetland acres replaced to wetland acres lost. Wetland mitigation requirements for the DEIS Build Alternatives in Maryland have been calculated based on MDE's standard replacement to impact ratios of 1:1 replacement for emergent nontidal wetland (PEM) impacts

and 2:1 replacement to impact for forested (PFO) and scrub-shrub (PSS) nontidal wetland impacts. The agencies also require stream mitigation for permanent impacts where functions and values have been lost. Stream mitigation requirements for the DEIS Build Alternatives in Maryland were calculated per linear foot based on a 1:1 replacement to impact ratio. Stream mitigation requirements may also be adjusted by the agencies depending on the type of impact and proposed mitigation.

Waterway impacts in Maryland that would not require mitigation include portions of streams flowing through existing culverts and under existing bridges, and POWs that would remain or be modified. These resources would retain their function and value following construction completion and would therefore not require mitigation. The length of the existing culvert or width of the bridge to remain or to be replaced would be used to determine the linear footage of stream impact that would not require mitigation. The existing area of the POW to remain would be used to determine the acres of POW impact that would not require mitigation. Mitigation would be required for POWs that would be permanently removed. POW removals would be mitigated off-site based on a 1:1 replacement to impact ratio as PEM wetland mitigation.

In Virginia, wetland mitigation for the DEIS Build Alternatives is proposed based on the following VDEQ replacement ratios.

- 2:1 – Replacement to impact for forested wetlands
- 1.5:1 – Replacement to impact for scrub-shrub wetlands
- 1:1 – Replacement to impact for emergent wetlands

Stream mitigation requirements for the DEIS Build Alternatives in Virginia are based on the Unified Stream Methodology (USM), which is an accepted method used by the USACE's regulatory program and VDEQ's Virginia Water Protection Permit (VWPP) Program. USM Stream Assessment Forms were used to calculate mitigation requirements for each impacted stream based on a combination of factors including the existing conditions of the channel (condition, buffers, instream habitat & channel alteration), the length of the reach being impacted, and the type of impact (severe, significant, moderate or negligible). The stream mitigation requirement for each impacted feature is calculated by using the following formula:

Required Mitigation (LF) = RCI x LF x IF

RCI = Reach Condition Index
LF = Impact Linear Footage
IF = Impact Factor

For additional information on the USM, see "*Unified Stream Methodology for Use in Virginia*", January, 2007.

4.2 Mitigation Requirements Summary

In Maryland, mitigation requirements range between 29.34 and 30.09 acres of wetland mitigation credit, and 99,456 and 100,982 linear feet of stream mitigation credit depending the DEIS Build Alternative. Impacts not requiring mitigation range between 52,424 and 52,653 linear feet of existing bridged/culverted stream impacts and 0.43 acres of POWs that will remain for all alternatives. Wetland and stream mitigation requirements in Maryland are summarized for each DEIS Build Alternative by federal HUC-8 watershed in **Appendix A**. Detailed information on the existing bridged/culverted stream

impacts that do not require mitigation are included in **Appendix B**. One POW (feature 8D) at station 1338+00 in the Middle Potomac-Anacostia-Occoquan watershed will remain for all of the DEIS Build Alternatives and not require mitigation. Locations of the existing bridges, culverts, and POW can be identified with stationing included on the MLS Joint Permit Application (JPA) Impact Plates.

In Virginia, the mitigation requirement for each DEIS Build Alternative is 0.10 acres of wetland mitigation and 729 linear feet of riverine mitigation in the Middle Potomac-Catoctin watershed. The wetland and riverine mitigation requirements in Virginia are summarized in **Tables 4-1** and **4-2**. USM Stream Assessment and Wetland Determination Forms are included in **Appendix C** for each proposed wetland and waterway impact in Virginia.

Table 4-1: Virginia Wetland Impacts & Required Mitigation

Watershed	Impact Type	Impact (AC)	Replacement Ratio	Mitigation Requirement (AC)
Middle Potomac-Catoctin	PFO	0.05	2:1	0.10
Total		**0.05**		**0.10**

Table 4-2: Virginia Waterway Impacts & Required Mitigation

Watershed	Resource Name	Impact Type	Reach Condition Index (RCI)	Impact (LF)	Impact Factor Type	Impact Factor (IF)	Mitigation Requirement (LF)
Middle Potomac-Catoctin	22AAA	Perennial	0.82	339	Access	0.0	0
	22AAA_C	Perennial	0.80	491	Existing Culvert	0.0	0
	22SS	Perennial	1.15	97	Access	0.0	0
	22UU	Intermittent	0.74	543	Roadway	1.0	402
	22VV	Ephemeral	0.75	371	Staging	1.0	279
	22WW/ 22XX	Ephemeral	0.75	64	Roadway	1.0	48
	22WW_C	Intermittent	0.80	272	Existing Culvert	0.0	0
	22ZZ	Perennial	0.96	97	Access	0.0	0
	22ZZ_C	Perennial	0.80	1,075	Existing Culvert	0.0	0
Total				**3,349**			**729**

Mitigation Requirement (LF) = RCI X LF X IF

5 MITIGATION APPROACH

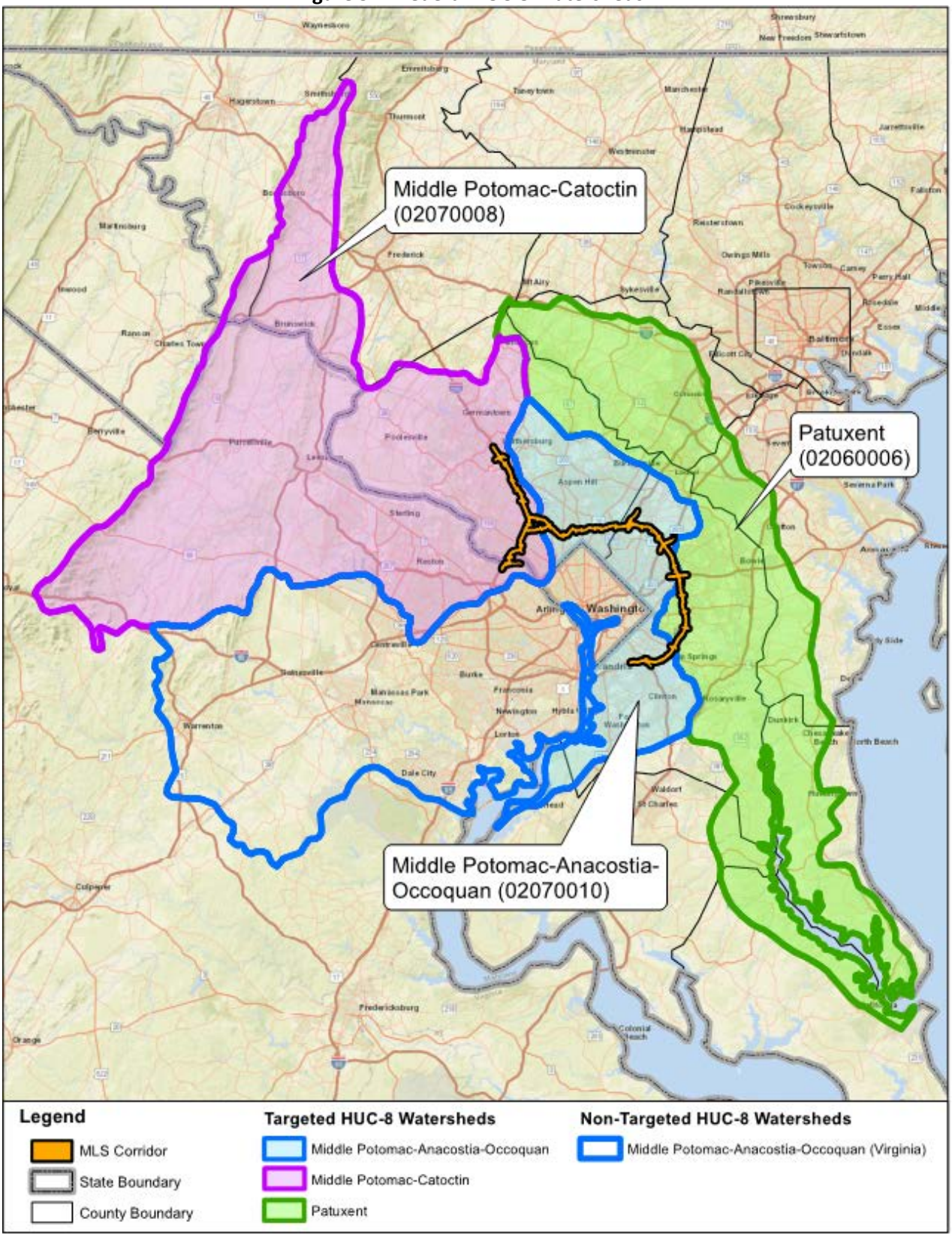
Mitigation opportunities were targeted within the three federal HUC-8 watersheds that would be impacted by the DEIS Build Alternatives (**Figure 5-1**). These targeted watersheds include the Middle Potomac-Anacostia-Occoquan (02070010), Middle Potomac-Catoctin (02070008), and Patuxent (02060006). The first step in pursuing mitigation for potential impacts resulting from the DEIS Build

Alternatives began with identifying potential on-site mitigation for waterways that would fully or partially retain their function and value following construction completion (i.e. channel relocations or channels to remain). On-site wetland mitigation was not proposed due to concerns with the potential failure of replacing functions and values adjacent to the proposed roadway expansion. Once on-site mitigation was determined, off-site mitigation options were pursued by state and watershed, based on the Federal Mitigation Rule hierarchy, beginning with mitigation banking and in-lieu fee programs, and followed by permittee-responsible mitigation. Available mitigation bank credits were identified in Virginia that could compensate for the proposed Virginia impacts; however, no mitigation bank credits or in-lieu fee programs were identified in Maryland. Two mitigation banks were identified in the USACE's RIBITS database in the Patuxent watershed in Maryland, however credits from these banks cannot be applied to MLS impacts because the MLS is located outside of each bank's service area. Due to the lack of in-lieu fee programs and mitigation bank credits in Maryland, permittee-responsible mitigation was pursued for the remaining mitigation requirements. A two-tiered approach was used to identify potential permittee-responsible mitigation that included a traditional mitigation site search on public lands and a Request for Proposals (RFP) on private lands.

The following is a list of the potential mitigation types that were investigated for the DEIS Build Alternatives:

- On-site Stream Mitigation
- Off-site Mitigation
    - Mitigation Banking & In-lieu Fee Programs
    - Traditional Mitigation Site Search on Public Lands
    - Request for Proposals (RFP) on Private Lands

Figure 5-1: Federal HUC-8 Watersheds



5.1 On-site Stream Mitigation

On-site mitigation is proposed for streams in Maryland that would fully or partially retain their function and value following construction completion. Proposed on-site stream mitigation includes open channels that would remain in place or be relocated within close proximity to their original location. Channels to remain in place consist of existing channels within the limits of disturbance (LOD) where no roadway fill or infrastructure is proposed. Impacts to these channels may be designated as temporary during the final design stages.

On-site mitigation credit for channel relocations and channels to remain was determined based on the functional value of the channel prior to construction and the proposed length of the channel after construction completion. Existing channel functional values range from high to low depending on the quality of the channel and the functions the channel provides. Full on-site mitigation credit (1:1 replacement to impact ratio) is proposed for channels with a low functional value, such as streams that are highly unstable, disconnected from the floodplain, concrete or rip-rap lined, straightened, or have been significantly altered in the past. These channels are anticipated to retain their limited functional value following construction completion and will therefore be mitigated entirely on-site. Partial credit (0.5:1 replacement to impact ratio) is proposed for channels with a medium functional value including streams that have been partially altered by the surrounding highway and developments, yet still retain some functions and values. These streams are anticipated to partially retain their function and value following construction and will therefore receive one-half the linear footage credit of the proposed channel. On-site mitigation credit is not proposed for channels with a high functional value. These high-quality channels include minimally altered streams that are connected to surrounding floodplains/wetlands and large perennial channels that provide significant functions and values. Channels with a high functional value are anticipated to be degraded as a result of construction and have significantly lower function and value following construction and would therefore require full off-site mitigation. See **Table 5-1** for a summary of the proposed on-site stream mitigation credit ratios.

Table 5-1: On-site Stream Mitigation Credits

Existing Channel Functional Value	Proposed On-Site Credit Ratios (Replacement to impact)
High	0:1
Medium	0.5:1
Low	1:1

5.1.1 Proposed On-site Stream Mitigation

In Maryland, on-site stream mitigation opportunities range from 59,837 to 60,486 linear feet depending on the DEIS Build Alternative. Proposed on-site stream mitigation and remaining mitigation requirements are summarized for each DEIS Build Alternative by HUC-8 watershed in **Appendix A**. Detailed tables of on-site stream replacements for each DEIS Build Alternative, including feature names, HUC-8 watersheds, stationing, type, and linear footage can be found in **Appendix D**. The approximate location of each on-site replacement can be determined via stationing included on the MLS JPA Impact Plates.

5.2 Off-Site Mitigation Requirement

In Maryland, off-site mitigation requirements vary depending on the DEIS Build Alternative impacts and proposed on-site stream mitigation. Impacts range from 16.08 to 16.52 acres of wetlands, and 151,880 to 153,635 linear feet of streams. Each alternative would impact 1.48 acres of POWs. Impacts not requiring mitigation range between 52,424 and 52,653 linear feet of existing bridged/culverted stream impacts and 0.43 acres of POWs that will remain for all alternatives. Mitigation requirements in Maryland range from 29.34 to 30.09 acres of wetland mitigation credit and 99,456 to 100,982 linear feet of stream mitigation credit. Proposed on-site stream mitigation ranges from 59,837 to 60,486 linear feet, resulting in an off-site stream mitigation requirement ranging from 39,619 to 40,496 linear feet. The DEIS Build Alternative impact and mitigation requirement ranges are displayed by HUC-8 watershed in **Tables 5-2** and **5-3**. Impacts and mitigation requirements in the Patuxent watershed are identical for all of the DEIS Build Alternatives. Tables showing each of the DEIS Build Alternative impacts and mitigation requirements are included in **Appendix A**.

Table 5-2: Maryland Wetland Mitigation - DEIS Build Alternative Ranges

Watershed	Wetland Impacts (AC)	POW Impacts (AC)	Off-Site Mitigation Requirement (AC)
Middle Potomac-Anacostia-Occoquan	9.85 - 10.11	0.79*	18.01 - 18.53
Middle Potomac-Catoctin	1.56 – 1.77	0.00	2.23 – 2.51
Patuxent	4.64	0.69	9.05
Total	**16.08 - 16.52**	**1.48**	**29.34 – 30.09**

*0.43 acres of POW in the Middle Potomac-Anacostia-Occoquan watershed will remain following construction and are therefore not included in the mitigation requirement.

Table 5-3: Maryland Stream Mitigation - DEIS Build Alternative Ranges

Watershed	Stream Impacts (LF)	Impacts Not Requiring Mitigation (LF)	Total Mitigation Requirement (LF)	Proposed On-Site Stream Mitigation (LF)	Off-Site Mitigation Requirement (LF)
Middle Potomac-Anacostia-Occoquan	95,673 – 96,554	32,716 – 32,915	62,957 - 63,639	43,234 - 43,594	19,723 - 20,045
Middle Potomac-Catoctin	33,474 – 34,348	11,032 – 11,062	22,442 – 23,286	7,801 - 8,152	14,579 - 15,134
Patuxent	22,733	8,676	14,057	8,740	5,317
Total	**151,880 - 153,635**	**52,424 - 52,653**	**99,456 - 100,982**	**59,837 - 60,486**	**39,619 - 40,496**

To ensure the compensatory mitigation package compensates for any of the DEIS Build Alternatives, the off-site mitigation requirement with the highest values was selected to determine the goals of the off-site, permittee-responsible mitigation. The highest off-site mitigation requirement in Maryland is referred to as the "MLS mitigation requirement" in this report, and includes 30.09 acres of wetland mitigation credits and 40,496 linear feet of stream mitigation credits. The MLS mitigation requirement is summarized by HUC-8 watershed in **Table 5-4**.

Table 5-4: MLS Mitigation Requirement

Watershed	Off-Site Wetland Mitigation Requirement (AC)			Off-Site Stream Mitigation Requirement (LF)
	PEM	PSS/PFO	**Total**	
Middle Potomac-Anacostia-Occoquan	2.41	16.12	**18.53**	20,045
Middle Potomac-Catoctin	1.03	1.48	**2.51**	15,134
Patuxent	1.61	7.44	**9.05**	5,317
Total	**5.05***	**25.04**	**30.09**	**40,496**

* 1.05 acres of POW impacts included in PEM wetland mitigation requirement.

5.3 Mitigation Banking & In-Lieu Fee Programs

5.3.1 Availability

Mitigation banking and in-lieu fee programs were pursued in Maryland and Virginia to compensate for unavoidable impacts from the DEIS Build Alternatives. The following agencies and mitigation banking organizations were consulted: US Environmental Protection Agency (EPA), USACE, Ecotone, Inc., Montgomery County Department of Environmental Protection (MCDEP), Prince George's County Department of Environmental Resources (PGDER), and M-NCPPC. Based on this research and coordination, there are no available mitigation bank credits or in-lieu fee programs in Maryland that could be applied to the MLS impacts, and therefore permittee-responsible mitigation would be required. Two mitigation banks were identified in the USACE's RIBITS database in the Patuxent watershed in Maryland, however credits from these banks were not pursued due to their service areas being located outside the MLS corridor.

In Virginia, five potential mitigation banking sites were identified in the USACE's RIBITS database within the Middle Potomac-Catoctin watershed on December 12, 2019. A total of 47,080 linear feet of stream mitigation credits and 2.26 acres of wetland mitigation credits are available from these banks. The available mitigation banking credits exceed the 0.10 wetland credits and 729 stream credits required for any of the DEIS Build Alternatives. The five mitigation banks identified within the Middle Potomac-Catoctin watershed in Virginia are summarized in **Table 5-5**.

Table 5-5: Potential Virginia Mitigation Banking Sites

Mitigation Banking Site	Mitigation Permit Number	Riverine Mitigation Credits Available (LF)	Wetland Mitigation Credits Available (AC)
Northern Virginia Stream	NAO-2007-3620	44,557	0
Rock Hedge	NAO-2008-2553	1,734	0.45
Pipken Site	NAO-2008-0713	621	0
Howsers Branch	NAO-2006-9613	111	1.81
South Fork Catoctin Site	NAO-2008-1969	57	0
Total		**47,080**	**2.26**

5.3.2 Proposed Mitigation Banking

Privately owned mitigation banks would be used to fulfill all mitigation requirements in Virginia. The mitigation requirement of 0.10 wetland mitigation credits and 729 riverine mitigation credits would be met by purchasing bank credits. MDOT SHA will negotiate with the banker to identify credits, confirm credit use with the USACE, and purchase credits to be included in the Final CMP.

5.4 Permittee-Responsible Mitigation

A two-tiered approach was used to identify potential permittee-responsible mitigation sites for the remaining off-site mitigation requirements in Maryland that included a traditional mitigation site search on public lands and a Request for Proposals (RFP) on private lands. The site selection process and results of the two approaches are discussed in the following sections.

5.4.1 Traditional Mitigation Site Search on Public Lands

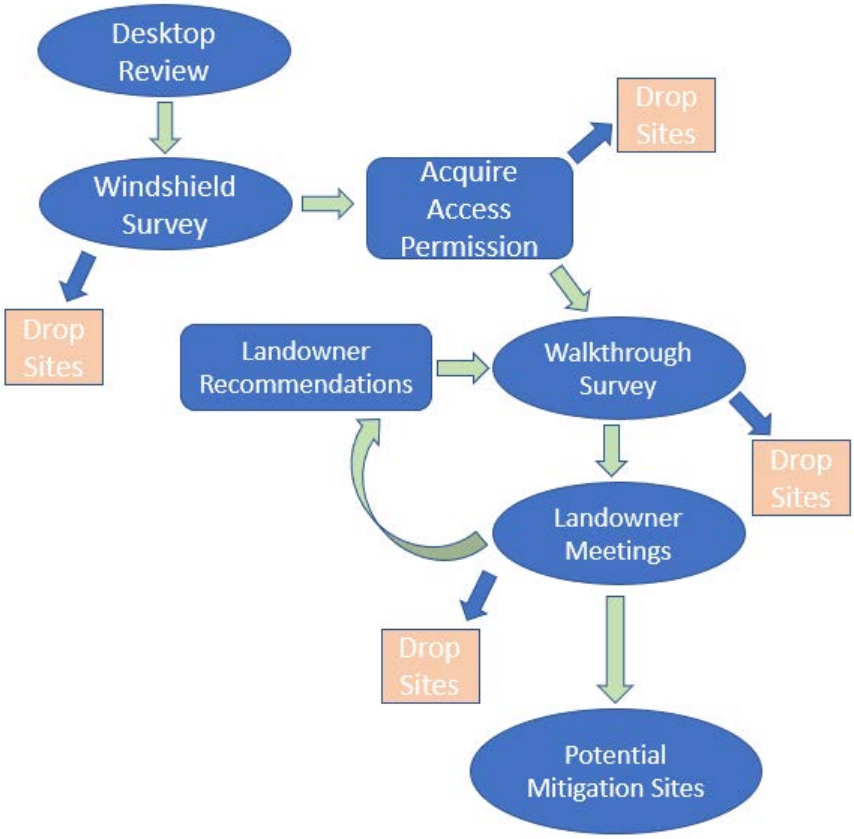
5.4.1.1 Site Search

The traditional mitigation site search focused on potential stream, wetland and fish passage mitigation sites on public lands within the three targeted HUC-8 watersheds. The traditional mitigation site search process occurred in the following five stages.

1. Desktop Review
2. Windshield Survey
3. Walkthrough Survey
4. Landowner Meetings
5. Potential Mitigation Site Selection

The process for the traditional mitigation site search and selection is illustrated in **Figure 5-2**. A more detailed discussion on each of the five stages of the process follows.

Figure 5-2: Traditional Mitigation Site Selection Process



Stage 1 – Desktop Review

The first stage of the traditional mitigation site selection process consisted of a desktop review of the MDOT SHA Environmental Program Division's (EPD) Master Site Selection geodatabase, which includes a compiled database of sites identified in the Water Resources Registry (WRR), state-wide TMDL program, and numerous watershed assessments, along with sites submitted by consultants identified through GIS analysis and from previous site searches and outreach coordination. All sites within the database were evaluated in accordance with the draft 2015 MDOT/SHA Site Selection Process Document. A list of potential fish passage sites located within MDOT SHA right-of-way (ROW) was also compiled from the Chesapeake Fish Passage Prioritization (CFPP) and North Atlantic Aquatic Connectivity Collaborative (NAACC) databases.

Stage 2 – Windshield Survey

A windshield survey was conducted for all wetland and stream sites identified in the desktop review. The windshield survey for stream and wetland sites consisted of reviewing sites on public land from the road ROW to determine their feasibility and potential for ecological uplift. Sites with constructability or feasibility constraints (i.e. steep slopes, utilities, limited access, private properties, etc.) and/or had limited potential for ecological uplift (i.e. stable conditions, ephemeral channels, high position in landscape, existing restoration, etc.) were removed from consideration. A windshield survey was not conducted for

fish passage sites due to their location within the state road ROW that allowed for direct access to the sites for a walkthrough survey.

Stage 3 – Walkthrough Survey

Permission to access all sites retained from the windshield survey was then requested from public landowners for a more detailed walkthrough survey. All sites that were granted access were rated by a team of environmental scientists and water resource engineers using MDOT SHA's Mitigation Field Assessment Forms. A similar assessment form was created for potential fish passage sites that includes criteria referenced from the NAACC and CFPP databases. All of the site assessment forms provide a quantitative means to assess and rank a site's mitigation potential based on feasibility, potential for ecological uplift, and associated construction impacts. The following criteria were rated in the site assessment form based on the mitigation type proposed at each site. A detailed explanation of each criterion rating can be found in **Appendix E**.

Wetland Site Criteria

1. Percentage of hydric soils
2. Hydrology connection to stream/wetlands
3. Evidence of flooding
4. Geomorphic position
5. Estimated cut to wetland hydrology
6. Vegetation cover type
7. Land use
8. Contiguous wetland/upland habitat value
9. Ease of access
10. Presence of utilities

Stream Site Criteria

1. Percentage of bank erosion
2. Degree of channel incision
3. Existing floodplain access
4. Opportunity for floodplain development
5. Drainage Area Evaluation
6. Vegetation cover type
7. Land Use
8. Opportunity for Ecological Lift
9. Ease of Access
10. Presence of utilities

Fish Passage Site Criteria

1. Functional upstream network
2. Number of downstream fish blockages
3. NAACC diadromous fish HUC 12 watershed score
4. Percentage of upstream impervious surface
5. Fish habitat diversity
6. Fish blockage height
7. Adjacent land use
8. Ease of construction
9. Ease of Access
10. Presence of utilities

Each criterion was scored on a scale from 1-10, with 1 representing the lowest rating and 10 representing the highest rating. The scores for each criterion were then combined for a total score for each site out of 100. The potential acreage or linear feet of mitigation credit was also estimated for each site and included on the site assessment form. Photographs were taken at representative locations of the sites. Upon

completion of the field site assessments, the results from all the sites were compared to identify sites with the greatest potential for overall ecological uplift and construction feasibility. Sites that had limited potential for ecological uplift, mitigation credit, or construction feasibility were removed from consideration. Other criteria considered in the site selection included the proximity of the site to the proposed impacts, potential mitigation credits, long-term sustainability of the site, and their potential for replacement of functions and values lost by the proposed roadway improvements.

Stage 4 – Landowner Meetings

Meetings were held with public landowners to discuss sites with the greatest mitigation potential that were identified during the walkthrough survey. Landowners either agreed with the proposed site, requested the site be removed, or were unfamiliar with the site and requested a follow-up field meeting to review the site. Sites recommended for removal by the landowner were dropped from the Potential Mitigation Site List. Most landowners provided additional mitigation site recommendations located on their properties at these meetings. Sites provided by the landowners were evaluated with the same walkthrough survey procedures as the sites originally identified.

Stage 5 – Potential Mitigation Site Selection

Sites with the greatest mitigation potential that received preliminary approval from the landowners were included in the Potential Mitigation Site List that would be presented to the agencies.

5.4.1.2 Results

A total of 15 wetland sites and 74 stream sites were identified in the desktop review and investigated during the windshield survey. A total of 47 fish passage sites were identified in the desktop review and later investigated during the walkthrough survey. Windshield survey results eliminated 11 wetland sites and 14 stream sites, and added one wetland site and three stream sites. Wetland sites were removed following the windshield survey for a variety of reasons including: high position in the landscape, extensive forest or high-quality wetlands, conflicts with existing land use, lack of potential hydrology, and locations on private properties. Stream sites were removed from further investigations following the windshield survey due to the following reasons: absence of an existing channel, stable channel conditions, ephemeral channels, prior stream restoration, and access or restoration required on private properties. Sites that were added during the windshield survey included unstable channels and open floodplain areas on public land located directly upstream or downstream of MDOT SHA database sites.

The initial walkthrough survey included a total of five wetland sites, 63 stream sites and 47 fish passage sites. Initial walkthrough survey results eliminated three wetland sites, 56 stream sites, and all 47 fish passage sites. Wetland sites removed following the initial walkthrough survey included sites with limited credit potential and those located in existing high-quality wetlands. Stream sites that were removed from further investigation following the initial walkthrough survey included sites with limited potential for ecological uplift and long-term sustainability, land use conflicts, limited credit potential, existing stream restoration, existing stable conditions, high-risk due to large watershed size, access challenges due to steep slopes, and sites with high quality natural resources such as mature forest, wetlands of special state concern, or forest conservation easements. All of the fish passage sites were removed following the initial walkthrough survey due to the following reasons: absence of fish blockage, limited upstream credit potential, access/restoration required on private properties, or access challenges due to steep slopes.

Meetings with public land owners, including DNR, BARC, M-NCPPC Montgomery and Prince George's Counties, and MDOT SHA, were held to discuss good potential sites retained from the walkthrough survey. A total of four wetland sites, 42 stream sites and three fish passage sites were recommended by landowners or agencies and added to the walkthrough survey. One wetland site and six stream sites were removed from the potential mitigation site list at the request of the landowner due to existing or proposed stream restoration at the site, potential impacts to natural resources, or land use conflicts. Sites recommended by landowners were either retained or removed following the final walkthrough survey. Sites were removed for the following reasons: limited potential for ecological lift and long-term sustainability, limited credit potential, absence of an existing channel, ephemeral nature of the channel, and access constraints. The final walkthrough survey resulted in the removal of two wetland sites, 36 stream sites, and two fish passage sites.

Four wetland sites, 12 stream sites, and one fish passage site were identified in the traditional mitigation site search on public lands that were included in the Potential Mitigation Site List.

Results from the traditional mitigation site search on public lands are summarized in **Table 5-6.** A vicinity map and detailed site list of all the potential public mitigation sites that were investigated in the windshield and walkthrough surveys is included in **Appendix F**. The site list includes general information on sites including the property owner, location, length, field assessment score and reason for removing or retaining sites. Assessment forms for all of the walkthrough sites, which includes criteria rankings, site photographs, and maps, are included in **Appendix E**; and public landowner meeting minutes can be found in **Appendix G**. A vicinity map and list of sites with the greatest mitigation potential that were presented to the agencies is included in **Appendix H**.

Table 5-6: Traditional Mitigation Site Search Results

Watershed	Mitigation Type		Windshield Survey			Walkthrough Survey			Potential Sites
			Initial Sites	Removed Sites	Added Sites	Initial Sites	Removed Sites	Added Sites	
Middle Potomac-Anacostia-Occoquan	Wetland	Number	6	6	0	0	0	2	1
		AC	75.01	75.01	0	0	0	36.11	29.32
	Stream	Number	49	9	0	40	38	33	6
		LF	136,636	19,353	0	117,283	112,275	76,149	21,331
	Fish Passage	Number	NA	NA	NA	1	1	3	1
Middle Potomac-Catoctin	Wetland	Number	9	5	1	5	3	2	3
		AC	81.22	47.90	8.54	41.86	20.10	23.24	32.63
	Stream	Number	16	4	2	14	10	9	5
		LF	48,907	14,783	6,285	40,409	25,755	12,557	13,816
	Fish Passage	Number	NA	NA	NA	5	5	0	0
Patuxent	Wetland	Number	0	0	0	0	0	0	0
		AC	0	0	0	0	0	0	0
	Stream	Number	9	1	1	9	8	0	1
		LF	25,010	1,030	4,260	28,240	21,498	0	6,742
	Fish Passage	Number	NA	NA	NA	41	41	0	0

5.4.2 Request for Proposals (RFP) on Private Lands

5.4.2.1 Summary

MDOT SHA issued a Request for Proposals (RFP) for full delivery services to provide permittee-responsible stream and wetland mitigation credits on private lands to mitigate for unavoidable impacts associated with the DEIS Build Alternatives. The awarded providers are responsible for accomplishing mitigation through resource agency-approved mitigation practices including, but not limited to: stream restoration and wetland restoration, creation, and enhancement services. Providers are responsible for site selection, land acquisition, survey, design, agency mitigation site approval, permitting support, construction, monitoring and adaptive management, as well as any other services required to deliver successful mitigation to MDOT SHA to ensure USACE and MDE permit compliance.

The solicitation process was designed to leverage the growing natural resource credit market by requesting full delivery of mitigation credits from providers under a permittee-provided mitigation framework. MDOT SHA issued the request to provide mitigation credits on private property, which required Phase I Mitigation Plans along with other supporting documents as the response to the RFP. The providers were required to demonstrate that they possessed the financial, technical and administrative qualifications necessary to complete their projects and meet the MDE and USACE mitigation requirements. If it was determined that the provider did not possess these qualifications, or the proposed site did not meet the technical requirements, the site was removed from consideration.

The provider is responsible for submitting stream and wetland mitigation credits in two stages. The first stage, Preliminary Design and Preconstruction Services, includes all activities required to secure a MDE Phase II Mitigation Plan approval and a USACE Final Mitigation Plan approval. Stage 2, Credit Delivery Services, includes Final Design, right-of-way certification, construction and monitoring/maintenance of mitigation credits and will conclude with USACE and MDE determination of site success and release from monitoring/maintenance requirements.

MDOT SHA developed the RFP to allow for concise review of multiple sites from a single provider as well as single sites from multiple providers. For example, if a provider proposed two independent sites and MDOT SHA accepted both sites, the provider would enter into two stand-alone contracts with MDOT SHA. MDOT SHA reserves the right to enter into contracts with any provider deemed qualified and whose proposal are most advantageous to the State. MDOT SHA made multiple awards to secure the palustrine emergent (PEM), palustrine forested (PFO) / palustrine scrub-shrub (PSS), and stream mitigation credits for the DEIS Build Alternatives and entered into multiple contracts on a mitigation site basis with providers to achieve the desired mitigation credits requested through the RFP.

5.4.2.2 Results

The RFP was advertised on April 16, 2019 and responses from the proposers were due on July 17, 2019. A total of six combined stream/wetland mitigation sites were chosen by MDOT SHA based on the administrative qualifications. A summary of the proposed RFP mitigation site credits is displayed by HUC-8 watershed in **Table 5-7**. A vicinity map and list of the potential private and public sites is included in **Appendix H**.

Table 5-7: Potential RFP Mitigation Sites

Watershed	Sites	Proposed Wetland Credit (AC)	Proposed Stream Credit (LF)
Middle Potomac-Anacostia-Occoquan	3	47.20	29,120
Middle Potomac-Catoctin	2	9.92	11,776
Patuxent	1	9.18	11,971
Total	**6**	**66.30**	**52,867**

5.4.3 Agency Meetings

Field meetings were conducted with MDE, USACE, DNR, USFWS, EPA and the potential mitigation site landowners in November and December of 2019 to review public and private sites included in the Potential Mitigation Site Vicinity Map and List in **Appendix H**. A total of 18 mitigation sites were reviewed with the agencies, including eight stream/wetland sites, eight stream sites, one wetland site, and one fish passage site. One site (RFP-6) that was originally removed from consideration prior to the agency meetings was added to the Potential Mitigation Site List and Map after further negotiations with the landowner and will be presented to the agencies in the near future. Meetings entailed walking the mitigation sites and discussing existing site conditions, site constructability, functional uplift potential, site constraints, and conceptual designs. Meeting minutes and attendee lists for each of the field meetings are included in **Appendix I**.

Following completion of the field reviews, a meeting was held with the USACE and MDE on January 10, 2020 to discuss all of the potential mitigation sites that were reviewed in the field and determine which sites had the greatest mitigation potential that should be included in the Phase I Mitigation Site List. Based on agency and landowner feedback, sites were revised, retained, or removed from consideration. Sites were removed due to limited functional uplift potential, site constraints, or lack of mitigation credit need in the watershed. Results from the meeting are included in the meeting minutes in **Appendix I** and documented in the "status" column of the Potential Mitigation Site List in **Appendix H**. Retained sites are included in the Phase I Mitigation Site List in **Section 6.2**.

6 PERMITTEE-RESPONSIBLE MITIGATION PACKAGE

6.1 MLS Mitigation Requirement

The off-site mitigation requirement with the greatest values, also referred to as the "MLS mitigation requirement", was used to determine the goals of the permittee-responsible mitigation package. The MLS mitigation requirement includes 30.09 acres of wetland mitigation credits and 40,496 linear feet of stream mitigation credits, and is summarized by HUC-8 watershed in **Table 6-1**.

Table 6-1: MLS Mitigation Requirement

Watershed	Off-Site Wetland Mitigation Requirement (AC)			Off-Site Stream Mitigation Requirement (LF)
	PEM	PSS/PFO	**Total**	
Middle Potomac-Anacostia-Occoquan	2.41	16.12	**18.53**	20,045
Middle Potomac-Catoctin	1.03	1.48	**2.51**	15,134
Patuxent	1.61	7.44	**9.05**	5,317
Total	**5.05***	**25.04**	**30.09**	**40,496**

* 1.05 acres of POW impacts included in PEM wetland mitigation requirement.

6.2 Phase I Mitigation Sites

MDOT SHA has identified 14 permittee-responsible, Phase I mitigation sites that are included in this Draft CMP. Sites with the greatest mitigation potential from the traditional mitigation site search on public lands and the RFP on private lands were selected. These sites have the potential to provide 80.05 acres of wetland credit, and 79,446 linear feet of stream mitigation credit. These credits far exceed the MLS mitigation requirement, and generally exceed the mitigation requirements for each watershed and type of resource. Excess credit potential has been included in the Draft CMP because of the preliminary nature, and limited investigations that have been completed for each site. It is possible that one or more sites could be removed due to a fatal flaw, and the potential credits ultimately negotiated with the resource agencies could be fewer than originally anticipated. As fatal flaws are uncovered, landowner coordination continues, and credits are negotiated, MDOT SHA will coordinate closely with the agencies to refine the mitigation package with the goal of providing a Final CMP that includes the sites that best compensate for the project impacts.

Phase I mitigation sites are listed in **Table 6-2**, and a vicinity map of the proposed sites is included in **Appendix J**. Phase I Mitigation Design Plans are presented in **Appendices K** and **L**.

Table 6-2: Phase I Mitigation Sites

Watershed	Site ID	Site Name	Mitigation Type & Credit Ratios	Proposed Wetland Credit (AC)	Proposed Stream Credit (LF)
Middle Potomac-Anacostia-Occoquan	AN-1	Crabbs Branch	Stream Restoration (1:1) Wetland Creation (1:1) Wetland Enhancement (4:1)	3.50	4,276
	AN-3	Pebblestone Dr. Tributary	Stream Restoration (1:1)	0.00	2,162
	AN-6	Paint Branch Fish Passage	Fish Passage Full Restoration (1:1) Full blockage removal (10:1) Partial blockage removal (20:1)	0.00	5,258
	AN-7	Paint Branch South Farm Tributaries	Stream Restoration & Fish Passage (1:1)	0.00	1,401
	RFP-1	Indian Creek and Tributaries at Konterra	Stream Restoration (1:1) Wetland Restoration/Creation (1:1) Wetland Enhancement (2:1) Wetland Buffer Enhancement (15:1)	31.00	26,475
	RFP-5	Henson Creek	Stream Restoration (1:1 & 2:1) Wetland Restoration/Creation (1:1) Wetland Enhancement (1.5:1) Wetland Preservation (10:1) Wetland Buffer Enhancement (15:1) Wetland Buffer Preservation (20:1) Upland Preservation (20:1)	5.85	1,091
	RFP-6	Mill Swamp Creek	Stream Restoration (1:1 & 2:1) Wetland Creation (1:1) Wetland Enhancement (1.5:1) Wetland Preservation (10:1) Wetland Buffer Enhancement (15:1) Wetland Buffer Preservation (20:1) Upland & Upland Buffer Preservation (20:1)	10.35	1,658
Total				**50.70**	**42,321**
Middle Potomac-Catoctin	CA-2	Lower Magruder Branch	Stream Restoration (1:1) Wetland Creation (1:1) Wetland Enhancement (4:1)	7.98	2,934
	CA-3	Upper Magruder Branch	Stream Restoration (1:1) Wetland Creation (1:1) Wetland Enhancement (4:1)	2.27	1,053
	CA-5	Seneca Creek Tributary	Stream Restoration (1:1)	0.00	2,649
	RFP-2	Cabin Branch	Stream Restoration (1:1) Wetland Restoration (1:1) Wetland Buffer Enhancement (15:1)	4.81	6,680

Watershed	Site ID	Site Name	Mitigation Type & Credit Ratios	Proposed Wetland Credit (AC)	Proposed Stream Credit (LF)
	RFP-3	Tuscarora Creek	Stream Restoration (1:1) Wetland Restoration (1:1) Wetland Preservation (10:1) Wetland Buffer Enhancement (15:1) Wetland Buffer Preservation (20:1)	5.11	5,096
Total				**20.17**	**18,412**
Patuxent	PA-1	Back Branch	Stream Restoration (1:1)	0.00	6,742
	RFP-4	Cabin Branch	Stream Restoration (1:1 & 2:1) Wetland Enhancement (5:1) Wetland Creation (1:1) Wetland Preservation (10:1) Wetland Buffer Enhancement (15:1)	9.18	11,971
Total				**9.18**	**18,713**
Total				**80.05**	**79,446**

When considering the mitigation need by impact type in each watershed, the selected sites meet or exceed the requirement in all cases. See **Tables 6-3** and **6-4**. for summaries of the MLS mitigation requirement and proposed mitigation by HUC-8 watershed.

Table 6-3: Phase I Wetland Mitigation Summary

Watershed	MLS Mitigation Requirement (ac)	Proposed Mitigation Sites	Proposed Mitigation Credit (AC)
Middle Potomac-Anacostia-Occoquan	18.53	4	50.70
Middle Potomac-Catoctin	2.51	4	20.17
Patuxent	9.05	1	9.18
Total	**30.09**	**9**	**80.05**

Table 6-4: Phase I Stream Mitigation Summary

Watershed	MLS Mitigation Requirement (LF)	Proposed Mitigation Sites	Proposed Mitigation Credit (LF)
Middle Potomac-Anacostia-Occoquan	20,045	7	42,321
Middle Potomac-Catoctin	15,134	5	18,412
Patuxent	5,317	2	18,713
Total	**40,496**	**14**	**79,446**

6.3 Twelve Mitigation Plan Components

In accordance with 33 CFR parts 325 and 332, and 40 CFR part 230 of the Federal Compensatory Mitigation Rule, the following section discusses the universal fundamental components that apply to all of the Phase I mitigation sites. Site-specific fundamental components (objectives, baseline information, determination of credits, mitigation work plan, maintenance plan, and monitoring requirements) will be discussed in further detail in the Phase II Mitigation Design Plans that will be developed with the Final CMP.

1. **Project Objectives**

   Project objectives for the proposed mitigation sites are briefly discussed in the Phase I Mitigation Design Plans in **Appendices K** and **L**. Project objectives are site-specific and will be further developed for each site in the Phase II Mitigation Design Plans.

2. **Site Selection**

   Site selection for public mitigation sites was based on the traditional mitigation site search that is discussed in **Section 5.4.1**. The private mitigation sites were selected based on MDOT SHA's RFP process that is discussed in **Section 5.4.2**.

3. **Site Protection Instrument**

   All mitigation sites, with the exception of M-NCPPC sites, will be protected by conservation easements to ensure conservation in perpetuity. The latest version of MDOT SHA's "Grant of Mitigation Easement" is proposed as the instrument that will ensure conservation of the mitigation site. This instrument has been accepted by USACE and MDE to preserve other mitigation sites. Upon construction completion, non-M-NCPPC mitigation sites, including 25-foot wetland buffers, will be placed under covenants and restrictions to protect the sites in perpetuity.

   M-NCPPC Montgomery County mitigation sites are typically already considered protected by park policies and M-NCPPC does not encumber properties with deed restrictions on parkland mitigation sites. M-NCPPC mitigation sites will be protected in accordance with M-NCPPC Montgomery County's integrated natural resource management plan, Natural Resource Management Plan for Natural Areas in M-NCPPC Parkland in Montgomery County, Maryland. This plan published in February 2013 requires preservation and conservation of natural areas and wetlands like the proposed mitigation sites.

   The proposed mitigation sites would be considered environmentally sensitive areas in the Natural Resource Management Plan for Natural Areas in M-NCPPC Parkland in Montgomery County, Maryland and are protected park resources. The following goals, visions and legal protection are identified in the plan.

   - M-NCPPC Montgomery County Mission: Protect and interpret our valuable natural and cultural resources; balance the demand for recreation with the need for conservation; offer a variety of enjoyable recreational activities that encourage healthy lifestyles; and provide clean, safe, and accessible places for leisure-time activities.
   - Goal 11 of the Vision 2030 Strategic Plan: Inventory, conserve, and enhance ecologically healthy and biologically diverse natural areas with a focus on Park Best Natural Areas,

Biodiversity Areas, and Environmentally Sensitive Areas as defined in the Land Preservation, Parks, and Recreation Plan (M-NCPPC, 2005).

- Environmental Guidelines for Management and Development in Montgomery County Parks: "…the Montgomery County General Plan and local area master plans articulate County-wide and planning area-wide goals, objectives, principles, and policies to protect sensitive areas from the adverse effects of development, as required by the Annotated Code of Maryland Article 66B…

4. Baseline Information

Preliminary baseline information for each mitigation site is included in the Phase I Mitigation Design Plans in **Appendices K** and **L**. Further detailed information, including wetland delineations, surveys, groundwater well data, etc. will be collected for each of the sites during the development of the Phase II Mitigation Design Plans.

5. Determination of Credits

A detailed explanation of the mitigation credit requirements is included in **Section 4** and **5.2**. Mitigation credits provided by each of the proposed mitigation sites are summarized in **Section 6.2** and discussed in the Phase I Mitigation Design Plans in **Appendices K** and **L.** Mitigation credits provided are site-specific and will be further developed for each site in the Phase II Mitigation Design Plans.

6. Mitigation Work Plan

The Phase I Mitigation Design Plans for each site are included in **Appendices K** and **L**. The geographical boundaries, construction methods, construction access, timing and sequence of construction, groundwater well data, access to hydrology/water source, planting specifications, elevations, and erosion and sediment control measures will be included the Phase II Mitigation Design Plans.

7. Maintenance Plan

Following construction, the public mitigation sites will be placed in MDOT SHA's monitoring program and the private mitigation sites will be monitored separately by the RFP providers. All mitigation sites will be subject to regular inspections to determine the progress and continued viability of the project. The post-monitoring period for each of the sites will be coordinated with the agencies and determined during the development of the Phase II Mitigation Design Plans. If remediation action is needed during or after the post-monitoring period, MDOT SHA will be responsible for preparing a remediation plan for the public sites and the RFP contractor will be responsible for preparing a remediation plan for the private sites that will be submitted for agency approval.

8. Performance Standards

Each mitigation site will have ecologically-based performance standards that are tied to site-specific objectives and values that will be developed during the Phase II Mitigation Design Plans. Performance standards for all of the wetland mitigation sites will be in accordance with the *Performance Standards and Monitoring Protocol for Permittee-responsible Nontidal Wetland Mitigation Sites in Maryland*, April 20, 2018.

9. Monitoring Requirements

Mitigation sites will be monitored for up to ten years. If MDE and the USACE determines that the site is successful prior to year 10, monitoring may be abbreviated. If it is determined that the site is not meeting the performance standards during the monitoring period, an adaptive management plan will be developed, and remedial action will occur to ensure the success of the site. Specific monitoring requirements will be negotiated with the agencies and determined for each mitigation site during the development of the Phase II Mitigation Design Plans. All wetland sites will be evaluated in accordance with the *Performance Standards and Monitoring Protocol for Permittee-responsible Nontidal Wetland Mitigation Sites*, April 20, 2018.

10. Long-term Management Plan

Covenants and Restrictions will be placed on each of the mitigation sites, with the exception of the M-NCPPC sites, to protect the sites in perpetuity. MDOT SHA will be the responsible party for the long-term management of all the sites. Following the completion of monitoring, each site will be visited annually to assess the site's condition as it relates to invasive species presence, trespassing, vandalism, nuisance wildlife, erosion, and hydrology.

11. Adaptive Management Plan

The Adaptive Management Plan for all mitigation sites will include monitoring the site, analyzing the site for success and having contingencies in place for changes in site conditions to address deficiencies or changes in management strategies and objectives. If deficiencies are found, remedial action will occur, and additional monitoring will take place to ensure success. If the mitigation goals of the site are not being met, an Adaptive Management Plan will be developed to assess and remediate the problem. Depending on the problem, the plan could include various assessments such as:

- Adjustment of monitoring schedule based on site conditions,
- Additional hydrologic monitoring,
- Hydrologic adjustment,
- Invasive species treatment recommendations,
- Vegetation protective measures,
- Supplemental plantings,
- Soil amendments, and
- Animal control/protection (beaver/deer/Canada goose, etc.).

Once a site is assessed, the monitoring team will coordinate the findings with the designers and MDOT SHA and recommendations will be developed. The agencies will be informed of the assessment findings and the recommendations. If needed, an interagency meeting will be conducted with the regulatory agencies, landowners, and MDOT SHA to determine the best course of action.

12. Financial Assurance

MDOT SHA will be responsible for monitoring and any necessary remedial actions for the public mitigation sites. Private mitigation site monitoring will be funded by MDOT SHA; however, the awarded RFP contractors will be responsible for monitoring and any required remedial actions. On an annual basis MDOT SHA reviews its need for funding and includes costs associated with monitoring,

management and remediation. The site's monitoring, maintenance, and management will be included in the annual review.

6.4 Preliminary MHT & USFWS Investigations

A preliminary review of the Maryland Historical Trust (MHT) and U.S. Fish and Wildlife Service (USFWS) online databases was completed for the Phase I mitigation sites to identify potential cultural, historical, or rare, threatened, or endangered (RTE) species records. The purpose of the preliminary review was to determine the likely need for future cultural and/or RTE investigations associated with the proposed sites. The preliminary review did not include site visits or coordination with any agencies. Based on the preliminary review, the majority of the Phase I mitigation sites will require further cultural resource investigations as part of the detailed investigations that will occur during development of the Phase II Mitigation Design Plans. The northern long-eared bat and several migratory bird species were identified in the USFWS IPaC results for the majority of the sites, however records of these species within the study areas has not yet been confirmed. Further coordination with USFWS, DNR and MHT will also take place during the development of the Phase II Mitigation Design Plans. The results from the preliminary review are summarized for each site in **Table M-1** in **Appendix M**.

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APPENDIX A: MITIGATION SUMMARY TABLES

Table A-1a. Maryland Wetland Mitigation Summary (Alternatives 8 and 9)

Watershed	Wetland Impacts (AC)				POW Impacts (AC)	Off-Site Mitigation Requirement (AC)			Total Proposed Off-Site Mitigation	
	PEM	PFO	PSS	**Total**		PEM (1:1)	PSS/PFO (2:1)	**Total**	Sites	Credit (AC)
Middle Potomac-Anacostia-Occoquan	2.05	7.65	0.41	**10.11**	0.79*	2.41	16.12	**18.53**	4	50.70
Middle Potomac-Catoctin	0.90	0.68	0.01	**1.59**	0.00	0.90	1.38	**2.28**	4	20.17
Patuxent	0.92	3.05	0.67	**4.64**	0.69	1.61	7.44	**9.05**	1	9.18
Total	**3.87**	**11.38**	**1.09**	**16.34**	**1.48**	**4.92**	**24.94**	**29.86**	**9**	**80.05**

*0.43 acres of POW in the Middle Potomac-Anacostia-Occoquan watershed will remain following construction and are therefore not included in the PEM mitigation requirement.

Table A-2a. Maryland Stream Mitigation Summary (Alternatives 8 and 9)

Watershed	Total Stream Impacts (LF)	Impacts Not Requiring Mitigation (LF)			Total Mitigation Requirement (LF)	Proposed On-Site Stream Mitigation (LF)	Off-Site Mitigation Requirement (LF)	Total Proposed Off-Site Mitigation	
		Existing Bridges	Existing Culverts	**Total**				Sites	Credit (LF)
Middle Potomac-Anacostia-Occoquan									
Perennial	43,377	636	16,183	**16,819**	26,558	14,479	12,079		
Intermittent	45,623	32	14,604	**14,636**	30,987	24,243	6,744	7	42,321
Ephemeral	7,273	46	1,414	**1,460**	5,813	4,829	984		
Total	**96,273**	714	32,201	**32,915**	63,358	43,551	19,807		
Middle Potomac-Catoctin									
Perennial	23,371	381	6,175	**6,556**	16,815	4,165	12,650		
Intermittent	9,246	543	3,899	**4,442**	4,804	3,130	1,674	5	18,412
Ephemeral	950	0	34	**34**	916	506	410		
Total	**33,567**	924	10,108	**11,032**	22,535	7,801	14,734		
Patuxent									
Perennial	10,554	314	2,900	**3,214**	7,340	4,100	3,240		
Intermittent	9,606	31	5,431	**5,462**	4,144	2,578	1,566	2	18,713
Ephemeral	2,573	0	0	**0**	2,573	2,062	511		
Total	**22,733**	345	8,331	**8,676**	14,057	8,740	5,317		
Total	**152,573**	**1,983**	**50,640**	**52,623**	**99,950**	**60,092**	**39,858**	**14**	**79,446**

Table A-3a. Virginia Mitigation Summary (Alternatives 8 and 9)

Watershed	Resource Type	Impacts	Credit Requirement	Proposed Bank Credits
Middle Potomac-Catoctin	Wetlands (AC)	0.05	0.10	0.10
	Waterways (LF)	3,349	729	729

Table A-1b. Maryland Wetland Mitigation Summary (Alternative 9M)

Watershed	Wetland Impacts (AC)				POW Impacts (AC)	Off-Site Mitigation Requirement (AC)			Total Proposed Off-Site Mitigation	
	PEM	PFO	PSS	**Total**		PEM (1:1)	PSS/PFO (2:1)	**Total**	Sites	Credit (AC)
Middle Potomac-Anacostia-Occoquan	2.05	7.39	0.41	**9.85**	0.79*	2.41	15.60	**18.01**	4	50.70
Middle Potomac-Catoctin	0.90	0.68	0.01	**1.59**	0.00	0.90	1.38	**2.28**	4	20.17
Patuxent	0.92	3.05	0.67	**4.64**	0.69	1.61	7.44	**9.05**	1	9.18
Total	**3.87**	**11.12**	**1.09**	**16.08**	**1.48**	**4.92**	**24.42**	**29.34**	**9**	**80.05**

*0.43 acres of POW in the Middle Potomac-Anacostia-Occoquan watershed will remain following construction and are therefore not included in the PEM mitigation requirement.

Table A-2b. Maryland Stream Mitigation Summary (Alternative 9M)

Watershed	Total Stream Impacts (LF)	Impacts Not Requiring Mitigation (LF)			Total Mitigation Requirement (LF)	Proposed On-Site Stream Mitigation (LF)	Off-Site Mitigation Requirement (LF)	Total Proposed Off-Site Mitigation	
		Existing Bridges	Existing Culverts	**Total**				Sites	Credit (LF)
Middle Potomac-Anacostia-Occoquan									
Perennial	43,133	636	16,156	**16,792**	26,341	14,347	11,994		
Intermittent	45,299	32	14,432	**14,464**	30,835	24,092	6,743	7	42,321
Ephemeral	7,241	46	1,414	**1,460**	5,781	4,795	986		
Total	**95,673**	714	32,002	**32,716**	62,957	43,234	19,723		
Middle Potomac-Catoctin									
Perennial	23,328	381	6,175	**6,556**	16,772	4,163	12,609		
Intermittent	9,196	543	3,899	**4,442**	4,754	3,188	1,566	5	18,412
Ephemeral	950	0	34	**34**	916	512	404		
Total	**33,474**	924	10,108	**11,032**	22,442	7,863	14,579		
Patuxent									
Perennial	10,554	314	2,900	**3,214**	7,340	4,100	3,240		
Intermittent	9,606	31	5,431	**5,462**	4,144	2,578	1,566	2	18,713
Ephemeral	2,573	0	0	**0**	2,573	2,062	511		
Total	**22,733**	345	8,331	**8,676**	14,057	8,740	5,317		
Total	**151,880**	**1,983**	**50,441**	**52,424**	**99,456**	**59,837**	**39,619**	**14**	**79,446**

Table A-3b. Virginia Mitigation Summary (Alternative 9M)

Watershed	Resource Type	Impacts	Credit Requirement	Proposed Bank Credits
Middle Potomac-Catoctin	Wetlands (AC)	0.05	0.10	0.10
	Waterways (LF)	3,349	729	729

Table A-1c. Maryland Wetland Mitigation Summary (Alternative 10)

Watershed	Wetland Impacts (AC)				POW Impacts (AC)	Off-Site Mitigation Requirement (AC)			Total Proposed Off-Site Mitigation	
	PEM	PFO	PSS	**Total**		PEM (1:1)	PSS/PFO (2:1)	**Total**	Sites	Credit (AC)
Middle Potomac-Anacostia-Occoquan	2.05	7.65	0.41	**10.11**	1.19*	2.41	16.12	**18.53**	4	50.70
Middle Potomac-Catoctin	1.03	0.73	0.01	**1.77**	0.00	1.03	1.48	**2.51**	4	20.17
Patuxent	0.92	3.05	0.67	**4.64**	0.29	1.61	7.44	**9.05**	1	9.18
Total	**4.00**	**11.43**	**1.09**	**16.52**	**1.48**	**5.05**	**25.04**	**30.09**	**9**	**80.05**

*0.43 acres of POW in the Middle Potomac-Anacostia-Occoquan watershed will remain following construction and are therefore not included in the PEM mitigation requirement.

Table A-2c. Maryland Stream Mitigation Summary (Alternative 10)

Watershed	Total Stream Impacts (LF)	Impacts Not Requiring Mitigation (LF)			Total Mitigation Requirement (LF)	Proposed On-Site Stream Mitigation (LF)	Off-Site Mitigation Requirement (LF)	Total Proposed Off-Site Mitigation	
		Existing Bridges	Existing Culverts	**Total**				Sites	Credit (LF)
Middle Potomac-Anacostia-Occoquan									
Perennial	43,648	636	16,183	**16,819**	26,829	14,526	12,303		
Intermittent	45,633	32	14,604	**14,636**	30,997	24,239	6,758	7	42,321
Ephemeral	7,273	46	1,414	**1,460**	5,813	4,829	984		
Total	**96,554**	714	32,201	**32,915**	63,639	43,594	20,045		
Middle Potomac-Catoctin									
Perennial	23,904	381	6,205	**6,586**	17,318	4,394	12,924		
Intermittent	9,462	543	3,899	**4,442**	5,020	3,271	1,749	5	18,412
Ephemeral	982	0	34	**34**	948	487	461		
Total	**34,348**	924	10,138	**11,062**	23,286	8,152	15,134		
Patuxent									
Perennial	10,554	314	2,900	**3,214**	7,340	4,100	3,240		
Intermittent	9,606	31	5,431	**5,462**	4,144	2,578	1,566	2	18,713
Ephemeral	2,573	0	0	**0**	2,573	2,062	511		
Total	**22,733**	345	8,331	**8,676**	14,057	8,740	5,317		
Total	**153,635**	**1,983**	**50,670**	**52,653**	**100,982**	**60,486**	**40,496**	**14**	**79,446**

Table A-3c. Virginia Mitigation Summary (Alternative 10)

Watershed	Resource Type	Impacts	Credit Requirement	Proposed Bank Credits
Middle Potomac-Catoctin	Wetlands (AC)	0.05	0.10	0.10
	Waterways (LF)	3,349	729	729

Table A-1d. Maryland Wetland Mitigation Summary (Alternative 13B)

Watershed	Wetland Impacts (AC)				POW Impacts (AC)	Off-Site Mitigation Requirement (AC)			Total Proposed Off-Site Mitigation	
	PEM	PFO	PSS	**Total**		PEM (1:1)	PSS/PFO (2:1)	**Total**	Sites	Credit (AC)
Middle Potomac-Anacostia-Occoquan	2.05	7.65	0.41	**10.11**	0.79*	2.41	16.12	**18.53**	4	50.70
Middle Potomac-Catoctin	0.89	0.66	0.01	**1.56**	0.00	0.89	1.34	**2.23**	4	20.17
Patuxent	0.92	3.05	0.67	**4.64**	0.69	1.61	7.44	**9.05**	1	9.18
Total	**3.86**	**11.36**	**1.09**	**16.31**	**1.48**	**4.91**	**24.90**	**29.81**	**9**	**80.05**

*0.43 acres of POW in the Middle Potomac-Anacostia-Occoquan watershed will remain following construction and are therefore not included in the PEM mitigation requirement.

Table A-2d. Maryland Stream Mitigation Summary (Alternative 13B)

Watershed	Total Stream Impacts (LF)	Impacts Not Requiring Mitigation (LF)			Total Mitigation Requirement (LF)	Proposed On-Site Stream Mitigation (LF)	Off-Site Mitigation Requirement (LF)	Total Proposed Off-Site Mitigation	
		Existing Bridges	Existing Culverts	**Total**				Sites	Credit (LF)
Middle Potomac-Anacostia-Occoquan									
Perennial	43,364	636	16,183	**16,819**	26,545	14,479	12,066		
Intermittent	45,623	32	14,604	**14,636**	30,987	24,167	6,820	7	42,321
Ephemeral	7,273	46	1,414	**1,460**	5,813	4,829	984		
Total	**96,260**	714	32,201	**32,915**	63,345	43,475	19,870		
Middle Potomac-Catoctin									
Perennial	23,351	381	6,173	**6,554**	16,797	4,225	12,572		
Intermittent	9,179	543	3,899	**4,442**	4,737	3,137	1,600	5	18,412
Ephemeral	950	0	34	**34**	916	507	409		
Total	**33,480**	924	10,106	**11,030**	22,450	7,869	14,581		
Patuxent									
Perennial	10,554	314	2,900	**3,214**	7,340	4,100	3,240		
Intermittent	9,606	31	5,431	**5,462**	4,144	2,578	1,566	2	18,713
Ephemeral	2,573	0	0	**0**	2,573	2,062	511		
Total	**22,733**	345	8,331	**8,676**	14,057	8,740	5,317		
Total	**152,473**	**1,983**	**50,638**	**52,621**	**99,852**	**60,084**	**39,768**	**14**	**79,446**

Table A-3d. Virginia Mitigation Summary (Alternative 13B)

Watershed	Resource Type	Impacts	Credit Requirement	Proposed Bank Credits
Middle Potomac-Catoctin	Wetlands (AC)	0.05	0.10	0.10
	Waterways (LF)	3,349	729	729

Table A-1e. Maryland Wetland Mitigation Summary (Alternative 13C)

Watershed	Wetland Impacts (AC)				POW Impacts (AC)	Off-Site Mitigation Requirement (AC)			Total Proposed Off-Site Mitigation	
	PEM	PFO	PSS	**Total**		PEM (1:1)	PSS/PFO (2:1)	**Total**	Sites	Credit (AC)
Middle Potomac-Anacostia-Occoquan	2.05	7.65	0.41	**10.11**	0.79*	2.41	16.12	**18.53**	4	50.70
Middle Potomac-Catoctin	1.02	0.70	0.01	**1.73**	0.00	1.02	1.42	**2.44**	4	20.17
Patuxent	0.92	3.05	0.67	**4.64**	0.69	1.61	7.44	**9.05**	1	9.18
Total	**3.99**	**11.40**	**1.09**	**16.48**	**1.48**	**5.04**	**24.98**	**30.02**	**9**	**80.05**

*0.43 acres of POW in the Middle Potomac-Anacostia-Occoquan watershed will remain following construction and are therefore not included in the PEM mitigation requirement.

Table A-2e. Maryland Stream Mitigation Summary (Alternative 13C)

Watershed	Total Stream Impacts (LF)	Impacts Not Requiring Mitigation (LF)			Total Mitigation Requirement (LF)	Proposed On-Site Stream Mitigation (LF)	Off-Site Mitigation Requirement (LF)	Total Proposed Off-Site Mitigation	
		Existing Bridges	Existing Culverts	**Total**				Sites	Credit (LF)
Middle Potomac-Anacostia-Occoquan									
Perennial	43,453	636	16,183	**16,819**	26,634	14,544	12,090		
Intermittent	45,623	32	14,604	**14,636**	30,987	24,173	6,814	7	42,321
Ephemeral	7,273	46	1,414	**1,460**	5,813	4,829	984		
Total	**96,349**	714	32,201	**32,915**	63,434	43,546	19,888		
Middle Potomac-Catoctin									
Perennial	23,885	381	6,205	**6,586**	17,299	4,402	12,897		
Intermittent	9,337	543	3,899	**4,442**	4,895	3,202	1,693	5	18,412
Ephemeral	979	0	34	**34**	945	506	439		
Total	**34,201**	924	10,138	**11,062**	23,139	8,110	15,029		
Patuxent									
Perennial	10,554	314	2,900	**3,214**	7,340	4,100	3,240		
Intermittent	9,606	31	5,431	**5,462**	4,144	2,578	1,566	2	18,713
Ephemeral	2,573	0	0	**0**	2,573	2,062	511		
Total	**22,733**	345	8,331	**8,676**	14,057	8,740	5,317		
Total	**153,283**	**1,983**	**50,670**	**52,653**	**100,630**	**60,396**	**40,234**	**14**	**79,446**

Table A-3e. Virginia Mitigation Summary (Alternative 13C)

Watershed	Resource Type	Impacts	Credit Requirement	Proposed Bank Credits
Middle Potomac-Catoctin	Wetlands (AC)	0.05	0.10	0.10
	Waterways (LF)	3,349	729	729

APPENDIX B: EXISTING BRIDGE & CULVERT STREAM IMPACT TABLES

EXISTING BRIDGE STREAM IMPACTS

Table B-1. Existing Bridge Stream Impacts - Middle Potomac-Anacostia-Occoquan (Alternatives 8,9, 9M, 10,13B and 13C)

Feature ID	Station	Classification	Length (LF)
11L_B	1071+00 LT	Perennial	70
11L_B1	1071+00 RT	Perennial	72
11M_B	1068+50 RT	Intermittent	32
12H_B	924+00 RT to 925+00 RT	Perennial	90
12H_B1	933+00 RT to 933+50 RT	Perennial	37
12II_B3	938+00 Median	Perennial	46
13P_B	797+50	Perennial	126
16G_B	610+00 RT	Perennial	39
16J_B	610+00 RT	Ephemeral	46
19K_B2	588+00 to 588+50	Perennial	156
Total			**714**

Table B-2. Existing Bridge Stream Impacts - Middle Potomac-Catoctin (Alternatives 8,9, 9M, 10,13B and 13C)

Feature ID	Station	Classification	Length (LF)
22AA_B	200+00 LT to 201+00 LT	Perennial	42
22AA_B1	198+00 RT to 200+00 LT	Perennial	201
22MM_B	106+00	Perennial	138
22NN_B	109+00	Intermittent	166
22T_B	128+50	Intermittent	153
22T_B1	128+50 LT	Intermittent	28
22V_B	118+50	Intermittent	168
22V_B1	118+50 RT	Intermittent	28
Total			**924**

Table B-3. Existing Bridge Stream Impacts – Patuxent (Alternatives 8,9, 9M, 10,13B and 13C)

Feature ID	Station	Classification	Length (LF)
5S_B	1558+00	Perennial	200
6AAA_B	1526+50	Intermittent	31
6G_B	1497+50 LT to 1499+00 LT	Perennial	114
Total			**345**

EXISTING CULVERT STREAM IMPACTS

Table B-4a. Existing Culvert Stream Impacts - Middle Potomac-Anacostia-Occoquan Alternatives 8,9,10,13B, and 13C

Feature ID	Station	Classification	Length (LF)
1A_C	1945+50 LT to 1949+00 RT	Intermittent	954
1D_C1	1988+00 LT to 1989+00 RT	Perennial	253
1H_C	1995+00	Intermittent	221
1Q_C	1928+00 LT to 1931+00 LT	Perennial	356
1R_C	1939+50 LT to 1940+50 LT	Perennial	121
1SS_C	1958+50 RT	Ephemeral	50
1U_C	1939+50 LT	Ephemeral	189
1VV_C	1973+00 RT to 1974+50 LT	Perennial	297
2F_C	1904+00 LT	Intermittent	82
2HH_C	1903+00 RT to 1904+00 LT	Intermittent	252
2I_C	1870+00	Intermittent	238
2J_C	1863+50 RT to 1864+50 LT	Perennial	249
2W_C	1911+50 RT to 1912+00 RT	Intermittent	57
2X_C	1916+50	Perennial	277
2Y_C	1925+50 LT to 1926+50 RT	Perennial	394
3A_C	1835+00 RT to 1836+00 LT	Perennial	232
3AA_C	1803+50 RT to 1804+00 LT	Perennial	302
3D_C	1821+00 RT to 1822+00 LT	Perennial	204
3JJ_C	1760+00 LT to 1761+00 LT	Intermittent	106
3JJ_C1	1758+00	Intermittent	305
3L_C	1792+50 LT to 1794+00 RT	Perennial	287
3LL_C	1755+00 RT to 1758+00 RT	Intermittent	317
3LL_C1	1761+50 RT to 1763+50 RT	Intermittent	195
3PP_C	1764+00 RT to 1764+50 RT	Ephemeral	112
4H_C	1754+00	Ephemeral	128
4H_C	1754+00	Ephemeral	205
7BB_C	1394+50 LT	Intermittent	38
7F_C	1422+00 RT to 1422+50 RT	Intermittent	30
7G_C	1431+00 RT to 1431+50 RT	Perennial	53
7G_C1	1426+00	Perennial	241
7JJ_C	1411+50 LT	Perennial	50
7JJ_C1	1411+00	Perennial	256
7N_C	1395+00 RT to 1395+50 RT	Perennial	28
7O_C	1394+00	Perennial	203
7PP_C	1334+00 RT to 1338+00 RT	Intermittent	429
7Q_C1	1350+00 RT to 1351+00 RT	Perennial	168
7Q_C2	1351+00	Perennial	341
7S_C	1341+00 to 1343+00 RT	Perennial	228
7T_C	1424+00 LT	Perennial	73
8E_C	1339+50 LT	Intermittent	295
8F_C	1333+50 LT to 1335+50 LT	Intermittent	221
8J_C	1331+50 LT to 1333+50 RT	Intermittent	505
8J_C1	1333+50 RT	Perennial	80

Table B-4a. Existing Culvert Stream Impacts - Middle Potomac-Anacostia-Occoquan Alternatives 8,9,10,13B, and 13C

Feature ID	Station	Classification	Length (LF)
8R_C1	1282+00	Perennial	355
8S_C	1289+50 LT to 1291+00 LT	Ephemeral	77
8S_C	1289+50 LT to 1291+00 LT	Ephemeral	176
8W_C	1338+50 RT to 1339+00 RT	Intermittent	67
8Z_C2	1334+00	Perennial	199
9C_C	1289+00	Intermittent	278
9C_C1	1287+00 RT to 1288+50 RT	Intermittent	174
9CC_C	1228+50	Perennial	326
9G_C	1184+50	Perennial	278
9J_C	1202+00	Perennial	274
9T_C	1263+00 RT to 1264+00 LT	Intermittent	231
9Y_C	1240+00 RT to 1240+50 LT	Perennial	194
9Z_C	1240+50 RT	Intermittent	24
10AA_C	1115+00	Perennial	241
10B_C	1164+00 RT to 1164+50 RT	Intermittent	95
10BB_C	1114+50 LT	Perennial	116
10C_C	1163+50 RT to 1166+00 RT	Perennial	226
10F_C	1162+50 RT to 1164+00 RT	Intermittent	117
10F_C1	1163+50	Intermittent	122
10J_C	1157+00 to 1160+50 RT	Intermittent	445
10K_C	1161+00	Intermittent	213
10MM_C	1160+50 LT to 1162+50 LT	Intermittent	210
10N_C	1142+00 RT to 1143+00 LT	Intermittent	397
10PP_C	1159+50 LT to 1162+00 LT	Intermittent	272
10Q_C	1110+00 LT	Ephemeral	91
10S_C	1112+00 LT	Perennial	132
10TT_C1	1173+00 RT. SB on 295	Perennial	67
10Y_C	1120+00 LT to 1121+50 RT	Perennial	340
11C_C	1102+50 to 1103+50 LT	Intermittent	120
11E_C	1104+00 LT to 1106+00 LT. NB on 201	Perennial	12
11E_C1	1092+50 RT to 1093+50 LT	Perennial	223
11E_C2	1092+00 RT	Perennial	57
11R_C	1015+00 LT	Perennial	21
11T_C	1013+50	Perennial	288
12C_C	916+00 RT SB on 95	Perennial	69
12E_C	911+00 RT to 912+50 RT	Perennial	91
12E_C1	914+00 RT to 916+00 RT	Perennial	51
12EE_C	900+50	Intermittent	247
12F_C	918+00 RT to 921+50 RT	Perennial	317
12H_C	909+00 RT to 910+50 RT	Perennial	17
12H_C1	916+50 RT to 919+00 RT	Perennial	122
12H_C2	928+00 RT	Perennial	52
12II_C	928+50 LT to 930+50 LT	Perennial	174

Table B-4a. Existing Culvert Stream Impacts - Middle Potomac-Anacostia-Occoquan Alternatives 8,9,10,13B, and 13C

Feature ID	Station	Classification	Length (LF)
12II_C1	938+50 LT	Perennial	79
12II_C2	938+00 RT	Perennial	90
12II_C3	926+00 LT to 927+50 LT	Perennial	159
12JJJ_C	907+00 RT to 908+50 RT	Perennial	172
12K_C	911+50 LT to 912+50 RT	Perennial	196
12KKK_C	907+00 LT to 907+50 RT	Intermittent	221
12OO_C	974+50	Perennial	221
12QQQ_C	939+50 LT to 940+00 LT	Intermittent	83
12RRR_C	945+50 RT to 946+00 LT	Perennial	216
12S_C	925+00	Intermittent	151
12WW_C	934+50 LT	Perennial	128
12WW_C1	932+50 LT to 933+50 LT	Perennial	186
12WWW_C	936+50 LT	Intermittent	146
12XX_C	923+50 LT to 925+50 LT	Perennial	252
12Y_C	932+00 LT to 934+00 LT	Intermittent	89
12YYY_C	933+50 LT to 935+00 LT	Perennial	175
12YYY_C1	932+00 LT	Perennial	107
12Z_C	918+50	Intermittent	56
12Z_C	918+50	Intermittent	143
13B_C	861+50 RT to 862+50 RT	Intermittent	54
13B_C	861+50 RT to 862+50 RT	Intermittent	91
13C_C	864+50 RT to 867+50 RT	Intermittent	126
13C_C1	873+00 LT to 874+00 RT	Intermittent	348
13J_C	768+50 LT to 769+00 LT	Intermittent	53
13J_C1	771+50 LT to 773+00 LT	Intermittent	159
13M_C	829+50 RT to 830+50 LT	Perennial	260
13Q_C	865+50 LT to 867+50 RT	Intermittent	343
13R_C	848+50	Intermittent	235
13S_C	844+00 LT to 845+50 LT	Intermittent	148
13T_C	847+00	Intermittent	286
14A_C	757+00	Intermittent	172
14E_C	744+50 LT to 745+00 LT	Perennial	57
14E_C1	745+00	Perennial	201
14G_C	707+50	Intermittent	185
15A_C	667+00 LT to 670+00 RT	Intermittent	551
15D_C	684+00 RT to 685+50 LT	Perennial	267
16A_C	610+00 LT to 612+00 LT	Perennial	131
16A_C1	603+00 RT to 604+00 LT	Perennial	265
16A_C2	589+50 RT to 590+50 RT	Perennial	110
16D_C	599+50	Intermittent	260
16E_C	630+00 RT to 637+00 RT	Intermittent	55
16G_C	626+50 RT to 630+00 RT	Perennial	191
16G_C1	620+00 RT to 625+50 RT	Perennial	592

Table B-4a. Existing Culvert Stream Impacts - Middle Potomac-Anacostia-Occoquan Alternatives 8,9,10,13B, and 13C

Feature ID	Station	Classification	Length (LF)
17BB_C	568+00 RT to 569+50 LT	Intermittent	295
17DD_C	565+50 RT to 569+00 Median	Intermittent	401
18B_C	526+50 RT to 527+00 LT	Ephemeral	386
18C_C	517+50	Perennial	253
18G_C	536+50 LT to 538+00 RT	Intermittent	1,274
19A_C	458+00	Intermittent	1,308
19B_C	436+00 LT to 436+50 median	Intermittent	114
19C_C	432+00 LT Outer loop	Perennial	130
19F_C	437+00 Median to 438+00 RT	Perennial	162
19F_C1	440+00 RT	Perennial	49
19F_C2	454+00 RT to 464+50 LT	Perennial	1,308
19J_C	407+50 RT to 408+00 RT	Perennial	22
19J_C1	408+50 RT to 410+00 LT	Perennial	274
19T_C	467+50	Perennial	227
19V_C	490+00 RT to 491+50 LT	Perennial	331
23G_C	4805+00	Perennial	187
23Q_C	4782+00 RT to 4783+00 LT	Perennial	250
Total			**32,201**

Table B-4b. Existing Culvert Stream Impacts - Middle Potomac-Anacostia-Occoquan Alternative 9M

Feature ID	Station	Classification	Length (LF)
1A_C	1945+50 LT to 1949+00 RT	Intermittent	954
1D_C1	1988+00 LT to 1989+00 RT	Perennial	253
1H_C	1995+00	Intermittent	221
1Q_C	1928+00 LT to 1931+00 LT	Perennial	356
1R_C	1939+50 LT to 1940+50 LT	Perennial	121
1SS_C	1958+50 RT	Ephemeral	50
1U_C	1939+50 LT	Ephemeral	189
1VV_C	1973+00 RT to 1974+50 LT	Perennial	297
2F_C	1904+00 LT	Intermittent	82
2HH_C	1903+00 RT to 1904+00 LT	Intermittent	252
2I_C	1870+00	Intermittent	238
2J_C	1863+50 RT to 1864+50 LT	Perennial	249
2W_C	1911+50 RT to 1912+00 RT	Intermittent	57
2X_C	1916+50	Perennial	277
2Y_C	1925+50 LT to 1926+50 RT	Perennial	394
3A_C	1835+00 RT to 1836+00 LT	Perennial	232
3AA_C	1803+50 RT to 1804+00 LT	Perennial	302
3D_C	1821+00 RT to 1822+00 LT	Perennial	204
3JJ_C	1760+00 LT to 1761+00 LT	Intermittent	106
3JJ_C1	1758+00	Intermittent	305
3L_C	1792+50 LT to 1794+00 RT	Perennial	287
3LL_C	1755+00 RT to 1758+00 RT	Intermittent	317
3LL_C1	1761+50 RT to 1763+50 RT	Intermittent	195
3PP_C	1764+00 RT to 1764+50 RT	Ephemeral	112
4H_C	1754+00	Ephemeral	128
4H_C	1754+00	Ephemeral	205
7BB_C	1394+50 LT	Intermittent	38
7F_C	1422+00 RT to 1422+50 RT	Intermittent	30
7G_C	1431+00 RT to 1431+50 RT	Perennial	53
7G_C1	1426+00	Perennial	241
7JJ_C	1411+50 LT	Perennial	50
7JJ_C1	1411+00	Perennial	256
7N_C	1395+00 RT to 1395+50 RT	Perennial	28
7O_C	1394+00	Perennial	203
7PP_C	1334+00 RT to 1338+00 RT.	Intermittent	429
7Q_C1	1350+00 RT to 1351+00 RT	Perennial	168
7Q_C2	1351+00	Perennial	341
7S_C	1341+00 to 1343+00 RT	Perennial	228
7T_C	1424+00 LT	Perennial	73
8E_C	1339+50 LT	Intermittent	295
8F_C	1333+50 LT to 1335+50 LT	Intermittent	221
8J_C	1331+50 LT to 1333+50 RT	Intermittent	505
8J_C1	1333+50 RT	Perennial	80

Table B-4b. Existing Culvert Stream Impacts - Middle Potomac-Anacostia-Occoquan Alternative 9M

Feature ID	Station	Classification	Length (LF)
8R_C1	1282+00	Perennial	355
8S_C	1289+50 LT to 1291+00 LT	Ephemeral	77
8S_C	1289+50 LT to 1291+00 LT	Ephemeral	176
8W_C	1338+50 RT to 1339+00 RT	Intermittent	67
8Z_C2	1334+00	Perennial	199
9C_C	1289+00	Intermittent	278
9C_C1	1287+00 RT to 1288+50 RT	Intermittent	174
9CC_C	1228+50	Perennial	326
9G_C	1184+50	Perennial	278
9J_C	1202+00	Perennial	274
9T_C	1263+00 RT to 1264+00 LT	Intermittent	231
9Y_C	1240+00 RT to 1240+50 LT	Perennial	194
9Z_C	1240+50 RT	Intermittent	24
10AA_C	1115+00	Perennial	241
10B_C	1164+00 RT to 1164+50 RT	Intermittent	95
10BB_C	1114+50 LT	Perennial	116
10C_C	1163+50 RT to 1166+00 RT	Perennial	226
10F_C	1162+50 RT to 1164+00 RT	Intermittent	117
10F_C1	1163+50	Intermittent	122
10J_C	1157+00 to 1160+50 RT	Intermittent	445
10K_C	1161+00	Intermittent	213
10MM_C	1160+50 LT to 1162+50 LT	Intermittent	210
10N_C	1142+00 RT to 1143+00 LT	Intermittent	397
10PP_C	1159+50 LT to 1162+00 LT	Intermittent	272
10Q_C	1110+00 LT	Ephemeral	91
10S_C	1112+00 LT	Perennial	132
10TT_C1	1173+00 RT. SB on 295	Perennial	67
10Y_C	1120+00 LT to 1121+50 RT	Perennial	340
11C_C	1102+50 to 1103+50 LT	Intermittent	120
11E_C	1104+00 LT to 1106+00 LT. NB on 201	Perennial	12
11E_C1	1092+50 RT to 1093+50 LT	Perennial	223
11E_C2	1092+00 RT	Perennial	57
11R_C	1015+00 LT	Perennial	21
11T_C	1013+50	Perennial	288
12C_C	916+00 RT SB on 95	Perennial	69
12E_C	911+00 RT to 912+50 RT	Perennial	91
12E_C1	914+00 RT to 916+00 RT	Perennial	51
12EE_C	900+50	Intermittent	247
12F_C	918+00 RT to 921+50 RT	Perennial	317
12H_C	909+00 RT to 910+50 RT	Perennial	17
12H_C1	916+50 RT to 919+00 RT	Perennial	122
12H_C2	928+00 RT	Perennial	52
12II_C	928+50 LT to 930+50 LT	Perennial	174

Table B-4b. Existing Culvert Stream Impacts - Middle Potomac-Anacostia-Occoquan Alternative 9M

Feature ID	Station	Classification	Length (LF)
12II_C1	938+50 LT	Perennial	79
12II_C2	938+00 RT	Perennial	90
12II_C3	926+00 LT to 927+50 LT	Perennial	159
12JJJ_C	907+00 RT to 908+50 RT	Perennial	172
12K_C	911+50 LT to 912+50 RT	Perennial	196
12KKK_C	907+00 LT to 907+50 RT	Intermittent	221
12OO_C	974+50	Perennial	221
12QQQ_C	939+50 LT to 940+00 LT	Intermittent	83
12RRR_C	945+50 RT to 946+00 LT	Perennial	216
12S_C	925+00	Intermittent	151
12WW_C	934+50 LT	Perennial	128
12WW_C1	932+50 LT to 933+50 LT	Perennial	186
12WWW_C	936+50 LT	Intermittent	146
12XX_C	923+50 LT to 925+50 LT	Perennial	252
12Y_C	932+00 LT to 934+00 LT	Intermittent	89
12YYY_C	933+50 LT to 935+00 LT	Perennial	175
12YYY_C1	932+00 LT	Perennial	107
12Z_C	918+50	Intermittent	56
12Z_C	918+50	Intermittent	143
13B_C	861+50 RT to 862+50 RT	Intermittent	54
13B_C	861+50 RT to 862+50 RT	Intermittent	91
13C_C	864+50 RT to 867+50 RT	Intermittent	126
13C_C1	873+00 LT to 874+00 RT	Intermittent	348
13J_C	768+50 LT to 769+00 LT	Intermittent	53
13J_C1	771+50 LT to 773+00 LT	Intermittent	159
13M_C	829+50 RT to 830+50 LT	Perennial	260
13Q_C	865+50 LT to 867+50 RT	Intermittent	343
13R_C	848+50	Intermittent	235
13S_C	844+00 LT to 845+50 LT	Intermittent	148
13T_C	847+00	Intermittent	286
14A_C	757+00	Intermittent	172
14E_C	744+50 LT to 745+00 LT	Perennial	42
14E_C1	745+00	Perennial	201
14G_C	707+50	Intermittent	185
15A_C	667+00 LT to 670+00 RT	Intermittent	429
15D_C	684+00 RT to 685+50 LT	Perennial	267
16A_C	610+00 LT to 612+00 LT	Perennial	131
16A_C1	603+00 RT to 604+00 LT	Perennial	265
16A_C2	589+50 RT to 590+50 RT	Perennial	110
16D_C	599+50	Intermittent	260
16E_C	630+00 RT to 637+00 RT	Intermittent	5
16G_C	626+50 RT to 630+00 RT	Perennial	191
16G_C1	620+00 RT to 625+50 RT	Perennial	592

Table B-4b. Existing Culvert Stream Impacts - Middle Potomac-Anacostia-Occoquan Alternative 9M

Feature ID	Station	Classification	Length (LF)
17BB_C	568+00 RT to 569+50 LT	Intermittent	295
17DD_C	565+50 RT to 569+00 Median	Intermittent	401
18B_C	526+50 RT to 527+00 LT	Ephemeral	386
18C_C	517+50	Perennial	241
18G_C	536+50 LT to 538+00 RT	Intermittent	1,274
19A_C	458+00	Intermittent	1,308
19B_C	436+00 LT to 436+50 median	Intermittent	114
19C_C	432+00 LT Outer loop	Perennial	130
19F_C	437+00 Median to 438+00 RT	Perennial	162
19F_C1	440+00 RT	Perennial	49
19F_C2	454+00 RT to 464+50 LT	Perennial	1,308
19J_C	407+50 RT to 408+00 RT	Perennial	22
19J_C1	408+50 RT to 410+00 LT	Perennial	274
19T_C	467+50	Perennial	227
19V_C	490+00 RT to 491+50 LT	Perennial	331
23G_C	4805+00	Perennial	187
23Q_C	4782+00 RT to 4783+00 LT	Perennial	250
Total			**32,002**

Table B-5a. Existing Culvert Stream Impacts - Middle Potomac-Catoctin
Alternatives 8, 9, and 9M

Feature ID	Station	Classification	Length (LF)
20D_C	322 RT to 324+00 RT	Perennial	180
21B_C	297+00 LT to 298+00 RT	Perennial	261
21C_C	261+00 RT to 262+50 LT	Perennial	252
21C_C1	237+00 LT to 269+00 RT	Perennial	321
21C_C2	224+00 LT to 227+00 LT	Perennial	328
21D_C	225+00 RT to 226+00 LT	Intermittent	316
21D_C1	228+00 LT to 229+00 LT	Intermittent	119
21F_C	245+50	Intermittent	258
21L_C	277+50 LT to 278+50 RT	Perennial	270
22A_C	219+50 LT to 221+00 LT	Intermittent	152
22C_C	218+50 LT to 219+00 LT	Intermittent	91
22CC_C	195+00 LT to 196+50 LT	Ephemeral	34
22H_C	197+50 RT to 198+50 RT	Intermittent	95
22HH_C	130+00 LT to 131+00 LT	Intermittent	113
22M_C	116+00	Perennial	65
22Q_C	125+00 RT	Perennial	277
22Z_C	198+00 RT on Cabin John Pkwy	Perennial	99
23A_C	3741+00 LT to 3742+00 LT	Perennial	216
23A_C1	3744+00 RT to 3748+00 LT	Perennial	407
23A_C2	3750+00 RT to 2752+50 RT	Perennial	236
23AA_C	3749+50 LT to 3750+50 LT	Perennial	101
23AA_C1	3753+00	Perennial	220
23D_C	3759+00 LT to 3760+50 RT	Intermittent	255
23K_C	3683+00 RT to 3684+50 RT	Perennial	178
23K_C1	3690+50 RT to 3692+50 RT	Perennial	53
23N_C	4725+00 LT to 4729+50 RT	Intermittent	583
23V_C	3720+00	Intermittent	777
24A_C	3683+00	Perennial	320
24F_C1	3615+00 LT to 3618+00 LT	Perennial	197
24F_C2	3627+00	Perennial	390
25H_C	3560+00 RT to 3562+00 LT	Perennial	420
26B_C	3509+00 LT to 3510+00 RT	Intermittent	306
26B_C1	3509+50 to 3510+00 RT	Intermittent	47
26C_C	3522+50 RT to 3524+00 LT	Intermittent	360
26C_C1	3523+50	Intermittent	22
27A_C	3478+50 LT to 3480+00 RT	Perennial	325
27A_C1	3483+00 RT to 3484+00 RT	Perennial	152
27L_C	3405+50	Intermittent	405
29A_C2	3335+50 RT to 3340+00 RT	Perennial	464
29B_C	3328+50	Perennial	443
Total			**10,108**

Table B-5b. Existing Culvert Stream Impacts - Middle Potomac-Catoctin
Alternatives 10 and 13C

Feature ID	Station	Classification	Length (LF)
20D_C	322 RT to 324+00 RT	Perennial	180
21B_C	297+00 LT to 298+00 RT	Perennial	261
21C_C	261+00 RT to 262+50 LT	Perennial	252
21C_C1	237+00 LT to 269+00 RT	Perennial	321
21C_C2	224+00 LT to 227+00 LT	Perennial	328
21D_C	225+00 RT to 226+00 LT	Intermittent	316
21D_C1	228+00 LT to 229+00 LT	Intermittent	119
21F_C	245+50	Intermittent	258
21L_C	277+50 LT to 278+50 RT	Perennial	270
22A_C	219+50 LT to 221+00 LT	Intermittent	152
22C_C	218+50 LT to 219+00 LT	Intermittent	91
22CC_C	195+00 LT to 196+50 LT	Ephemeral	34
22H_C	197+50 RT to 198+50 RT	Intermittent	95
22HH_C	130+00 LT to 131+00 LT	Intermittent	113
22M_C	116+00	Perennial	65
22Q_C	125+00 RT	Perennial	277
22Z_C	198+00 RT on Cabin John Pkwy	Perennial	99
23A_C	3741+00 LT to 3742+00 LT	Perennial	216
23A_C1	3744+00 RT to 3748+00 LT	Perennial	407
23A_C2	3750+00 RT to 2752+50 RT	Perennial	236
23AA_C	3749+50 LT to 3750+50 LT	Perennial	101
23AA_C1	3753+00	Perennial	220
23D_C	3759+00 LT to 3760+50 RT	Intermittent	255
23K_C	3683+00 RT to 3684+50 RT	Perennial	178
23K_C1	3690+50 RT to 3692+50 RT	Perennial	83
23N_C	4725+00 LT to 4729+50 RT	Intermittent	583
23V_C	3720+00	Intermittent	777
24A_C	3683+00	Perennial	320
24F_C1	3615+00 LT to 3618+00 LT	Perennial	197
24F_C2	3627+00	Perennial	390
25H_C	3560+00 RT to 3562+00 LT	Perennial	420
26B_C	3509+00 LT to 3510+00 RT	Intermittent	306
26B_C1	3509+50 to 3510+00 RT	Intermittent	47
26C_C	3522+50 RT to 3524+00 LT	Intermittent	360
26C_C1	3523+50	Intermittent	22
27A_C	3478+50 LT to 3480+00 RT	Perennial	325
27A_C1	3483+00 RT to 3484+00 RT	Perennial	152
27L_C	3405+50	Intermittent	405
29A_C2	3335+50 RT to 3340+00 RT	Perennial	464
29B_C	3328+50	Perennial	443
Total			**10,138**

Table B-5c. Existing Culvert Stream Impacts - Middle Potomac-Catoctin
Alternative 13B

Feature ID	Station	Classification	Length (LF)
20D_C	322 RT to 324+00 RT	Perennial	180
21B_C	297+00 LT to 298+00 RT	Perennial	261
21C_C	261+00 RT to 262+50 LT	Perennial	252
21C_C1	237+00 LT to 269+00 RT	Perennial	321
21C_C2	224+00 LT to 227+00 LT	Perennial	328
21D_C	225+00 RT to 226+00 LT	Intermittent	316
21D_C1	228+00 LT to 229+00 LT	Intermittent	119
21F_C	245+50	Intermittent	258
21L_C	277+50 LT to 278+50 RT	Perennial	270
22A_C	219+50 LT to 221+00 LT	Intermittent	152
22C_C	218+50 LT to 219+00 LT	Intermittent	91
22CC_C	195+00 LT to 196+50 LT	Ephemeral	34
22H_C	197+50 RT to 198+50 RT	Intermittent	95
22HH_C	130+00 LT to 131+00 LT	Intermittent	113
22M_C	116+00	Perennial	65
22Q_C	125+00 RT	Perennial	277
22Z_C	198+00 RT on Cabin John Pkwy	Perennial	99
23A_C	3741+00 LT to 3742+00 LT	Perennial	216
23A_C1	3744+00 RT to 3748+00 LT	Perennial	407
23A_C2	3750+00 RT to 2752+50 RT	Perennial	236
23AA_C	3749+50 LT to 3750+50 LT	Perennial	101
23AA_C1	3753+00	Perennial	220
23D_C	3759+00 LT to 3760+50 RT	Intermittent	255
23K_C	3683+00 RT to 3684+50 RT	Perennial	178
23K_C1	3690+50 RT to 3692+50 RT	Perennial	53
23N_C	4725+00 LT to 4729+50 RT	Intermittent	583
23V_C	3720+00	Intermittent	777
24A_C	3683+00	Perennial	320
24F_C1	3615+00 LT to 3618+00 LT	Perennial	197
24F_C2	3627+00	Perennial	390
25H_C	3560+00 RT to 3562+00 LT	Perennial	418
26B_C	3509+00 LT to 3510+00 RT	Intermittent	306
26B_C1	3509+50 to 3510+00 RT	Intermittent	47
26C_C	3522+50 RT to 3524+00 LT	Intermittent	360
26C_C1	3523+50	Intermittent	22
27A_C	3478+50 LT to 3480+00 RT	Perennial	325
27A_C1	3483+00 RT to 3484+00 RT	Perennial	152
27L_C	3405+50	Intermittent	405
29A_C2	3335+50 RT to 3340+00 RT	Perennial	464
29B_C	3328+50	Perennial	443
Total			**10,106**

Table B-6a. Existing Culvert Stream Impacts - Patuxent
Alternatives 8,9,9M,10,13B, and 13C

Feature ID	Station	Classification	Length (LF)
4B_C	1687+50	Intermittent	257
4BBB_C	1673+00 RT	Perennial	24
4E_C	1693+00 RT to 1694+00 LT	Intermittent	245
4GG_C	1743+00 RT to 1744+50 LT	Intermittent	326
4HHH_C	1672+00 RT	Intermittent	23
4M_C	1716+00 RT to 1717+50 LT	Perennial	270
4Q_C	1714+00 to 1714+50	Perennial	231
4T_C	1673+50 RT to 1675+00 LT	Intermittent	290
4TTTT_C2	1630+50 LT	Perennial	33
4W_C	1665+00 LT to 1665+50 RT	Perennial	271
4W_C1	1665+50 RT	Perennial	27
4Z_C	1636+50	Perennial	21
4Z_C1	1630+50 LT to 1631+00 LT	Perennial	103
4Z_C2	1624+00 LT to 1625+50 LT	Perennial	80
5F_C1	1620+00	Perennial	496
5FF_C	1593+50	Intermittent	244
5QQ_C	1551+00 LT to 1551+50 LT	Intermittent	80
6AAA_C	1527+00 RT	Intermittent	43
6AAA_C1	1526+00	Intermittent	236
6BB_C	1491+00 LT to 1492+50 LT	Intermittent	118
6BBBB_C	1469+00	Intermittent	257
6DDD_C	1460+00 LT to 1461+50 LT	Intermittent	129
6FFFF_C1	1526+50 RT	Intermittent	24
6G_C	1451+00 LT to 1456+00 LT	Perennial	526
6G_C1	1486+50 LT to 1491+00 LT	Perennial	328
6GGG_C	1544+50 RT to 1546+00 RT	Intermittent	134
6GGG_C1	1549+00 RT to 1549+50 RT	Intermittent	70
6III_C	1508+50 LT to 1509+50 RT	Intermittent	267
6JJJ_C	1512+50 RT to 1513+00 LT	Perennial	251
6MMM_C	1496+00	Perennial	239
6NNN_C	1496+50 RT	Intermittent	26
6RRR_C	1461+00 RT to 1462+50 LT	Intermittent	370
6SS_C	1484+00	Intermittent	66
6TTT_C	1480+00 RT to 1480+50 LT	Intermittent	314
6UU_C	1465+00	Intermittent	252
6WW_C	1456+50 LT to 1457+50 LT	Intermittent	95
7A_C	1431+00 to 1443+00	Intermittent	1,485
8HH_C	1353+00 LT	Intermittent	80
Total			**8,331**

APPENDIX C: VIRGINIA USM STREAM ASSESSMENT FORMS

Stream Assessment Form (Form 1)

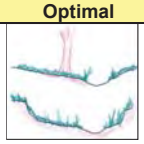
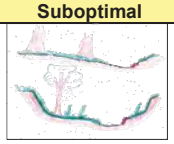
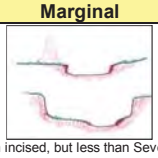
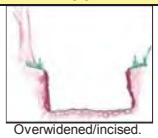
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	I-495 NEXT	Fairfax	R3	02070008	8/20/2018	22AAA	339	0.0

Name(s) of Evaluator(s)	Stream Name and Information
Scott Shifflett, Laura Cooper, Kyle Haynes, Evan Fowler, Emily Onufer	unnamed tributary to the Potomac River

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	**Suboptimal**	**Marginal**	**Poor**	**Severe**	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	**CI**
Score	**3**	**2.4**	**2**	**1.6**	**1**	**1.6**
NOTES>>	**The majority of the stream banks have significant evidence of erosion.**					

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							
	Optimal	**Suboptimal**		**Marginal**		**Poor**		**NOTES>>** The buffer of this stream has mature trees with significant canopy cover and has an un-maintained understory with very dense vegetation
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	**Low**	**High**	**Low**	**High**	**Low**	
Condition Scores	**1.5**	**1.2**	**1.1**	**0.85**	**0.75**	**0.6**	**0.5**	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	**100%**						**100%**	
	Score >	**1.1**							
								CI= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	**100%**						**100%**	**Rt Bank CI >** **1.10** **CI**
	Score >	**1.1**							**Lt Bank CI >** **1.10** **1.10**

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

NOTES>> Habitat elements are marginal for the majority of the stream.

	Conditional Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.
Score	**1.5**	**1.2**	**0.9**	**0.5**

CI **0.90**

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
	VDOT	Fairfax	R3	0207008	8/20/18	SK	339	0.0

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

NOTES>> The stream has been straightened

	Conditional Category							
	Negligible	Minor		Moderate		Severe		
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.		
SCORE	**1.5**	**1.3**	**1.1**	**0.9**	**0.7**	**0.5**		**0.50**

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	**0.82**
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	**0**
CR = RCI X LF X IF	

INSERT PHOTOS:

DESCRIBE PROPOSED IMPACT:

Construction access - temporary impact

Stream Assessment Form (Form 1)

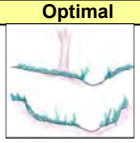
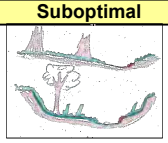
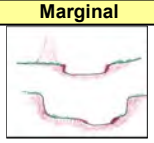
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Managed Lanes Study	Fairfax	R3	02070008	3/31/2020	22AAA_C	491	0.0

Name(s) of Evaluator(s)	Stream Name and Information
Karl Hellmann & Alex Nussbaum	Unnamed tributary to the Potomoac River

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	CI
Score	3	2.4	2	1.6	1	3.0
NOTES>>	Entire stream segment flows through an existing culvert and therefore lacks incision.					

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							
	Optimal	Suboptimal		Marginal		Poor		NOTES>> Entire stream segment is within an existing culvert and therefore does not have a riparian buffer.
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%	
	Score >	0							
								CI= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%					100%	Rt Bank CI > 0.00	CI
	Score >	0						Lt Bank CI > 0.00	0.00

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>> Entire stream segment is within an existing culvert and lacks most habitat elements.	
	Optimal	Suboptimal	Marginal	Poor		
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.		CI
Score	1.5	1.2	0.9	0.5		0.50

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
	MDOT SHA	Fairfax	R3	02070008	3/31/2020		491	0.0

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

NOTES>> Entire stream segment has been altered and consists of a waterway flowing through an existing culvert.

	Conditional Category						
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	0.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	0.80
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	0
CR = RCI X LF X IF	

INSERT PHOTOS:

DESCRIBE PROPOSED IMPACT:

Existing culvert to remain- temporary impact

Stream Assessment Form (Form 1)

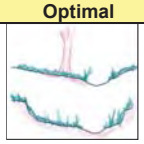
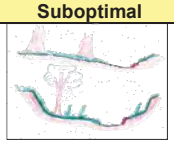
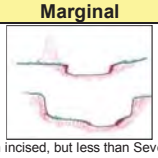
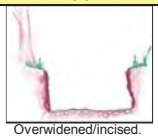
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	I-495 NEXT	Fairfax	R3	02070008	8/20/2018	22SS	97	0.0

Name(s) of Evaluator(s)	Stream Name and Information
Scott Shifflett, Laura Cooper, Kyle Haynes, Evan Fowler, Emily Onufer	unnamed tributary to the Potomac

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>	Banks are significantly incised throught with evidence of erosion.					

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor	
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.
		High	Low	High	Low	High	Low
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5

NOTES>> The buffer is has significant areas of disturbance on the left bank including houses and lawns. The right bank has more natural features but still has lawns which intersect.

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	80%	20%					100%
	Score >	1.5	0.6					
Left Bank	% Riparian Area>	90%	10%					100%
	Score >	1.5	0.6					

CI= (Sum % RA * Scores*0.01)/2

Rt Bank CI >	1.32	CI
Lt Bank CI >	1.41	1.37

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

Conditional Category	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.50

NOTES>> Habitat elements are present in the majority of the stream.

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
	VDOT	Fairfax	R3	0207008	8/20/18	CC/CD	97	0.0

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

NOTES>> alteration/straightening has occurred on a small section of this stream

	Conditional Category						
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	**1.5**	**1.3**	**1.1**	**0.9**	**0.7**	**0.5**	**1.30**

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	**1.15**
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	**0**
CR = RCI X LF X IF	

INSERT PHOTOS:

DESCRIBE PROPOSED IMPACT:

Construction access - temporary impact

Stream Assessment Form (Form 1)

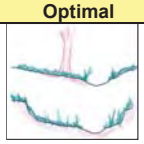
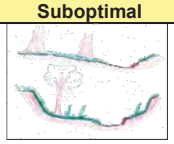
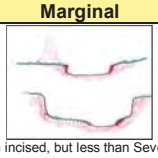
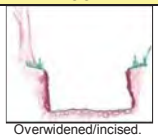
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	I-495 NEXT	Fairfax	R3	02070008	8/20/2018	22UU	543	1.0

Name(s) of Evaluator(s)	Stream Name and Information
Scott Shifflett, Laura Cooper, Kyle Haynes, Evan Fowler, Emily Onufer	unnamed tributary to the Potomac

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	**Suboptimal**	**Marginal**	**Poor**	**Severe**	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	**CI**
Score	**3**	**2.4**	**2**	**1.6**	**1**	**1.6**
NOTES>>	**Banks are significantly incised throught with evidence of erosion.**					

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category						
	Optimal	**Suboptimal**		**Marginal**		**Poor**	
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.
		High	**Low**	**High**	**Low**	**High**	**Low**
Condition Scores	**1.5**	**1.2**	**1.1**	**0.85**	**0.75**	**0.6**	**0.5**

NOTES>> Both sides of the stream are wetland/floodplain mosaic. The right bank has I-495 which runs through it while the left bank has a home and yard.

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	**30%**	**70%**					**100%**	
	Score >	**1.5**	**0.5**						
								CI= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	**90%**	**10%**					**100%**	**Rt Bank CI >** **0.80** **CI**
	Score >	**1.5**	**0.6**						**Lt Bank CI >** **1.41** **1.11**

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	**Suboptimal**	**Marginal**	**Poor**	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	**CI**
Score	**1.5**	**1.2**	**0.9**	**0.5**	**0.50**

NOTES>> Habitat elements are not present, the majority of the channel has been riprapped

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
	VDOT	Fairfax	R4	0207008	8/20/18	DE	543	1.0

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

NOTES>> The majority of the channel has been altered through straightening and riprap

	Conditional Category						
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	**1.5**	**1.3**	**1.1**	**0.9**	**0.7**	**0.5**	**0.50**

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	**0.74**
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	**401**
CR = RCI X LF X IF	

INSERT PHOTOS:

DESCRIBE PROPOSED IMPACT:

Impacted by roadway design

Ephemeral Stream Assessment Form (Form 1a)

Unified Stream Methodology for use in Virginia

For use in ephemeral streams

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	I-495 NEXT	Fairfax	EPH	02070008	8/20/2018	22VV	371	1.0

Name(s) of Evaluator(s)	Stream Name and Information
Scott Shifflett, Laura Cooper, Kyle Haynes, Evan Fowler, Emily Onufer	unnamed tributary to the Potomac

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category							
	Optimal	Suboptimal		Marginal		Poor	
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and an non-maintained understory. Wetlands areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with >30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.
		High	Low	High	Low	High	Low
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5

NOTES>> Both sides of the stream are wetland/floodplain mosaic.

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.5								
									CI= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank CI >	1.50
	Score >	1.5							Lt Bank CI >	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH	
THE REACH CONDITION INDEX (RCI) >>	0.75
RCI= (Riparian CI)/2	
COMPENSATION REQUIREMENT (CR) >>	278
CR = RCI X LF X IF	

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

INSERT PHOTOS:

DESCRIBE PROPOSED IMPACT:

Impacted by roadway design and construction staging area.

Ephemeral Stream Assessment Form (Form 1a)

Unified Stream Methodology for use in Virginia

For use in ephemeral streams

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	I-495 NEXT	Fairfax	EPH	02070008	8/20/2018	22WW/22XX	64	1.0

Name(s) of Evaluator(s)	Stream Name and Information
Scott Shifflett, Laura Cooper, Kyle Haynes, Evan Fowler, Emily Onufer	unnamed tributary to the Potomac

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		Both sides of the stream are wetland/floodplain mosaic.
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and an non-maintained understory. Wetlands areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with >30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.5									
									CI= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	100%						100%	Rt Bank CI >	1.50	CI
	Score >	1.5							Lt Bank CI >	1.50	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	0.75

RCI= (Riparian CI)/2

COMPENSATION REQUIREMENT (CR) >>	35

CR = RCI X LF X IF

INSERT PHOTOS:

DESCRIBE PROPOSED IMPACT:

Impacted by roadway design

Stream Assessment Form (Form 1)

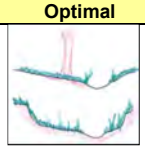
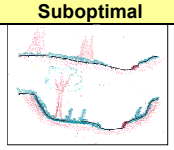
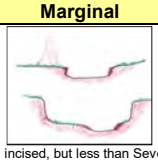
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Managed Lanes Study	Fairfax	R3	02070008	3/31/2020	22WW_C	272	0.0

Name(s) of Evaluator(s)	Stream Name and Information
Karl Hellmann & Alex Nussbaum	Unnamed tributary to the Potomoac River

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	CI
Score	3	2.4	2	1.6	1	3.0

NOTES>> Entire stream segment flows through an existing culvert and therefore lacks incision.

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor	
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.
		High	Low	High	Low	High	Low
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5

NOTES>> Entire stream segment is within an existing culvert and therefore does not have a riparian buffer.

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%	
	Score >	0							
								CI= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%					100%	Rt Bank CI >	0.00
	Score >	0						Lt Bank CI >	0.00

CI: 0.00

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

Conditional Category	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.50

NOTES>> Entire stream segment is within an existing culvert and lacks most habitat elements.

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
	MDOT SHA	Fairfax	R3	02070008	3/31/2020		272	0.0

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

NOTES>> Entire stream segment has been altered and consists of a waterway flowing through an existing culvert.

	Conditional Category						
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	0.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	**0.80**
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	**0**
CR = RCI X LF X IF	

INSERT PHOTOS:

DESCRIBE PROPOSED IMPACT:

Existing culvert to remain - temporary impact

Stream Assessment Form (Form 1)

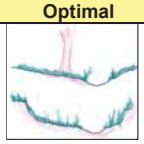
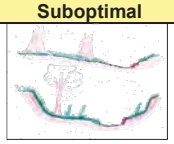
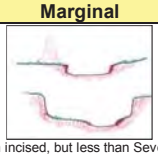
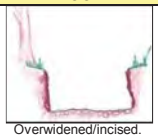
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	I-495 NEXT	Fairfax	R3	02070008	8/20/2018	22ZZ	97	0.0

Name(s) of Evaluator(s)	Stream Name and Information
Scott Shifflett, Laura Cooper, Kyle Haynes, Evan Fowler, Emily Onufer	unnamed tributary to the Potomac River

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	**Suboptimal**	**Marginal**	**Poor**	**Severe**	
						
Channel Condition	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	**CI**
Score	**3**	**2.4**	**2**	**1.6**	**1**	**2.0**

NOTES>> **Inscision evident on approximately 50% of the stream banks with some veritcle banks.**

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category						
	Optimal	**Suboptimal**		**Marginal**		**Poor**	
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.
		High	**Low**	**High**	**Low**	**High**	**Low**
Condition Scores	**1.5**	**1.2**	**1.1**	**0.85**	**0.75**	**0.6**	**0.5**

NOTES>> The stream is surrounded by homes and roads although the majority of the buffer is higher quality with some evidence of disturbance in locations.

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	**60%**	**30%**	**10%**				**100%**	
	Score >	**1.2**	**0.75**	**0.5**					
								CI= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	**40%**	**40%**	**20%**				**100%**	**Rt Bank CI >** **1.00** **CI**
	Score >	**1.5**	**0.85**	**0.5**					**Lt Bank CI >** **1.04** **1.02**

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.
Score	**1.5**	**1.2**	**0.9**	**0.5**

NOTES>> Habitat elements are marginal for the majority of the stream.

CI **0.90**

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
	VDOT	Fairfax	R3	0207008	8/20/18	SH	97	0.0

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

NOTES>> It appears that a good portion of the stream has been straightened.

	Conditional Category						
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	**1.5**	**1.3**	**1.1**	**0.9**	**0.7**	**0.5**	**0.90**

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	**0.96**
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	**0**
CR = RCI X LF X IF	

INSERT PHOTOS:

DESCRIBE PROPOSED IMPACT:

Construction access - temporary impact

Stream Assessment Form (Form 1)

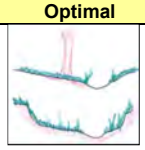
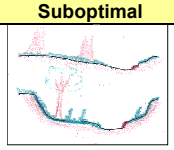
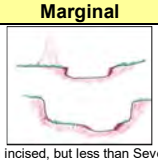
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Managed Lanes Study	Fairfax	R3	02070008	3/31/2020	22ZZ_C	1075	0.0

Name(s) of Evaluator(s)	Stream Name and Information
Karl Hellmann & Alex Nussbaum	Unnamed tributary to the Potomoac River

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	CI
Score	3	2.4	2	1.6	1	3.0

NOTES>> Entire stream segment flows through an existing culvert and therefore lacks incision.

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor	
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.
		High	Low	High	Low	High	Low
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5

NOTES>> Entire stream segment is within an existing culvert and therefore does not have a riparian buffer.

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%	
	Score >	0							
								CI= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%					100%	Rt Bank CI >	0.00
	Score >	0						Lt Bank CI >	0.00

CI: 0.00

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

Conditional Category	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.50

NOTES>> Entire stream segment is within an existing culvert and lacks most habitat elements.

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
	MDOT SHA	Fairfax	R3	02070008	3/31/2020		1075	0.0

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

NOTES>> Entire stream segment has been altered and consists of a waterway flowing through an existing culvert.

	Conditional Category						
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	0.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	**0.80**
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	**0**
CR = RCI X LF X IF	

INSERT PHOTOS:

DESCRIBE PROPOSED IMPACT:

Existing culvert to remain - temporary impact

APPENDIX D: ON-SITE STREAM MITIGATION TABLES

ALTERNATIVES 8 AND 9

Table D-1a. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternatives 8 and 9

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
1D_1	1989+50	Perennial	Medium	121	0.5:1	60.5
1D_2	1987+50	Perennial	Medium	78	0.5:1	39
1G	1994+50	Ephemeral	Low	19	1:1	19
1H	1995+00	Intermittent	Low	2	1:1	2
1H_D	1999+00	Intermittent	Low	625	1:1	625
1O	1929+00	Ephemeral	Low	227	1:1	227
1P	1931+00	Intermittent	Low	178	1:1	178
1Q	1930+00	Perennial	High	56	0:1	0
1Q_1	1927+00	Perennial	High	252	0:1	0
1R	1943+00	Perennial	Medium	482	0.5:1	241
1R_1	1936+00	Perennial	Medium	548	0.5:1	274
1RR	1958+50	Intermittent	Low	26	1:1	26
1SS	1957+00	Ephemeral	Low	317	1:1	317
1TT	1969+00	Intermittent	Low	53	1:1	53
1VV	1973+00	Perennial	Medium	39	0.5:1	19.5
1VV_1	1974+50	Perennial	Medium	18	0.5:1	9
1XX	1975+00	Ephemeral	Medium	136	0.5:1	68
1XX_1	1974+00	Intermittent	Medium	141	0.5:1	70.5
1YY	1972+00	Intermittent	Low	362	1:1	362
2A	1924+50	Ephemeral	Low	170	1:1	170
2AA	1857+00	Intermittent	Low	50	1:1	50
2D	1917+00	Ephemeral	Low	13	1:1	13
2E	1916+50	Intermittent	Low	77	1:1	77
2F	1901+00	Intermittent	Medium	669	0.5:1	334.5
2F_D	1896+00	Intermittent	Medium	499	0.5:1	249.5
2H	1870+00	Intermittent	Low	53	1:1	53
2HH	1902+50	Intermittent	Low	52	1:1	52
2I	1871+00	Intermittent	Low	244	1:1	244
2J	1864+50	Perennial	Medium	44	0.5:1	22
2J_1	1863+00	Perennial	Medium	30	0.5:1	15
2JJ	1917+00	Intermittent	Low	73	1:1	73
2L	1862+00	Intermittent	Medium	313	0.5:1	156.5
2MM	1904+00	Perennial	Medium	4	0.5:1	2
2OO	1915+00	Ephemeral	Low	33	1:1	33
2R	1870+00	Perennial	Medium	27	0.5:1	13.5
2T	1874+00	Intermittent	Medium	989	0.5:1	494.5
2V	1857+50	Perennial	Medium	16	0.5:1	8
2VV	1921+00	Intermittent	Low	17	1:1	17
2W	1914+00	Intermittent	Low	451	1:1	451
2X	1916+50	Perennial	Medium	16	0.5:1	8
2X_1	1916+50	Perennial	Medium	203	0.5:1	101.5
2Y	1928+00	Perennial	Low	241	1:1	241

Table D-1a. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternatives 8 and 9

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
2Y_1	1926+00	Perennial	Low	388	1:1	388
2YY	1921+00	Intermittent	Low	51	1:1	51
3A	1836+00	Perennial	Medium	44	0.5:1	22
3AA_1	1803+00	Perennial	Low	40	1:1	40
3BB	1804+00	Ephemeral	Low	120	1:1	120
3BBB	1804+00	Intermittent	Low	41	1:1	41
3CC	1819+50	Intermittent	Low	303	1:1	303
3D	1822+50	Perennial	Medium	45	0.5:1	22.5
3D_1	1820+50	Perennial	Medium	87	0.5:1	43.5
3DD	1821+00	Perennial	Medium	45	0.5:1	22.5
3F	1801+50	Ephemeral	Low	244	1:1	244
3FFF	1804+50	Intermittent	Low	52	1:1	52
3FFF_D	1805+00	Intermittent	Low	66	1:1	66
3H	1823+00	Intermittent	Low	102	1:1	102
3I	1818+00	Intermittent	Low	551	1:1	551
3JJ	1758+00	Intermittent	Low	321	1:1	321
3L	1792+50	Perennial	Medium	35	0.5:1	17.5
3L_1	1793+50	Perennial	Medium	38	0.5:1	19
3LL	1754+50	Intermittent	Low	92	1:1	92
3LL_1	1759+00	Intermittent	Low	521	1:1	521
3LLL	1794+00	Ephemeral	Low	16	1:1	16
3PP	1764+00	Ephemeral	Low	87	1:1	87
3Q	1790+00	Ephemeral	Low	73	1:1	73
3RR	1764+00	Ephemeral	Low	206	1:1	206
3S	1792+50	Perennial	Medium	183	0.5:1	91.5
3SS	1792+50	Intermittent	Low	9	1:1	9
3U	1789+50	Intermittent	Low	44	1:1	44
3UU	1817+00	Intermittent	Low	6	1:1	6
3ZZ	1764+00	Perennial	Medium	95	0.5:1	47.5
4H	1754+00	Ephemeral	Low	331	1:1	331
4YYY	1755+00	Intermittent	Low	35	1:1	35
7AA	1347+00	Intermittent	Low	102	1:1	102
7BB	1395+00	Intermittent	Low	56	1:1	56
7BB_1	1394+00	Intermittent	Low	76	1:1	76
7BB_D	1397+00	Intermittent	Low	518	1:1	518
7D	1425+50	Intermittent	Low	27	1:1	27
7E	1424+00	Perennial	Low	327	1:1	327
7F	1422+50	Intermittent	Low	32	1:1	32
7G	1431+50	Perennial	Medium	20	0.5:1	10
7G_1	1428+00	Perennial	Medium	484	0.5:1	242
7GG	1409+50	Intermittent	Low	255	1:1	255
7H	1427+00	Intermittent	Low	373	1:1	373

Table D-1a. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternatives 8 and 9

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
7I	1410+00	Intermittent	Medium	37	0.5:1	18.5
7JJ	1411+50	Perennial	Medium	11	0.5:1	5.5
7JJ_1	1411+00	Perennial	Medium	7	0.5:1	3.5
7MM	1347+00	Intermittent	Low	150	1:1	150
7N	1396+50	Perennial	Low	218	1:1	218
7N_1	1394+50	Perennial	Low	76	1:1	76
7NN	1347+00	Ephemeral	Low	134	1:1	134
7O	1393+00	Perennial	Low	53	1:1	53
7O_1	1394+00	Perennial	Low	41	1:1	41
7PP	1347+00	Intermittent	Low	35	1:1	35
7S	1347+00	Perennial	Medium	128	0.5:1	64
7T	1424+00	Perennial	Low	17	1:1	17
7T_1	1425+00	Perennial	Low	207	1:1	207
7V	1429+00	Ephemeral	Low	46	1:1	46
8A	1334+50	Intermittent	Low	186	1:1	186
8E	1338+50	Intermittent	Low	106	1:1	106
8F	1336+00	Intermittent	Low	70	1:1	70
8G_1	1339+00	Intermittent	Low	47	1:1	47
8HH	1347+00	Intermittent	Medium	133	0.5:1	66.5
8I	1337+50	Ephemeral	Low	45	1:1	45
8J	1328+50	Intermittent	Low	181	1:1	181
8J_2	1333+50	Perennial	Medium	29	0.5:1	14.5
8MM	1334+00	Intermittent	Low	41	1:1	41
8N	1330+00	Intermittent	Medium	112	0.5:1	56
8N_1	1332+00	Perennial	Medium	319	0.5:1	159.5
8N_D	1329+50	Intermittent	Medium	51	0.5:1	25.5
8R_D1	1282+50	Intermittent	Low	347	1:1	347
8S	1292+00	Ephemeral	Low	137	1:1	137
8S_1	1289+00	Ephemeral	Low	7	1:1	7
8T	1289+00	Ephemeral	Low	118	1:1	118
8V	1310+00	Intermittent	Low	46	1:1	46
8W	1347+00	Intermittent	Medium	211	0.5:1	105.5
8W_1	1347+00	Intermittent	Medium	502	0.5:1	251
8Z	1347+00	Perennial	Medium	60	0.5:1	30
9A	1290+00	Intermittent	Low	141	1:1	141
9C	1289+00	Intermittent	Low	196	1:1	196
9CC	1227+00	Perennial	Low	325	1:1	325
9F	1186+00	Intermittent	Low	292	1:1	292
9FF	1229+00	Ephemeral	Low	103	1:1	103
9G	1184+50	Perennial	Medium	133	0.5:1	66.5
9G_1	1184+50	Perennial	Medium	50	0.5:1	25
9GG	1228+00	Intermittent	Low	5	1:1	5

Table D-1a. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternatives 8 and 9

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
9J	1203+00	Perennial	Medium	49	0.5:1	24.5
9JJ	1242+50	Perennial	Medium	407	0.5:1	203.5
9LL	1245+00	Ephemeral	Low	32	1:1	32
9M	1204+00	Intermittent	Low	308	1:1	308
9M_D	1208+00	Intermittent	Low	419	1:1	419
9MM	1244+00	Intermittent	Low	106	1:1	106
9P	1202+00	Ephemeral	Low	198	1:1	198
9QQ	1200+50	Intermittent	Low	99	1:1	99
9QQ_1	1199+50	Ephemeral	Low	89	1:1	89
9R	1289+50	Intermittent	Low	589	1:1	589
9RR	1204+00	Intermittent	Low	456	1:1	456
9RR_1	1206+00	Ephemeral	Low	113	1:1	113
9T	1264+00	Intermittent	Low	18	1:1	18
9T_1	1263+00	Perennial	Low	78	1:1	78
9VV	1225+00	Intermittent	Low	119	1:1	119
9Y	1240+50	Perennial	Medium	61	0.5:1	30.5
9Y_1	1240+00	Perennial	Medium	33	0.5:1	16.5
9Z	1240+50	Intermittent	Low	31	1:1	31
10AA	1115+00	Perennial	Low	265	1:1	265
10B_1	1163+50	Intermittent	Low	48	1:1	48
10BB	1119+00	Perennial	Low	586	1:1	586
10C	1163+50	Perennial	Medium	101	0.5:1	50.5
10C_1	1165+50	Perennial	Medium	53	0.5:1	26.5
10E	1160+50	Perennial	Low	73	1:1	73
10F	1160+00	Intermittent	Low	11	1:1	11
10F_1	1162+50	Intermittent	Low	79	1:1	79
10F_2	1163+00	Intermittent	Low	53	1:1	53
10FF	1158+00	Intermittent	Low	136	1:1	136
10J	1156+00	Intermittent	Low	174	1:1	174
10JJ	1158+00	Intermittent	Low	12	1:1	12
10KK	1158+00	Intermittent	Low	200	1:1	200
10L	1145+00	Intermittent	Low	524	1:1	524
10MM	1158+00	Intermittent	Low	25	1:1	25
10MM_1	1158+00	Intermittent	Medium	342	0.5:1	171
10N	1142+50	Intermittent	Low	74	1:1	74
10N_1	1140+50	Intermittent	Low	269	1:1	269
10N_D	1142+50	Intermittent	Low	191	1:1	191
10PP	1158+00	Intermittent	Medium	28	0.5:1	14
10PP_1	1158+00	Intermittent	Medium	80	0.5:1	40
10Q	1109+00	Ephemeral	Low	123	1:1	123
10S	1112+50	Perennial	Low	450	1:1	450
10U	1114+00	Intermittent	Low	176	1:1	176

Table D-1a. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternatives 8 and 9

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
10X	1134+00	Ephemeral	Low	174	1:1	174
11A	1104+00	Intermittent	Low	111	1:1	111
11A_1	1103+50	Perennial	Low	30	1:1	30
11AA	1067+50	Intermittent	Low	343	1:1	343
11C	1103+00	Intermittent	Low	257	1:1	257
11CC	1069+50	Intermittent	Low	18	1:1	18
11D	1102+50	Intermittent	Low	97	1:1	97
11E_D	1097+00	Perennial	Low	915	1:1	915
11E_D2	1092+00	Perennial	Low	46	1:1	46
11G	1095+00	Intermittent	Low	861	1:1	861
11GG	1034+50	Ephemeral	Low	156	1:1	156
11H	1079+50	Intermittent	Low	16	1:1	16
11L	1071+00	Perennial	Medium	51	0.5:1	25.5
11L_2	1071+00	Perennial	Medium	81	0.5:1	40.5
11M	1068+00	Intermittent	Low	4	1:1	4
11M_1	1069+00	Intermittent	Low	211	1:1	211
11M_B	1068+50	Intermittent	Low	31	1:1	31
11R	1014+00	Perennial	Low	99	1:1	99
11R_1	1014+50	Perennial	Low	60	1:1	60
11R_D	1011+00	Intermittent	Low	593	1:1	593
11T	1013+50	Perennial	Low	21	1:1	21
11V	1072+50	Perennial	Low	191	1:1	191
11Y	1060+00	Intermittent	Low	387	1:1	387
12C	0915+00	Perennial	Low	271	1:1	271
12CCC	0923+50	Perennial	Low	213	1:1	213
12F	0918+50	Perennial	Low	33	1:1	33
12FFF	0929+00	Ephemeral	Low	422	1:1	422
12GGG	0906+50	Ephemeral	Low	79	1:1	79
12H	0908+50	Perennial	Low	28	1:1	28
12H_2	0924+00	Perennial	Low	8	1:1	8
12H_3	0926+00	Perennial	Low	286	1:1	286
12H_4	0930+00	Perennial	Low	475	1:1	475
12H_5	0933+50	Perennial	Low	22	1:1	22
12HHH	0906+00	Intermittent	Low	176	1:1	176
12HHHH	0895+50	Intermittent	Low	43	1:1	43
12II	0928+00	Perennial	High	71	0:1	0
12II_4	0938+00	Perennial	High	292	0:1	0
12II_5	0938+00	Perennial	High	91	0:1	0
12JJJ	0906+50	Perennial	Low	28	1:1	28
12K	0910+00	Perennial	Low	60	1:1	60
12K_1	0912+50	Perennial	Low	3	1:1	3
12KK	0943+00	Perennial	Low	489	1:1	489

Table D-1a. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternatives 8 and 9

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
12KKK	0906+50	Intermittent	Low	265	1:1	265
12LL	0951+00	Ephemeral	Low	123	1:1	123
12MM	0967+00	Intermittent	Low	402	1:1	402
12MMM	0907+00	Ephemeral	Low	34	1:1	34
12NNN	0907+50	Intermittent	Low	174	1:1	174
12O	0907+50	Intermittent	Low	167	1:1	167
12O_1	0908+00	Intermittent	Low	84	1:1	84
12OO	0976+50	Perennial	Medium	65	0.5:1	32.5
12OO_1	0976+50	Perennial	Medium	33	0.5:1	16.5
12P	0909+00	Intermittent	Low	44	1:1	44
12PPP	0939+50	Intermittent	Low	74	1:1	74
12QQQ	0939+00	Intermittent	Low	168	1:1	168
12RRR	0946+00	Perennial	Low	29	1:1	29
12S	0923+00	Intermittent	Low	351	1:1	351
12T	0923+50	Intermittent	Low	40	1:1	40
12T_D	0921+50	Intermittent	Low	386	1:1	386
12UUU	0976+00	Perennial	Low	32	1:1	32
12VVV	0931+00	Intermittent	Low	431	1:1	431
12WW	0935+00	Perennial	Low	97	1:1	97
12WW_1	0934+50	Perennial	Low	24	1:1	24
12WW_2	0931+00	Perennial	Low	35	1:1	35
12WWW	0937+00	Intermittent	Low	84	1:1	84
12WWW_1	0935+00	Intermittent	Low	90	1:1	90
12XX	0925+00	Perennial	Medium	100	0.5:1	50
12XX_1	0923+50	Perennial	Medium	15	0.5:1	7.5
12Y	0929+50	Intermittent	Low	18	1:1	18
12Y_D	0929+00	Intermittent	Low	215	1:1	215
12YYY	0934+50	Perennial	Low	843	1:1	843
12YYY_1	0931+00	Perennial	Low	160	1:1	160
12Z	0917+50	Intermittent	Low	113	1:1	113
13A	0807+50	Intermittent	Low	143	1:1	143
13C	0863+00	Intermittent	Low	145	1:1	145
13C_1	0870+00	Intermittent	Low	601	1:1	601
13E	0794+00	Ephemeral	Low	28	1:1	28
13G	0792+00	Intermittent	Low	11	1:1	11
13H	0785+50	Perennial	Low	211	1:1	211
13I	0795+00	Ephemeral	Low	154	1:1	154
13I_1	0796+50	Intermittent	Low	170	1:1	170
13J	0767+00	Intermittent	Low	59	1:1	59
13J_1	0770+00	Intermittent	Low	235	1:1	235
13J_2	0774+00	Intermittent	Low	49	1:1	49
13K	0798+50	Intermittent	Low	158	1:1	158

Table D-1a. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternatives 8 and 9

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
13L	0798+50	Ephemeral	Low	198	1:1	198
13M	0836+00	Perennial	Low	1528	1:1	1528
13M_1	0828+50	Perennial	Low	78	1:1	78
13M_D	0844+50	Intermittent	Low	151	1:1	151
13N	0828+00	Ephemeral	Low	58	1:1	58
13P	0797+00	Perennial	High	100	0:1	0
13P_1	0797+50	Perennial	High	256	0:1	0
13Q	0863+00	Intermittent	Low	519	1:1	519
13R	0849+00	Intermittent	Low	192	1:1	192
13S	0846+00	Intermittent	Low	23	1:1	23
13X_1	0830+00	Perennial	Low	29	1:1	29
13Y	0830+00	Perennial	Low	86	1:1	86
13Z	0869+00	Intermittent	Low	380	1:1	380
14A	0745+00	Intermittent	Medium	9	0.5:1	4.5
14A_1	0745+00	Intermittent	Medium	161	0.5:1	80.5
14E	0745+00	Perennial	Medium	41	0.5:1	20.5
14G	0707+50	Intermittent	Medium	10	0.5:1	5
14G_1	0707+50	Intermittent	Medium	16	0.5:1	8
15A	0664+00	Intermittent	Low	581	1:1	581
15B	0662+50	Intermittent	Low	99	1:1	99
15C	0686+00	Intermittent	Low	14	1:1	14
15D	0685+50	Perennial	Medium	21	0.5:1	10.5
15E	0685+00	Ephemeral	Low	7	1:1	7
16A	0604+00	Perennial	Medium	50	0.5:1	25
16A_1	0597+00	Perennial	Medium	1116	0.5:1	558
16A_2	0589+00	Perennial	Medium	84	0.5:1	42
16D	0599+50	Intermittent	Low	36	1:1	36
16E	0638+00	Intermittent	Low	164	1:1	164
16G	0614+00	Perennial	Medium	172	0.5:1	86
16G_1	0606+00	Perennial	Medium	165	0.5:1	82.5
16G_D	0626+00	Perennial	Medium	56	0.5:1	28
16G_D1	0619+50	Perennial	Medium	141	0.5:1	70.5
16J	0610+50	Ephemeral	Low	42	1:1	42
16J_1	0610+00	Ephemeral	Low	3	1:1	3
17B	0544+00	Ephemeral	Low	50	1:1	50
17BB	0568+00	Intermittent	Medium	31	0.5:1	15.5
17DD	0565+50	Intermittent	Medium	26	0.5:1	13
17F	0588+50	Perennial	Medium	3	0.5:1	1.5
17Y	0558+00	Intermittent	Low	31	1:1	31
17Z	0579+50	Ephemeral	Low	197	1:1	197
18A	0527+00	Intermittent	Low	13	1:1	13
18B	0526+50	Ephemeral	Low	35	1:1	35

Table D-1a. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternatives 8 and 9

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
18C_1	0517+50	Perennial	Medium	20	0.5:1	10
18G	0537+00	Intermittent	Low	5	1:1	5
18I	0509+00	Perennial	Low	5	1:1	5
19B	0436+00	Intermittent	Low	26	1:1	26
19C	0432+00	Perennial	Medium	33	0.5:1	16.5
19F	0434+00	Perennial	Low	104	1:1	104
19F_1	0438+00	Perennial	Low	110	1:1	110
19F_2	0441+00	Perennial	Low	67	1:1	67
19F_3	0454+00	Perennial	Low	59	1:1	59
19F_4	0468+00	Perennial	Low	4	1:1	4
19J_1	0408+00	Perennial	Low	32	1:1	32
19J_2	0410+00	Perennial	Low	67	1:1	67
19K_1	0470+00	Perennial	High	8	0:1	0
19K_2	0491+00	Perennial	Medium	135	0.5:1	67.5
19K_7	0588+50	Perennial	Medium	69	0.5:1	34.5
19K_8	0588+50	Perennial	Medium	71	0.5:1	35.5
19R	0462+50	Intermittent	Low	3	1:1	3
19R_1	0463+50	Intermittent	Low	1	1:1	1
19T	0467+50	Perennial	Low	74	1:1	74
19T_1	0468+50	Perennial	Low	121	1:1	121
19V	0490+00	Perennial	Medium	53	0.5:1	26.5
23G	4799+00	Perennial	Medium	1124	0.5:1	562
23G_1	4805+00	Perennial	Medium	56	0.5:1	28
23Q	4774+50	Intermittent	Medium	256	0.5:1	128
23Q_1	4782+00	Perennial	Medium	61	0.5:1	30.5
23Q_2	4783+50	Perennial	Medium	46	0.5:1	23
23R	4770+00	Perennial	Medium	36	0.5:1	18
23S	4796+00	Intermittent	Medium	33	0.5:1	16.5
Total						**43,551**

Table D-2a. On-Site Stream Mitigation - Middle-Potomac-Catoctin
Alternatives 8 and 9

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
20B	0342+00	Intermittent	Low	19	1:1	19
20D	0324+00	Perennial	Low	438	1:1	438
20E	0332+00	Intermittent	Low	22	1:1	22
21B	0305+00	Perennial	Medium	1024	0.5:1	512
21C	0276+00	Perennial	Medium	2298	0.5:1	1149
21C_1	0245+00	Perennial	Medium	1844	0.5:1	922
21C_2	0233+00	Perennial	Medium	406	0.5:1	203
21D	0225+50	Intermittent	Low	86	1:1	86
21D_1	0227+00	Intermittent	Low	215	1:1	215
21F	0246+00	Intermittent	Low	75	1:1	75
21G	0239+00	Intermittent	Low	57	1:1	57
21H	0247+50	Ephemeral	Low	27	1:1	27
21L_D	0278+50	Perennial	Low	71	1:1	71
21M	0262+50	Intermittent	Low	23	1:1	23
21V	0297+00	Ephemeral	Low	87	1:1	87
22A	0222+00	Intermittent	Low	140	1:1	140
22AA	0224+00	Perennial	Medium	82	0.5:1	41
22AA_1	0200+50	Perennial	Medium	16	0.5:1	8
22AA_2	0200+00	Perennial	Medium	98	0.5:1	49
22AA_3	0198+00	Perennial	Medium	188	0.5:1	94
22B	0219+00	Intermittent	Low	35	1:1	35
22C	0219+00	Intermittent	Low	50	1:1	50
22D	0218+50	Intermittent	Low	144	1:1	144
22EE	0192+00	Ephemeral	Low	45	1:1	45
22FF	0177+00	Ephemeral	Low	34	1:1	34
22H	0198+00	Intermittent	Low	7	1:1	7
22H_1	0198+00	Intermittent	Low	10	1:1	10
22HH	0132+00	Intermittent	Medium	260	0.5:1	130
22HH_1	0129+00	Intermittent	Medium	154	0.5:1	77
22HH_2	0127+50	Intermittent	Medium	117	0.5:1	58.5
22KK	0198+00	Perennial	Low	26	1:1	26
22M_1	0114+00	Perennial	Medium	30	0.5:1	15
22MM	0106+00	Perennial	High	1025	0:1	0
22MM_B	0106+00	Perennial	High	138	0:1	0
22NN	0110+00	Intermittent	Low	275	1:1	275
22NN_B	0109+00	Intermittent	Low	166	1:1	166
22P	0125+00	Intermittent	Medium	9	0.5:1	4.5
22Q	0125+00	Perennial	Medium	136	0.5:1	68
22Q_1	0125+00	Perennial	Medium	61	0.5:1	30.5
22QQ	0113+50	Intermittent	Low	106	1:1	106
22T_D	0128+50	Intermittent	Low	8	1:1	8
22T_D1	0128+50	Intermittent	Low	34	1:1	34
22T_D2	0128+50	Intermittent	Low	92	1:1	92
22V	0118+50	Intermittent	Low	76	1:1	76

Table D-2a. On-Site Stream Mitigation - Middle-Potomac-Catoctin
Alternatives 8 and 9

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
22V_1	0118+50	Intermittent	Low	39	1:1	39
22V_2	0118+50	Intermittent	Low	26	1:1	26
22Z	0198+00	Perennial	Medium	72	0.5:1	36
22Z_1	0197+00	Perennial	Medium	38	0.5:1	19
23A_1	3744+00	Perennial	High	110	0:1	0
23A_3	3758+00	Perennial	High	352	0:1	0
23AA	3749+50	Perennial	Medium	73	0.5:1	36.5
23AA_1	3751+00	Perennial	Medium	210	0.5:1	105
23D	3755+50	Intermittent	Medium	677	0.5:1	338.5
23DD	3701+50	Intermittent	Low	100	1:1	100
23K	3701+00	Perennial	Medium	70	0.5:1	35
23K_D	3688+00	Perennial	Medium	601	0.5:1	300.5
23N	4718+00	Intermittent	Medium	164	0.5:1	82
23N_D	4730+00	Intermittent	Medium	32	0.5:1	16
23V	3722+00	Intermittent	Low	13	1:1	13
24A	3683+00	Perennial	High	33	0:1	0
24A_1	3683+00	Perennial	High	50	0:1	0
24D	3639+50	Perennial	Medium	12	0.5:1	6
24F_2	3627+00	Perennial	High	50	0:1	0
24F_3	3626+00	Perennial	High	35	0:1	0
25F	3582+00	Ephemeral	Low	203	1:1	203
25G	3597+00	Intermittent	Low	125	1:1	125
25L	3597+00	Intermittent	Low	66	1:1	66
26B	3509+00	Intermittent	Medium	37	0.5:1	18.5
26C	3525+00	Intermittent	High	96	0:1	0
26G	3534+00	Ephemeral	Medium	139	0.5:1	69.5
26G_1	3530+50	Intermittent	Medium	418	0.5:1	209
26J	3524+00	Intermittent	Medium	31	0.5:1	15.5
27A	3478+50	Perennial	High	34	0:1	0
27A_1	3480+00	Perennial	High	85	0:1	0
27A_2	3484+00	Perennial	High	59	0:1	0
27B	3479+00	Intermittent	Medium	16	0.5:1	8
27K	3484+00	Ephemeral	Low	41	1:1	41
28B	3340+00	Intermittent	Low	64	1:1	64
29A_2	3340+00	Perennial	High	30	0:1	0
29B	3329+00	Perennial	High	35	0:1	0
29B_1	3329+00	Perennial	High	34	0:1	0
29D_D	3340+00	Intermittent	Low	93	1:1	93
29K	3340+00	Intermittent	Medium	12	0.5:1	6
Total						**7,801**

Table D-3a. On-Site Stream Mitigation - Patuxent
Alternatives 8 and 9

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
4B	1687+50	Intermittent	Low	20	1:1	20
4BBB	1675+00	Perennial	Medium	372	0.5:1	186
4BBB_1	1672+50	Perennial	Medium	40	0.5:1	20
4BBBB	1735+00	Ephemeral	Low	71	1:1	71
4C	1687+00	Ephemeral	Low	42	1:1	42
4E	1694+00	Intermittent	Medium	36	0.5:1	18
4EE	1665+00	Perennial	Low	71	1:1	71
4GG	1745+00	Intermittent	Low	72	1:1	72
4GGG	1667+00	Ephemeral	Low	236	1:1	236
4GGGG	1733+00	Perennial	Low	11	1:1	11
4J	1744+00	Ephemeral	Low	98	1:1	98
4JJJJ	1693+00	Perennial	Low	17	1:1	17
4K	1725+50	Intermittent	Low	15	1:1	15
4L	1724+50	Intermittent	Low	19	1:1	19
4LLLL	1692+50	Ephemeral	Low	87	1:1	87
4M	1718+00	Perennial	High	105	0:1	0
4MMMM	1694+50	Ephemeral	Low	87	1:1	87
4NN	1713+50	Intermittent	Low	37	1:1	37
4NNN_1	1631+50	Intermittent	Medium	42	0.5:1	21
4O	1706+00	Intermittent	Medium	343	0.5:1	171.5
4OO	1712+00	Intermittent	Low	50	1:1	50
4OOOO	1693+50	Intermittent	Medium	72	0.5:1	36
4P	1703+00	Ephemeral	Low	40	1:1	40
4PPPP	1715+00	Perennial	Medium	232	0.5:1	116
4Q	1713+00	Perennial	Medium	144	0.5:1	72
4Q_1	1713+50	Perennial	Medium	51	0.5:1	25.5
4QQ	1708+00	Intermittent	Low	18	1:1	18
4QQQQ	1713+00	Intermittent	Medium	90	0.5:1	45
4RRR	1687+00	Intermittent	Medium	81	0.5:1	40.5
4S	1714+50	Ephemeral	Low	118	1:1	118
4T	1674+50	Intermittent	Low	40	1:1	40
4U	1675+00	Intermittent	Low	78	1:1	78
4UUU	1688+00	Intermittent	Medium	69	0.5:1	34.5
4W	1665+00	Perennial	Medium	36	0.5:1	18
4W_2	1665+50	Perennial	Medium	26	0.5:1	13
4Z_1	1631+50	Perennial	Medium	50	0.5:1	25
4Z_2	1630+50	Perennial	Medium	42	0.5:1	21
4Z_3	1623+00	Perennial	Medium	98	0.5:1	49
5BB	1547+00	Intermittent	Low	108	1:1	108
5F	1619+00	Perennial	Medium	49	0.5:1	24.5
5F_1	1620+50	Perennial	Medium	142	0.5:1	71
5J	1621+00	Intermittent	Low	5	1:1	5
5JJ	1570+00	Ephemeral	Low	10	1:1	10
5KK	1563+00	Intermittent	Low	5	1:1	5
5MM	1555+00	Intermittent	Low	20	1:1	20

Table D-3a. On-Site Stream Mitigation - Patuxent
Alternatives 8 and 9

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
5N	1620+00	Intermittent	Low	122	1:1	122
5O	1596+00	Ephemeral	Low	197	1:1	197
5P	1594+00	Intermittent	Low	144	1:1	144
5Q	1554+50	Perennial	Low	943	1:1	943
5QQ	1551+00	Intermittent	Low	12	1:1	12
5S	1558+00	Perennial	Medium	70	0.5:1	35
5S_1	1558+00	Perennial	Medium	47	0.5:1	23.5
5T	1557+50	Perennial	Low	11	1:1	11
5Y	1549+00	Ephemeral	Low	111	1:1	111
6AA	1480+50	Intermittent	Low	6	1:1	6
6AAA	1527+50	Intermittent	Low	47	1:1	47
6AAA_1	1527+00	Intermittent	Low	33	1:1	33
6AAA_2	1526+00	Intermittent	Low	25	1:1	25
6AAAA	1464+50	Ephemeral	Low	9	1:1	9
6B	1511+00	Perennial	Low	9	1:1	9
6EEE	1457+50	Intermittent	Low	22	1:1	22
6FFFF_1	1526+50	Intermittent	Low	3	1:1	3
6G	1451+50	Perennial	Medium	1	0.5:1	0.5
6G_1	1467+00	Perennial	Medium	1064	0.5:1	532
6G_2	1493+00	Perennial	Medium	672	0.5:1	336
6G_3	1500+00	Perennial	Medium	1063	0.5:1	531.5
6G_6	1555+50	Perennial	Medium	270	0.5:1	135
6GGG	1543+00	Intermittent	Low	112	1:1	112
6GGG_1	1546+50	Intermittent	Low	200	1:1	200
6III	1511+00	Intermittent	Low	409	1:1	409
6J	1509+50	Ephemeral	Low	24	1:1	24
6JJJ	1513+00	Perennial	Low	32	1:1	32
6L	1521+00	Intermittent	Low	13	1:1	13
6LLL	1498+00	Perennial	Low	738	1:1	738
6MM	1539+00	Ephemeral	Low	149	1:1	149
6MMM	1496+00	Perennial	Low	33	1:1	33
6NNN_1	1496+00	Intermittent	Low	30	1:1	30
6RRR	1461+00	Intermittent	Low	52	1:1	52
6RRR_D	1460+00	Intermittent	Low	115	1:1	115
6T	1493+50	Intermittent	Low	59	1:1	59
6TTT	1479+00	Intermittent	Low	211	1:1	211
6UU	1465+00	Intermittent	Medium	35	0.5:1	17.5
6UUU	1478+00	Intermittent	Low	62	1:1	62
6V	1485+50	Ephemeral	Low	185	1:1	185
6WW	1456+50	Intermittent	Medium	61	0.5:1	30.5
6XX	1456+00	Ephemeral	Low	53	1:1	53
6YY	1456+50	Ephemeral	Low	63	1:1	63
7B	1443+50	Ephemeral	Low	482	1:1	482
Total						**8,740**

ALTERNATIVE 9M

Table D-1b. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 9M

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
1D_1	1989+50	Perennial	Medium	121	0.5:1	60.5
1D_2	1987+50	Perennial	Medium	78	0.5:1	39
1G	1994+50	Ephemeral	Low	19	1:1	19
1H	1995+00	Intermittent	Low	2	1:1	2
1H_D	1999+00	Intermittent	Low	625	1:1	625
1O	1929+00	Ephemeral	Low	227	1:1	227
1P	1931+00	Intermittent	Low	178	1:1	178
1Q	1930+00	Perennial	High	56	0:1	0
1Q_1	1927+00	Perennial	High	252	0:1	0
1R	1943+00	Perennial	Medium	482	0.5:1	241
1R_1	1936+00	Perennial	Medium	548	0.5:1	274
1RR	1958+50	Intermittent	Low	26	1:1	26
1SS	1957+00	Ephemeral	Low	317	1:1	317
1TT	1969+00	Intermittent	Low	53	1:1	53
1VV	1973+00	Perennial	Medium	39	0.5:1	19.5
1VV_1	1974+50	Perennial	Medium	18	0.5:1	9
1XX	1975+00	Ephemeral	Medium	136	0.5:1	68
1XX_1	1974+00	Intermittent	Medium	141	0.5:1	70.5
1YY	1972+00	Intermittent	Low	362	1:1	362
2A	1924+50	Ephemeral	Low	170	1:1	170
2AA	1857+00	Intermittent	Low	50	1:1	50
2D	1917+00	Ephemeral	Low	13	1:1	13
2E	1916+50	Intermittent	Low	77	1:1	77
2F	1901+00	Intermittent	Medium	669	0.5:1	334.5
2F_D	1896+00	Intermittent	Medium	499	0.5:1	249.5
2H	1870+00	Intermittent	Low	53	1:1	53
2HH	1902+50	Intermittent	Low	52	1:1	52
2I	1871+00	Intermittent	Low	244	1:1	244
2J	1864+50	Perennial	Medium	44	0.5:1	22
2J_1	1863+00	Perennial	Medium	30	0.5:1	15
2JJ	1917+00	Intermittent	Low	73	1:1	73
2L	1862+00	Intermittent	Medium	313	0.5:1	156.5
2MM	1904+00	Perennial	Medium	4	0.5:1	2
2OO	1915+00	Ephemeral	Low	33	1:1	33
2R	1870+00	Perennial	Medium	27	0.5:1	13.5
2T	1874+00	Intermittent	Medium	989	0.5:1	494.5
2V	1857+50	Perennial	Medium	16	0.5:1	8
2VV	1921+00	Intermittent	Low	17	1:1	17
2W	1914+00	Intermittent	Low	451	1:1	451
2X	1916+50	Perennial	Medium	16	0.5:1	8
2X_1	1916+50	Perennial	Medium	203	0.5:1	101.5
2Y	1928+00	Perennial	Low	241	1:1	241

Table D-1b. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 9M

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
2Y_1	1926+00	Perennial	Low	388	1:1	388
2YY	1921+00	Intermittent	Low	51	1:1	51
3A	1836+00	Perennial	Medium	44	0.5:1	22
3AA_1	1803+00	Perennial	Low	40	1:1	40
3BB	1804+00	Ephemeral	Low	120	1:1	120
3BBB	1804+00	Intermittent	Low	41	1:1	41
3CC	1819+50	Intermittent	Low	303	1:1	303
3D	1822+50	Perennial	Medium	45	0.5:1	22.5
3D_1	1820+50	Perennial	Medium	87	0.5:1	43.5
3DD	1821+00	Perennial	Medium	45	0.5:1	22.5
3F	1801+50	Ephemeral	Low	244	1:1	244
3FFF	1804+50	Intermittent	Low	52	1:1	52
3FFF_D	1805+00	Intermittent	Low	66	1:1	66
3H	1823+00	Intermittent	Low	102	1:1	102
3I	1818+00	Intermittent	Low	551	1:1	551
3JJ	1758+00	Intermittent	Low	321	1:1	321
3L	1792+50	Perennial	Medium	35	0.5:1	17.5
3L_1	1793+50	Perennial	Medium	38	0.5:1	19
3LL	1754+50	Intermittent	Low	92	1:1	92
3LL_1	1759+00	Intermittent	Low	521	1:1	521
3LLL	1794+00	Ephemeral	Low	16	1:1	16
3PP	1764+00	Ephemeral	Low	87	1:1	87
3Q	1790+00	Ephemeral	Low	73	1:1	73
3RR	1764+00	Ephemeral	Low	206	1:1	206
3S	1792+50	Perennial	Medium	183	0.5:1	91.5
3SS	1792+50	Intermittent	Low	9	1:1	9
3U	1789+50	Intermittent	Low	44	1:1	44
3UU	1817+00	Intermittent	Low	6	1:1	6
3ZZ	1764+00	Perennial	Medium	95	0.5:1	47.5
4H	1754+00	Ephemeral	Low	331	1:1	331
4YYY	1755+00	Intermittent	Low	35	1:1	35
7AA	1347+00	Intermittent	Low	102	1:1	102
7BB	1395+00	Intermittent	Low	56	1:1	56
7BB_1	1394+00	Intermittent	Low	76	1:1	76
7BB_D	1397+00	Intermittent	Low	518	1:1	518
7D	1425+50	Intermittent	Low	27	1:1	27
7E	1424+00	Perennial	Low	327	1:1	327
7F	1422+50	Intermittent	Low	32	1:1	32
7G	1431+50	Perennial	Medium	20	0.5:1	10
7G_1	1428+00	Perennial	Medium	484	0.5:1	242
7GG	1409+50	Intermittent	Low	255	1:1	255
7H	1427+00	Intermittent	Low	373	1:1	373

Table D-1b. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 9M

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
7I	1410+00	Intermittent	Medium	37	0.5:1	18.5
7JJ	1411+50	Perennial	Medium	11	0.5:1	5.5
7JJ_1	1411+00	Perennial	Medium	7	0.5:1	3.5
7MM	1347+00	Intermittent	Low	150	1:1	150
7N	1396+50	Perennial	Low	218	1:1	218
7N_1	1394+50	Perennial	Low	76	1:1	76
7NN	1347+00	Ephemeral	Low	134	1:1	134
7O	1393+00	Perennial	Low	53	1:1	53
7O_1	1394+00	Perennial	Low	41	1:1	41
7PP	1347+00	Intermittent	Low	35	1:1	35
7S	1347+00	Perennial	Medium	128	0.5:1	64
7T	1424+00	Perennial	Low	17	1:1	17
7T_1	1425+00	Perennial	Low	207	1:1	207
7V	1429+00	Ephemeral	Low	46	1:1	46
8A	1334+50	Intermittent	Low	186	1:1	186
8E	1338+50	Intermittent	Low	106	1:1	106
8F	1336+00	Intermittent	Low	70	1:1	70
8G_1	1339+00	Intermittent	Low	47	1:1	47
8HH	1347+00	Intermittent	Medium	133	0.5:1	66.5
8I	1337+50	Ephemeral	Low	45	1:1	45
8J	1328+50	Intermittent	Low	181	1:1	181
8J_2	1333+50	Perennial	Medium	29	0.5:1	14.5
8MM	1334+00	Intermittent	Low	41	1:1	41
8N	1330+00	Intermittent	Medium	112	0.5:1	56
8N_1	1332+00	Perennial	Medium	319	0.5:1	159.5
8N_D	1329+50	Intermittent	Medium	51	0.5:1	25.5
8R_D1	1282+50	Intermittent	Low	347	1:1	347
8S	1292+00	Ephemeral	Low	137	1:1	137
8S_1	1289+00	Ephemeral	Low	7	1:1	7
8T	1289+00	Ephemeral	Low	118	1:1	118
8V	1310+00	Intermittent	Low	46	1:1	46
8W	1347+00	Intermittent	Medium	211	0.5:1	105.5
8W_1	1347+00	Intermittent	Medium	502	0.5:1	251
8Z	1347+00	Perennial	Medium	60	0.5:1	30
9A	1290+00	Intermittent	Low	141	1:1	141
9C	1289+00	Intermittent	Low	196	1:1	196
9CC	1227+00	Perennial	Low	325	1:1	325
9F	1186+00	Intermittent	Low	292	1:1	292
9FF	1229+00	Ephemeral	Low	103	1:1	103
9G	1184+50	Perennial	Medium	133	0.5:1	66.5
9G_1	1184+50	Perennial	Medium	50	0.5:1	25
9GG	1228+00	Intermittent	Low	5	1:1	5

Table D-1b. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 9M

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
9J	1203+00	Perennial	Medium	49	0.5:1	24.5
9JJ	1242+50	Perennial	Medium	407	0.5:1	203.5
9LL	1245+00	Ephemeral	Low	32	1:1	32
9M	1204+00	Intermittent	Low	308	1:1	308
9M_D	1208+00	Intermittent	Low	419	1:1	419
9MM	1244+00	Intermittent	Low	106	1:1	106
9P	1202+00	Ephemeral	Low	198	1:1	198
9QQ	1200+50	Intermittent	Low	99	1:1	99
9QQ_1	1199+50	Ephemeral	Low	89	1:1	89
9R	1289+50	Intermittent	Low	589	1:1	589
9RR	1204+00	Intermittent	Low	456	1:1	456
9RR_1	1206+00	Ephemeral	Low	113	1:1	113
9T	1264+00	Intermittent	Low	18	1:1	18
9T_1	1263+00	Perennial	Low	78	1:1	78
9VV	1225+00	Intermittent	Low	119	1:1	119
9Y	1240+50	Perennial	Medium	61	0.5:1	30.5
9Y_1	1240+00	Perennial	Medium	33	0.5:1	16.5
9Z	1240+50	Intermittent	Low	31	1:1	31
10AA	1115+00	Perennial	Low	265	1:1	265
10B_1	1163+50	Intermittent	Low	48	1:1	48
10BB	1119+00	Perennial	Low	586	1:1	586
10C	1163+50	Perennial	Medium	101	0.5:1	50.5
10C_1	1165+50	Perennial	Medium	53	0.5:1	26.5
10E	1160+50	Perennial	Low	73	1:1	73
10F	1160+00	Intermittent	Low	11	1:1	11
10F_1	1162+50	Intermittent	Low	79	1:1	79
10F_2	1163+00	Intermittent	Low	53	1:1	53
10FF	1158+00	Intermittent	Low	136	1:1	136
10J	1156+00	Intermittent	Low	174	1:1	174
10JJ	1158+00	Intermittent	Low	12	1:1	12
10KK	1158+00	Intermittent	Low	200	1:1	200
10L	1145+00	Intermittent	Low	524	1:1	524
10MM	1158+00	Intermittent	Low	25	1:1	25
10MM_1	1158+00	Intermittent	Medium	342	0.5:1	171
10N	1142+50	Intermittent	Low	74	1:1	74
10N_1	1140+50	Intermittent	Low	269	1:1	269
10N_D	1142+50	Intermittent	Low	191	1:1	191
10PP	1158+00	Intermittent	Medium	28	0.5:1	14
10PP_1	1158+00	Intermittent	Medium	80	0.5:1	40
10Q	1109+00	Ephemeral	Low	123	1:1	123
10S	1112+50	Perennial	Low	450	1:1	450
10U	1114+00	Intermittent	Low	176	1:1	176

Table D-1b. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 9M

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
10X	1134+00	Ephemeral	Low	174	1:1	174
11A	1104+00	Intermittent	Low	111	1:1	111
11A_1	1103+50	Perennial	Low	30	1:1	30
11AA	1067+50	Intermittent	Low	343	1:1	343
11C	1103+00	Intermittent	Low	257	1:1	257
11CC	1069+50	Intermittent	Low	18	1:1	18
11D	1102+50	Intermittent	Low	97	1:1	97
11E_D	1097+00	Perennial	Low	915	1:1	915
11E_D2	1092+00	Perennial	Low	46		46
11G	1095+00	Intermittent	Low	861	1:1	861
11GG	1034+50	Ephemeral	Low	156	1:1	156
11H	1079+50	Intermittent	Low	16	1:1	16
11L	1071+00	Perennial	Medium	51	0.5:1	25.5
11L_2	1071+00	Perennial	Medium	81	0.5:1	40.5
11M	1068+00	Intermittent	Low	4	1:1	4
11M_1	1069+00	Intermittent	Low	211	1:1	211
11M_B	1068+50	Intermittent	Low	31	1:1	31
11R	1014+00	Perennial	Low	99	1:1	99
11R_1	1014+50	Perennial	Low	60	1:1	60
11R_D	1011+00	Intermittent	Low	593	1:1	593
11T	1013+50	Perennial	Low	21	1:1	21
11V	1072+50	Perennial	Low	191	1:1	191
11Y	1060+00	Intermittent	Low	387	1:1	387
12C	0915+00	Perennial	Low	276	1:1	276
12CCC	0923+50	Perennial	Low	213	1:1	213
12F	0918+50	Perennial	Low	33	1:1	33
12FFF	0929+00	Ephemeral	Low	422	1:1	422
12GGG	0906+50	Ephemeral	Low	78	1:1	78
12H	0908+50	Perennial	Low	28	1:1	28
12H_2	0924+00	Perennial	Low	8	1:1	8
12H_3	0926+00	Perennial	Low	286	1:1	286
12H_4	0930+00	Perennial	Low	475	1:1	475
12H_5	0933+50	Perennial	Low	22	1:1	22
12HHH	0906+00	Intermittent	Low	176	1:1	176
12HHHH	0895+50	Intermittent	Low	43	1:1	43
12II	0928+00	Perennial	High	71	0:1	0
12II_4	0938+00	Perennial	High	292	0:1	0
12II_5	0938+00	Perennial	High	84	0:1	0
12JJJ	0906+50	Perennial	Low	28	1:1	28
12K	0910+00	Perennial	Low	59	1:1	59
12K_1	0912+50	Perennial	Low	3	1:1	3
12KK	0943+00	Perennial	Low	489	1:1	489

Table D-1b. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 9M

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
12KKK	0906+50	Intermittent	Low	265	1:1	265
12LL	0951+00	Ephemeral	Low	123	1:1	123
12MM	0967+00	Intermittent	Low	402	1:1	402
12MMM	0907+00	Ephemeral	Low	34	1:1	34
12NNN	0907+50	Intermittent	Low	174	1:1	174
12O	0907+50	Intermittent	Low	167	1:1	167
12O_1	0908+00	Intermittent	Low	79	1:1	79
12OO	0976+50	Perennial	Medium	65	0.5:1	32.5
12OO_1	0976+50	Perennial	Medium	33	0.5:1	16.5
12P	0909+00	Intermittent	Low	44	1:1	44
12PPP	0939+50	Intermittent	Low	75	1:1	75
12QQQ	0939+00	Intermittent	Low	167	1:1	167
12RRR	0946+00	Perennial	Low	29	1:1	29
12S	0923+00	Intermittent	Low	343	1:1	343
12T	0923+50	Intermittent	Low	40	1:1	40
12T_D	0921+50	Intermittent	Low	386	1:1	386
12UUU	0976+00	Perennial	Low	32	1:1	32
12VVV	0931+00	Intermittent	Low	433	1:1	433
12WW	0935+00	Perennial	Low	97	1:1	97
12WW_1	0934+50	Perennial	Low	24	1:1	24
12WW_2	0931+00	Perennial	Low	35	1:1	35
12WWW	0937+00	Intermittent	Low	84	1:1	84
12WWW_1	0935+00	Intermittent	Low	90	1:1	90
12XX	0925+00	Perennial	Medium	100	0.5:1	50
12XX_1	0923+50	Perennial	Medium	14	0.5:1	7
12Y	0929+50	Intermittent	Low	18	1:1	18
12Y_D	0929+00	Intermittent	Low	215	1:1	215
12YYY	0934+50	Perennial	Low	843	1:1	843
12YYY_1	0931+00	Perennial	Low	160	1:1	160
12Z	0917+50	Intermittent	Low	113	1:1	113
13A	0807+50	Intermittent	Low	122	1:1	122
13C	0863+00	Intermittent	Low	147	1:1	147
13C_1	0870+00	Intermittent	Low	615	1:1	615
13E	0794+00	Ephemeral	Low	27	1:1	27
13G	0792+00	Intermittent	Low	11	1:1	11
13H	0785+50	Perennial	Low	210	1:1	210
13I	0795+00	Ephemeral	Low	154	1:1	154
13I_1	0796+50	Intermittent	Low	170	1:1	170
13J	0767+00	Intermittent	Low	63	1:1	63
13J_1	0770+00	Intermittent	Low	210	1:1	210
13J_2	0774+00	Intermittent	Low	83	1:1	83
13K	0798+50	Intermittent	Low	116	1:1	116

Table D-1b. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 9M

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
13L	0798+50	Ephemeral	Low	197	1:1	197
13M	0836+00	Perennial	Low	1518	1:1	1518
13M_1	0828+50	Perennial	Low	66	1:1	66
13M_D	0844+50	Intermittent	Low	152	1:1	152
13N	0828+00	Ephemeral	Low	65	1:1	65
13P	0797+00	Perennial	High	62	0:1	0
13P_1	0797+50	Perennial	High	231	0:1	0
13Q	0863+00	Intermittent	Low	519	1:1	519
13R	0849+00	Intermittent	Low	167	1:1	167
13X_1	0830+00	Perennial	Low	14	1:1	14
13Y	0830+00	Perennial	Low	72	1:1	72
13Z	0869+00	Intermittent	Low	384	1:1	384
14A	0745+00	Intermittent	Medium	2	0.5:1	1
14A_1	0745+00	Intermittent	Medium	162	0.5:1	81
14E	0745+00	Perennial	Medium	53	0.5:1	26.5
14G	0707+50	Intermittent	Medium	9	0.5:1	4.5
14G_1	0707+50	Intermittent	Medium	16	0.5:1	8
15A	0664+00	Intermittent	Low	578	1:1	578
15B	0662+50	Intermittent	Low	104	1:1	104
15D	0685+50	Perennial	Medium	8	0.5:1	4
16A	0604+00	Perennial	Medium	38	0.5:1	19
16A_1	0597+00	Perennial	Medium	1116	0.5:1	558
16A_2	0589+00	Perennial	Medium	84	0.5:1	42
16D	0599+50	Intermittent	Low	29	1:1	29
16E	0638+00	Intermittent	Low	153	1:1	153
16F	0626+50	Ephemeral	Low	21	1:1	21
16G	0614+00	Perennial	Medium	136	0.5:1	68
16G_1	0606+00	Perennial	Medium	148	0.5:1	74
16G_D	0626+00	Perennial	Medium	56	0.5:1	28
16G_D1	0619+50	Perennial	Medium	141	0.5:1	70.5
16J	0610+50	Ephemeral	Low	7	1:1	7
16J_1	0610+00	Ephemeral	Low	3	1:1	3
17B	0544+00	Ephemeral	Low	50	1:1	50
17BB	0568+00	Intermittent	Medium	31	0.5:1	15.5
17DD	0565+50	Intermittent	Medium	3	0.5:1	1.5
17Y	0558+00	Intermittent	Low	31	1:1	31
17Z	0579+50	Ephemeral	Low	177	1:1	177
18A	0527+00	Intermittent	Low	13	1:1	13
18B	0526+50	Ephemeral	Low	38	1:1	38
18C_1	0517+50	Perennial	Medium	20	0.5:1	10
18G	0537+00	Intermittent	Low	5	1:1	5
18I	0509+00	Perennial	Low	5	1:1	5

Table D-1b. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 9M

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
19B	0436+00	Intermittent	Low	26	1:1	26
19C	0432+00	Perennial	Medium	33	0.5:1	16.5
19F	0434+00	Perennial	Low	104	1:1	104
19F_1	0438+00	Perennial	Low	110	1:1	110
19F_2	0441+00	Perennial	Low	67	1:1	67
19F_3	0454+00	Perennial	Low	59	1:1	59
19F_4	0468+00	Perennial	Low	4	1:1	4
19J_1	0408+00	Perennial	Low	33	1:1	33
19J_2	0410+00	Perennial	Low	61	1:1	61
19K_1	0470+00	Perennial	High	8	0:1	0
19K_2	0491+00	Perennial	Medium	135	0.5:1	67.5
19K_7	0588+50	Perennial	Medium	46	0.5:1	23
19K_8	0588+50	Perennial	Medium	47	0.5:1	23.5
19R	0462+50	Intermittent	Low	3	1:1	3
19R_1	0463+50	Intermittent	Low	1	1:1	1
19T	0467+50	Perennial	Low	74	1:1	74
19T_1	0468+50	Perennial	Low	121	1:1	121
19V	0490+00	Perennial	Medium	39	0.5:1	19.5
23G	4799+00	Perennial	Medium	1131	0.5:1	565.5
23G_1	4805+00	Perennial	Medium	55	0.5:1	27.5
23Q	4774+50	Intermittent	Medium	234	0.5:1	117
23Q_1	4782+00	Perennial	Medium	58	0.5:1	29
23Q_2	4783+50	Perennial	Medium	43	0.5:1	21.5
23R	4770+00	Perennial	Medium	10	0.5:1	5
23S	4796+00	Intermittent	Medium	17	0.5:1	8.5
Total						**43,234**

Table D-2b. On-Site Stream Mitigation - Middle-Potomac-Catoctin
Alternative 9M

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
20B	0342+00	Intermittent	Low	21	1:1	21
20D	0324+00	Perennial	Low	438	1:1	438
20E	0332+00	Intermittent	Low	22	1:1	22
21B	0305+00	Perennial	Medium	965	0.5:1	482.5
21C	0276+00	Perennial	Medium	2298	0.5:1	1149
21C_1	0245+00	Perennial	Medium	1844	0.5:1	922
21C_2	0233+00	Perennial	Medium	406	0.5:1	203
21D	0225+50	Intermittent	Low	86	1:1	86
21D_1	0227+00	Intermittent	Low	215	1:1	215
21F	0246+00	Intermittent	Low	75	1:1	75
21G	0239+00	Intermittent	Low	57	1:1	57
21H	0247+50	Ephemeral	Low	27	1:1	27
21L_D	0278+50	Perennial	Low	71	1:1	71
21M	0262+50	Intermittent	Low	23	1:1	23
21V	0297+00	Ephemeral	Low	87	1:1	87
22A	0222+00	Intermittent	Low	140	1:1	140
22AA	0224+00	Perennial	Medium	82	0.5:1	41
22AA_1	0200+50	Perennial	Medium	16	0.5:1	8
22AA_2	0200+00	Perennial	Medium	98	0.5:1	49
22AA_3	0198+00	Perennial	Medium	188	0.5:1	94
22B	0219+00	Intermittent	Low	35	1:1	35
22C	0219+00	Intermittent	Low	50	1:1	50
22D	0218+50	Intermittent	Low	144	1:1	144
22EE	0192+00	Ephemeral	Low	45	1:1	45
22FF	0177+00	Ephemeral	Low	34	1:1	34
22H	0198+00	Intermittent	Low	7	1:1	7
22H_1	0198+00	Intermittent	Low	10	1:1	10
22HH	0132+00	Intermittent	Medium	260	0.5:1	130
22HH_1	0129+00	Intermittent	Medium	154	0.5:1	77
22HH_2	0127+50	Intermittent	Medium	117	0.5:1	58.5
22KK	0198+00	Perennial	Low	26	1:1	26
22M_1	0114+00	Perennial	Medium	30	0.5:1	15
22MM	0106+00	Perennial	High	1025	0:1	0
22MM_B	0106+00	Perennial	High	138	0:1	0
22NN	0110+00	Intermittent	Low	275	1:1	275
22NN_B	0109+00	Intermittent	Low	166	1:1	166
22P	0125+00	Intermittent	Medium	9	0.5:1	4.5
22Q	0125+00	Perennial	Medium	136	0.5:1	68
22Q_1	0125+00	Perennial	Medium	61	0.5:1	30.5
22QQ	0113+50	Intermittent	Low	106	1:1	106
22T_D	0128+50	Intermittent	Low	8	1:1	8
22T_D1	0128+50	Intermittent	Low	34	1:1	34
22T_D2	0128+50	Intermittent	Low	92	1:1	92
22V	0118+50	Intermittent	Low	76	1:1	76

Table D-2b. On-Site Stream Mitigation - Middle-Potomac-Catoctin
Alternative 9M

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
22V_1	0118+50	Intermittent	Low	39	1:1	39
22V_2	0118+50	Intermittent	Low	26	1:1	26
22Z	0198+00	Perennial	Medium	72	0.5:1	36
22Z_1	0197+00	Perennial	Medium	38	0.5:1	19
23A_1	3744+00	Perennial	High	110	0:1	0
23A_3	3758+00	Perennial	High	363	0:1	0
23AA	3749+50	Perennial	Medium	76	0.5:1	38
23AA_1	3751+00	Perennial	Medium	202	0.5:1	101
23D	3755+50	Intermittent	Medium	700	0.5:1	350
23DD	3701+50	Intermittent	Low	97	1:1	97
23K	3701+00	Perennial	Medium	70	0.5:1	35
23K_D	3688+00	Perennial	Medium	640	0.5:1	320
23N	4718+00	Intermittent	Medium	164	0.5:1	82
23N_D	4730+00	Intermittent	Medium	32	0.5:1	16
23V	3722+00	Intermittent	Low	25	1:1	25
24A	3683+00	Perennial	High	33	0:1	0
24A_1	3683+00	Perennial	High	50	0:1	0
24D	3639+50	Perennial	Medium	15	0.5:1	7.5
24F_2	3627+00	Perennial	High	50	0:1	0
24F_3	3626+00	Perennial	High	35	0:1	0
25F	3582+00	Ephemeral	Low	208	1:1	208
25G	3597+00	Intermittent	Low	133	1:1	133
25L	3597+00	Intermittent	Low	42	1:1	42
26B	3509+00	Intermittent	Medium	43	0.5:1	21.5
26C	3525+00	Intermittent	High	99	0:1	0
26G	3534+00	Ephemeral	Medium	140	0.5:1	70
26G_1	3530+50	Intermittent	Medium	406	0.5:1	203
26J	3524+00	Intermittent	Medium	31	0.5:1	15.5
27A	3478+50	Perennial	High	34	0:1	0
27A_1	3480+00	Perennial	High	85	0:1	0
27A_2	3484+00	Perennial	High	59	0:1	0
27B	3479+00	Intermittent	Medium	16	0.5:1	8
27D	3476+00	Intermittent	Medium	10	0.5:1	5
27K	3484+00	Ephemeral	Low	41	1:1	41
28B	3340+00	Intermittent	Low	89	1:1	89
29A_1	3340+00	Perennial	Medium	19	0.5:1	9.5
29A_2	3340+00	Perennial	High	30	0:1	0
29B	3329+00	Perennial	High	35	0:1	0
29B_1	3329+00	Perennial	High	34	0:1	0
29D_D	3340+00	Intermittent	Low	118	1:1	118
29K	3340+00	Intermittent	Medium	12	0.5:1	6
Total						**7,863**

Table D-3b. On-Site Stream Mitigation - Patuxent
Alternative 9M

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
4B	1687+50	Intermittent	Low	20	1:1	20
4BBB	1675+00	Perennial	Medium	372	0.5:1	186
4BBB_1	1672+50	Perennial	Medium	40	0.5:1	20
4BBBB	1735+00	Ephemeral	Low	71	1:1	71
4C	1687+00	Ephemeral	Low	42	1:1	42
4E	1694+00	Intermittent	Medium	36	0.5:1	18
4EE	1665+00	Perennial	Low	71	1:1	71
4GG	1745+00	Intermittent	Low	72	1:1	72
4GGG	1667+00	Ephemeral	Low	236	1:1	236
4GGGG	1733+00	Perennial	Low	11	1:1	11
4J	1744+00	Ephemeral	Low	98	1:1	98
4JJJJ	1693+00	Perennial	Low	17	1:1	17
4K	1725+50	Intermittent	Low	15	1:1	15
4L	1724+50	Intermittent	Low	19	1:1	19
4LLLL	1692+50	Ephemeral	Low	87	1:1	87
4M	1718+00	Perennial	High	105	0:1	0
4MMMM	1694+50	Ephemeral	Low	87	1:1	87
4NN	1713+50	Intermittent	Low	37	1:1	37
4NNN_1	1631+50	Intermittent	Medium	42	0.5:1	21
4O	1706+00	Intermittent	Medium	343	0.5:1	171.5
4OO	1712+00	Intermittent	Low	50	1:1	50
4OOOO	1693+50	Intermittent	Medium	72	0.5:1	36
4P	1703+00	Ephemeral	Low	40	1:1	40
4PPPP	1715+00	Perennial	Medium	232	0.5:1	116
4Q	1713+00	Perennial	Medium	144	0.5:1	72
4Q_1	1713+50	Perennial	Medium	51	0.5:1	25.5
4QQ	1708+00	Intermittent	Low	18	1:1	18
4QQQQ	1713+00	Intermittent	Medium	90	0.5:1	45
4RRR	1687+00	Intermittent	Medium	81	0.5:1	40.5
4S	1714+50	Ephemeral	Low	118	1:1	118
4T	1674+50	Intermittent	Low	40	1:1	40
4U	1675+00	Intermittent	Low	78	1:1	78
4UUU	1688+00	Intermittent	Medium	69	0.5:1	34.5
4W	1665+00	Perennial	Medium	36	0.5:1	18
4W_2	1665+50	Perennial	Medium	26	0.5:1	13
4Z_1	1631+50	Perennial	Medium	50	0.5:1	25
4Z_2	1630+50	Perennial	Medium	42	0.5:1	21
4Z_3	1623+00	Perennial	Medium	98	0.5:1	49
5BB	1547+00	Intermittent	Low	108	1:1	108
5F	1619+00	Perennial	Medium	49	0.5:1	24.5
5F_1	1620+50	Perennial	Medium	142	0.5:1	71
5J	1621+00	Intermittent	Low	5	1:1	5
5JJ	1570+00	Ephemeral	Low	10	1:1	10
5KK	1563+00	Intermittent	Low	5	1:1	5
5MM	1555+00	Intermittent	Low	20	1:1	20

ALTERNATIVE 9M: ONSITE STREAM MITIGATION

Table D-3b. On-Site Stream Mitigation - Patuxent

Alternative 9M

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
5N	1620+00	Intermittent	Low	122	1:1	122
5O	1596+00	Ephemeral	Low	197	1:1	197
5P	1594+00	Intermittent	Low	144	1:1	144
5Q	1554+50	Perennial	Low	943	1:1	943
5QQ	1551+00	Intermittent	Low	12	1:1	12
5S	1558+00	Perennial	Medium	70	0.5:1	35
5S_1	1558+00	Perennial	Medium	47	0.5:1	23.5
5T	1557+50	Perennial	Low	11	1:1	11
5Y	1549+00	Ephemeral	Low	111	1:1	111
6AA	1480+50	Intermittent	Low	6	1:1	6
6AAA	1527+50	Intermittent	Low	47	1:1	47
6AAA_1	1527+00	Intermittent	Low	33	1:1	33
6AAA_2	1526+00	Intermittent	Low	25	1:1	25
6AAAA	1464+50	Ephemeral	Low	9	1:1	9
6B	1511+00	Perennial	Low	9	1:1	9
6EEE	1457+50	Intermittent	Low	22	1:1	22
6FFFF_1	1526+50	Intermittent	Low	3	1:1	3
6G	1451+50	Perennial	Medium	1	0.5:1	0.5
6G_1	1467+00	Perennial	Medium	1064	0.5:1	532
6G_2	1493+00	Perennial	Medium	672	0.5:1	336
6G_3	1500+00	Perennial	Medium	1063	0.5:1	531.5
6G_6	1555+50	Perennial	Medium	270	0.5:1	135
6GGG	1543+00	Intermittent	Low	112	1:1	112
6GGG_1	1546+50	Intermittent	Low	200	1:1	200
6III	1511+00	Intermittent	Low	409	1:1	409
6J	1509+50	Ephemeral	Low	24	1:1	24
6JJJ	1513+00	Perennial	Low	32	1:1	32
6L	1521+00	Intermittent	Low	13	1:1	13
6LLL	1498+00	Perennial	Low	738	1:1	738
6MM	1539+00	Ephemeral	Low	149	1:1	149
6MMM	1496+00	Perennial	Low	33	1:1	33
6NNN_1	1496+00	Intermittent	Low	30	1:1	30
6RRR	1461+00	Intermittent	Low	52	1:1	52
6RRR_D	1460+00	Intermittent	Low	115	1:1	115
6T	1493+50	Intermittent	Low	59	1:1	59
6TTT	1479+00	Intermittent	Low	211	1:1	211
6UU	1465+00	Intermittent	Medium	35	0.5:1	17.5
6UUU	1478+00	Intermittent	Low	62	1:1	62
6V	1485+50	Ephemeral	Low	185	1:1	185
6WW	1456+50	Intermittent	Medium	61	0.5:1	30.5
6XX	1456+00	Ephemeral	Low	53	1:1	53
6YY	1456+50	Ephemeral	Low	63	1:1	63
7B	1443+50	Ephemeral	Low	482	1:1	482
Total						**8,740**

ALTERNATIVE 10

Table D-1c. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 10

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
1D_1	1989+50	Perennial	Medium	121	0.5:1	60.5
1D_2	1987+50	Perennial	Medium	78	0.5:1	39
1G	1994+50	Ephemeral	Low	19	1:1	19
1H	1995+00	Intermittent	Low	2	1:1	2
1H_D	1999+00	Intermittent	Low	625	1:1	625
1O	1929+00	Ephemeral	Low	227	1:1	227
1P	1931+00	Intermittent	Low	178	1:1	178
1Q	1930+00	Perennial	High	56	0:1	0
1Q_1	1927+00	Perennial	High	252	0:1	0
1R	1943+00	Perennial	Medium	482	0.5:1	241
1R_1	1936+00	Perennial	Medium	548	0.5:1	274
1RR	1958+50	Intermittent	Low	26	1:1	26
1SS	1957+00	Ephemeral	Low	317	1:1	317
1TT	1969+00	Intermittent	Low	53	1:1	53
1VV	1973+00	Perennial	Medium	39	0.5:1	19.5
1VV_1	1974+50	Perennial	Medium	18	0.5:1	9
1XX	1975+00	Ephemeral	Medium	136	0.5:1	68
1XX_1	1974+00	Intermittent	Medium	141	0.5:1	70.5
1YY	1972+00	Intermittent	Low	362	1:1	362
2A	1924+50	Ephemeral	Low	170	1:1	170
2AA	1857+00	Intermittent	Low	50	1:1	50
2D	1917+00	Ephemeral	Low	13	1:1	13
2E	1916+50	Intermittent	Low	77	1:1	77
2F	1901+00	Intermittent	Medium	669	0.5:1	334.5
2F_D	1896+00	Intermittent	Medium	499	0.5:1	249.5
2H	1870+00	Intermittent	Low	53	1:1	53
2HH	1902+50	Intermittent	Low	52	1:1	52
2I	1871+00	Intermittent	Low	244	1:1	244
2J	1864+50	Perennial	Medium	44	0.5:1	22
2J_1	1863+00	Perennial	Medium	30	0.5:1	15
2JJ	1917+00	Intermittent	Low	73	1:1	73
2L	1862+00	Intermittent	Medium	313	0.5:1	156.5
2MM	1904+00	Perennial	Medium	4	0.5:1	2
2OO	1915+00	Ephemeral	Low	33	1:1	33
2R	1870+00	Perennial	Medium	27	0.5:1	13.5
2T	1874+00	Intermittent	Medium	989	0.5:1	494.5
2V	1857+50	Perennial	Medium	16	0.5:1	8
2VV	1921+00	Intermittent	Low	17	1:1	17
2W	1914+00	Intermittent	Low	451	1:1	451
2X	1916+50	Perennial	Medium	16	0.5:1	8
2X_1	1916+50	Perennial	Medium	203	0.5:1	101.5
2Y	1928+00	Perennial	Low	241	1:1	241

Table D-1c. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 10

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
2Y_1	1926+00	Perennial	Low	388	1:1	388
2YY	1921+00	Intermittent	Low	51	1:1	51
3A	1836+00	Perennial	Medium	44	0.5:1	22
3AA_1	1803+00	Perennial	Low	40	1:1	40
3BB	1804+00	Ephemeral	Low	120	1:1	120
3BBB	1804+00	Intermittent	Low	41	1:1	41
3CC	1819+50	Intermittent	Low	303	1:1	303
3D	1822+50	Perennial	Medium	45	0.5:1	22.5
3D_1	1820+50	Perennial	Medium	87	0.5:1	43.5
3DD	1821+00	Perennial	Medium	45	0.5:1	22.5
3F	1801+50	Ephemeral	Low	244	1:1	244
3FFF	1804+50	Intermittent	Low	52	1:1	52
3FFF_D	1805+00	Intermittent	Low	66	1:1	66
3H	1823+00	Intermittent	Low	102	1:1	102
3I	1818+00	Intermittent	Low	551	1:1	551
3JJ	1758+00	Intermittent	Low	321	1:1	321
3L	1792+50	Perennial	Medium	35	0.5:1	17.5
3L_1	1793+50	Perennial	Medium	38	0.5:1	19
3LL	1754+50	Intermittent	Low	92	1:1	92
3LL_1	1759+00	Intermittent	Low	521	1:1	521
3LLL	1794+00	Ephemeral	Low	16	1:1	16
3PP	1764+00	Ephemeral	Low	87	1:1	87
3Q	1790+00	Ephemeral	Low	73	1:1	73
3RR	1764+00	Ephemeral	Low	206	1:1	206
3S	1792+50	Perennial	Medium	183	0.5:1	91.5
3SS	1792+50	Intermittent	Low	9	1:1	9
3U	1789+50	Intermittent	Low	44	1:1	44
3UU	1817+00	Intermittent	Low	6	1:1	6
3ZZ	1764+00	Perennial	Medium	95	0.5:1	47.5
4H	1754+00	Ephemeral	Low	331	1:1	331
4YYY	1755+00	Intermittent	Low	35	1:1	35
7AA	1347+00	Intermittent	Low	102	1:1	102
7BB	1395+00	Intermittent	Low	56	1:1	56
7BB_1	1394+00	Intermittent	Low	76	1:1	76
7BB_D	1397+00	Intermittent	Low	518	1:1	518
7D	1425+50	Intermittent	Low	27	1:1	27
7E	1424+00	Perennial	Low	327	1:1	327
7F	1422+50	Intermittent	Low	32	1:1	32
7G	1431+50	Perennial	Medium	20	0.5:1	10
7G_1	1428+00	Perennial	Medium	484	0.5:1	242
7GG	1409+50	Intermittent	Low	255	1:1	255
7H	1427+00	Intermittent	Low	373	1:1	373

Table D-1c. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 10

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
7I	1410+00	Intermittent	Medium	37	0.5:1	18.5
7JJ	1411+50	Perennial	Medium	11	0.5:1	5.5
7JJ_1	1411+00	Perennial	Medium	7	0.5:1	3.5
7MM	1347+00	Intermittent	Low	150	1:1	150
7N	1396+50	Perennial	Low	218	1:1	218
7N_1	1394+50	Perennial	Low	76	1:1	76
7NN	1347+00	Ephemeral	Low	134	1:1	134
7O	1393+00	Perennial	Low	53	1:1	53
7O_1	1394+00	Perennial	Low	41	1:1	41
7PP	1347+00	Intermittent	Low	35	1:1	35
7S	1347+00	Perennial	Medium	128	0.5:1	64
7T	1424+00	Perennial	Low	17	1:1	17
7T_1	1425+00	Perennial	Low	207	1:1	207
7V	1429+00	Ephemeral	Low	46	1:1	46
8A	1334+50	Intermittent	Low	186	1:1	186
8E	1338+50	Intermittent	Low	106	1:1	106
8F	1336+00	Intermittent	Low	70	1:1	70
8G_1	1339+00	Intermittent	Low	47	1:1	47
8HH	1347+00	Intermittent	Medium	133	0.5:1	66.5
8I	1337+50	Ephemeral	Low	45	1:1	45
8J	1328+50	Intermittent	Low	181	1:1	181
8J_2	1333+50	Perennial	Medium	29	0.5:1	14.5
8MM	1334+00	Intermittent	Low	41	1:1	41
8N	1330+00	Intermittent	Medium	112	0.5:1	56
8N_1	1332+00	Perennial	Medium	319	0.5:1	159.5
8N_D	1329+50	Intermittent	Medium	51	0.5:1	25.5
8R_D1	1282+50	Intermittent	Low	347	1:1	347
8S	1292+00	Ephemeral	Low	137	1:1	137
8S_1	1289+00	Ephemeral	Low	7	1:1	7
8T	1289+00	Ephemeral	Low	118	1:1	118
8V	1310+00	Intermittent	Low	46	1:1	46
8W	1347+00	Intermittent	Medium	211	0.5:1	105.5
8W_1	1347+00	Intermittent	Medium	502	0.5:1	251
8Z	1347+00	Perennial	Medium	60	0.5:1	30
9A	1290+00	Intermittent	Low	141	1:1	141
9C	1289+00	Intermittent	Low	196	1:1	196
9CC	1227+00	Perennial	Low	325	1:1	325
9F	1186+00	Intermittent	Low	292	1:1	292
9FF	1229+00	Ephemeral	Low	103	1:1	103
9G	1184+50	Perennial	Medium	133	0.5:1	66.5
9G_1	1184+50	Perennial	Medium	50	0.5:1	25
9GG	1228+00	Intermittent	Low	5	1:1	5

Table D-1c. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 10

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
9J	1203+00	Perennial	Medium	49	0.5:1	24.5
9JJ	1242+50	Perennial	Medium	407	0.5:1	203.5
9LL	1245+00	Ephemeral	Low	32	1:1	32
9M	1204+00	Intermittent	Low	308	1:1	308
9M_D	1208+00	Intermittent	Low	419	1:1	419
9MM	1244+00	Intermittent	Low	106	1:1	106
9P	1202+00	Ephemeral	Low	198	1:1	198
9QQ	1200+50	Intermittent	Low	99	1:1	99
9QQ_1	1199+50	Ephemeral	Low	89	1:1	89
9R	1289+50	Intermittent	Low	589	1:1	589
9RR	1204+00	Intermittent	Low	456	1:1	456
9RR_1	1206+00	Ephemeral	Low	113	1:1	113
9T	1264+00	Intermittent	Low	18	1:1	18
9T_1	1263+00	Perennial	Low	78	1:1	78
9VV	1225+00	Intermittent	Low	119	1:1	119
9Y	1240+50	Perennial	Medium	61	0.5:1	30.5
9Y_1	1240+00	Perennial	Medium	33	0.5:1	16.5
9Z	1240+50	Intermittent	Low	31	1:1	31
10AA	1115+00	Perennial	Low	265	1:1	265
10B_1	1163+50	Intermittent	Low	48	1:1	48
10BB	1119+00	Perennial	Low	586	1:1	586
10C	1163+50	Perennial	Medium	101	0.5:1	50.5
10C_1	1165+50	Perennial	Medium	53	0.5:1	26.5
10E	1160+50	Perennial	Low	73	1:1	73
10F	1160+00	Intermittent	Low	11	1:1	11
10F_1	1162+50	Intermittent	Low	79	1:1	79
10F_2	1163+00	Intermittent	Low	53	1:1	53
10FF	1158+00	Intermittent	Low	136	1:1	136
10J	1156+00	Intermittent	Low	174	1:1	174
10JJ	1158+00	Intermittent	Low	12	1:1	12
10KK	1158+00	Intermittent	Low	200	1:1	200
10L	1145+00	Intermittent	Low	524	1:1	524
10MM	1158+00	Intermittent	Low	25	1:1	25
10MM_1	1158+00	Intermittent	Medium	342	0.5:1	171
10N	1142+50	Intermittent	Low	74	1:1	74
10N_1	1140+50	Intermittent	Low	269	1:1	269
10N_D	1142+50	Intermittent	Low	191	1:1	191
10PP	1158+00	Intermittent	Medium	28	0.5:1	14
10PP_1	1158+00	Intermittent	Medium	80	0.5:1	40
10Q	1109+00	Ephemeral	Low	123	1:1	123
10S	1112+50	Perennial	Low	450	1:1	450
10U	1114+00	Intermittent	Low	176	1:1	176

Table D-1c. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 10

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
10X	1134+00	Ephemeral	Low	174	1:1	174
11A	1104+00	Intermittent	Low	111	1:1	111
11A_1	1103+50	Perennial	Low	30	1:1	30
11AA	1067+50	Intermittent	Low	343	1:1	343
11C	1103+00	Intermittent	Low	257	1:1	257
11CC	1069+50	Intermittent	Low	18	1:1	18
11D	1102+50	Intermittent	Low	97	1:1	97
11E_D	1097+00	Perennial	Low	915	1:1	915
11E_D2	1092+00	Perennial	Low	46	1:1	46
11G	1095+00	Intermittent	Low	861	1:1	861
11GG	1034+50	Ephemeral	Low	156	1:1	156
11H	1079+50	Intermittent	Low	16	1:1	16
11L	1071+00	Perennial	Medium	51	0.5:1	25.5
11L_2	1071+00	Perennial	Medium	81	0.5:1	40.5
11M	1068+00	Intermittent	Low	4	1:1	4
11M_1	1069+00	Intermittent	Low	211	1:1	211
11M_B	1068+50	Intermittent	Low	31	1:1	31
11R	1014+00	Perennial	Low	99	1:1	99
11R_1	1014+50	Perennial	Low	60	1:1	60
11R_D	1011+00	Intermittent	Low	593	1:1	593
11T	1013+50	Perennial	Low	21	1:1	21
11V	1072+50	Perennial	Low	191	1:1	191
11Y	1060+00	Intermittent	Low	387	1:1	387
12C	0915+00	Perennial	Low	271	1:1	271
12CCC	0923+50	Perennial	Low	175	1:1	175
12F	0918+50	Perennial	Low	33	1:1	33
12FFF	0929+00	Ephemeral	Low	422	1:1	422
12GGG	0906+50	Ephemeral	Low	79	1:1	79
12H	0908+50	Perennial	Low	44	1:1	44
12H_2	0924+00	Perennial	Low	8	1:1	8
12H_3	0926+00	Perennial	Low	286	1:1	286
12H_4	0930+00	Perennial	Low	475	1:1	475
12H_5	0933+50	Perennial	Low	22	1:1	22
12HHH	0906+00	Intermittent	Low	176	1:1	176
12HHHH	0895+50	Intermittent	Low	43	1:1	43
12II	0928+00	Perennial	High	71	0:1	0
12II_4	0938+00	Perennial	High	267	0:1	0
12II_5	0938+00	Perennial	High	91	0:1	0
12JJJ	0906+50	Perennial	Low	28	1:1	28
12K	0910+00	Perennial	Low	60	1:1	60
12K_1	0912+50	Perennial	Low	3	1:1	3
12KK	0943+00	Perennial	Low	535	1:1	535

Table D-1c. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 10

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
12KKK	0906+50	Intermittent	Low	265	1:1	265
12LL	0951+00	Ephemeral	Low	123	1:1	123
12MM	0967+00	Intermittent	Low	402	1:1	402
12MMM	0907+00	Ephemeral	Low	34	1:1	34
12NNN	0907+50	Intermittent	Low	174	1:1	174
12O	0907+50	Intermittent	Low	147	1:1	147
12O_1	0908+00	Intermittent	Low	84	1:1	84
12OO	0976+50	Perennial	Medium	65	0.5:1	32.5
12OO_1	0976+50	Perennial	Medium	33	0.5:1	16.5
12P	0909+00	Intermittent	Low	31	1:1	31
12PPP	0939+50	Intermittent	Low	74	1:1	74
12QQQ	0939+00	Intermittent	Low	168	1:1	168
12RRR	0946+00	Perennial	Low	29	1:1	29
12S	0923+00	Intermittent	Low	351	1:1	351
12T	0923+50	Intermittent	Low	40	1:1	40
12T_D	0921+50	Intermittent	Low	386	1:1	386
12UUU	0976+00	Perennial	Low	32	1:1	32
12VVV	0931+00	Intermittent	Low	431	1:1	431
12WW	0935+00	Perennial	Low	97	1:1	97
12WW_1	0934+50	Perennial	Low	24	1:1	24
12WW_2	0931+00	Perennial	Low	35	1:1	35
12WWW	0937+00	Intermittent	Low	84	1:1	84
12WWW_1	0935+00	Intermittent	Low	90	1:1	90
12XX	0925+00	Perennial	Medium	100	0.5:1	50
12XX_1	0923+50	Perennial	Medium	15	0.5:1	7.5
12Y	0929+50	Intermittent	Low	4	1:1	4
12Y_D	0929+00	Intermittent	Low	215	1:1	215
12YYY	0934+50	Perennial	Low	843	1:1	843
12YYY_1	0931+00	Perennial	Low	160	1:1	160
12Z	0917+50	Intermittent	Low	100	1:1	100
13A	0807+50	Intermittent	Low	143	1:1	143
13C	0863+00	Intermittent	Low	145	1:1	145
13C_1	0870+00	Intermittent	Low	601	1:1	601
13E	0794+00	Ephemeral	Low	28	1:1	28
13G	0792+00	Intermittent	Low	11	1:1	11
13H	0785+50	Perennial	Low	211	1:1	211
13I	0795+00	Ephemeral	Low	154	1:1	154
13I_1	0796+50	Intermittent	Low	170	1:1	170
13J	0767+00	Intermittent	Low	59	1:1	59
13J_1	0770+00	Intermittent	Low	218	1:1	218
13J_2	0774+00	Intermittent	Low	49	1:1	49
13K	0798+50	Intermittent	Low	158	1:1	158

Table D-1c. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 10

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
13L	0798+50	Ephemeral	Low	198	1:1	198
13M	0836+00	Perennial	Low	1528	1:1	1528
13M_1	0828+50	Perennial	Low	78	1:1	78
13M_D	0844+50	Intermittent	Low	151	1:1	151
13N	0828+00	Ephemeral	Low	58	1:1	58
13P	0797+00	Perennial	High	100	0:1	0
13P_1	0797+50	Perennial	High	256	0:1	0
13Q	0863+00	Intermittent	Low	519	1:1	519
13R	0849+00	Intermittent	Low	192	1:1	192
13S	0846+00	Intermittent	Low	23	1:1	23
13X_1	0830+00	Perennial	Low	29	1:1	29
13Y	0830+00	Perennial	Low	86	1:1	86
13Z	0869+00	Intermittent	Low	380	1:1	380
14A	0745+00	Intermittent	Medium	9	0.5:1	4.5
14A_1	0745+00	Intermittent	Medium	161	0.5:1	80.5
14E	0745+00	Perennial	Medium	41	0.5:1	20.5
14G	0707+50	Intermittent	Medium	10	0.5:1	5
14G_1	0707+50	Intermittent	Medium	16	0.5:1	8
15A	0664+00	Intermittent	Low	581	1:1	581
15B	0662+50	Intermittent	Low	99	1:1	99
15C	0686+00	Intermittent	Low	14	1:1	14
15D	0685+50	Perennial	Medium	21	0.5:1	10.5
15E	0685+00	Ephemeral	Low	7	1:1	7
16A	0604+00	Perennial	Medium	50	0.5:1	25
16A_1	0597+00	Perennial	Medium	1116	0.5:1	558
16A_2	0589+00	Perennial	Medium	81	0.5:1	40.5
16D	0599+50	Intermittent	Low	36	1:1	36
16E	0638+00	Intermittent	Low	164	1:1	164
16G	0614+00	Perennial	Medium	172	0.5:1	86
16G_1	0606+00	Perennial	Medium	165	0.5:1	82.5
16G_D	0626+00	Perennial	Medium	56	0.5:1	28
16G_D1	0619+50	Perennial	Medium	141	0.5:1	70.5
16J	0610+50	Ephemeral	Low	42	1:1	42
16J_1	0610+00	Ephemeral	Low	3	1:1	3
17B	0544+00	Ephemeral	Low	50	1:1	50
17BB	0568+00	Intermittent	Medium	31	0.5:1	15.5
17DD	0565+50	Intermittent	Medium	26	0.5:1	13
17F	0588+50	Perennial	Medium	3	0.5:1	1.5
17Y	0558+00	Intermittent	Low	31	1:1	31
17Z	0579+50	Ephemeral	Low	197	1:1	197
18A	0527+00	Intermittent	Low	13	1:1	13
18B	0526+50	Ephemeral	Low	35	1:1	35

Table D-1c. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 10

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
18C_1	0517+50	Perennial	Medium	20	0.5:1	10
18G	0537+00	Intermittent	Low	5	1:1	5
18I	0509+00	Perennial	Low	5	1:1	5
19B	0436+00	Intermittent	Low	26	1:1	26
19C	0432+00	Perennial	Medium	33	0.5:1	16.5
19F	0434+00	Perennial	Low	104	1:1	104
19F_1	0438+00	Perennial	Low	110	1:1	110
19F_2	0441+00	Perennial	Low	67	1:1	67
19F_3	0454+00	Perennial	Low	49	1:1	49
19F_4	0468+00	Perennial	Low	4	1:1	4
19J_1	0408+00	Perennial	Low	32	1:1	32
19J_2	0410+00	Perennial	Low	67	1:1	67
19K_1	0470+00	Perennial	High	8	0:1	0
19K_2	0491+00	Perennial	Medium	135	0.5:1	67.5
19K_7	0588+50	Perennial	Medium	69	0.5:1	34.5
19K_8	0588+50	Perennial	Medium	71	0.5:1	35.5
19R	0462+50	Intermittent	Low	3	1:1	3
19R_1	0463+50	Intermittent	Low	1	1:1	1
19T	0467+50	Perennial	Low	74	1:1	74
19T_1	0468+50	Perennial	Low	121	1:1	121
19V	0490+00	Perennial	Medium	18	0.5:1	9
23G	4799+00	Perennial	Medium	1125	0.5:1	562.5
23G_1	4805+00	Perennial	Medium	55	0.5:1	27.5
23Q	4774+50	Intermittent	Medium	416	0.5:1	208
23Q_1	4782+00	Perennial	Medium	81	0.5:1	40.5
23Q_2	4783+50	Perennial	Medium	94	0.5:1	47
23R	4770+00	Perennial	Medium	72	0.5:1	36
23S	4796+00	Intermittent	Medium	18	0.5:1	9
Total						**43,594**

Table D-2c. On-Site Stream Mitigation - Middle-Potomac-Catoctin
Alternative 10

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
20B	0342+00	Intermittent	Low	19	1:1	19
20D	0324+00	Perennial	Low	505	1:1	505
20E	0332+00	Intermittent	Low	22	1:1	22
21B	0305+00	Perennial	Medium	1024	0.5:1	512
21C	0276+00	Perennial	Medium	2298	0.5:1	1149
21C_1	0245+00	Perennial	Medium	1844	0.5:1	922
21C_2	0233+00	Perennial	Medium	406	0.5:1	203
21D	0225+50	Intermittent	Low	86	1:1	86
21D_1	0227+00	Intermittent	Low	215	1:1	215
21F	0246+00	Intermittent	Low	75	1:1	75
21G	0239+00	Intermittent	Low	57	1:1	57
21H	0247+50	Ephemeral	Low	27	1:1	27
21L_D	0278+50	Perennial	Low	71	1:1	71
21M	0262+50	Intermittent	Low	23	1:1	23
21V	0297+00	Ephemeral	Low	87	1:1	87
22A	0222+00	Intermittent	Low	140	1:1	140
22AA	0224+00	Perennial	Medium	82	0.5:1	41
22AA_1	0200+50	Perennial	Medium	16	0.5:1	8
22AA_2	0200+00	Perennial	Medium	98	0.5:1	49
22AA_3	0198+00	Perennial	Medium	188	0.5:1	94
22B	0219+00	Intermittent	Low	35	1:1	35
22C	0219+00	Intermittent	Low	50	1:1	50
22D	0218+50	Intermittent	Low	144	1:1	144
22EE	0192+00	Ephemeral	Low	45	1:1	45
22FF	0177+00	Ephemeral	Low	34	1:1	34
22H	0198+00	Intermittent	Low	7	1:1	7
22H_1	0198+00	Intermittent	Low	10	1:1	10
22HH	0132+00	Intermittent	Medium	260	0.5:1	130
22HH_1	0129+00	Intermittent	Medium	154	0.5:1	77
22HH_2	0127+50	Intermittent	Medium	117	0.5:1	58.5
22KK	0198+00	Perennial	Low	26	1:1	26
22M_1	0114+00	Perennial	Medium	30	0.5:1	15
22MM	0106+00	Perennial	High	1025	0:1	0
22MM_B	0106+00	Perennial	High	138	0:1	0
22NN	0110+00	Intermittent	Low	275	1:1	275
22NN_B	0109+00	Intermittent	Low	166	1:1	166
22P	0125+00	Intermittent	Medium	9	0.5:1	4.5
22Q	0125+00	Perennial	Medium	136	0.5:1	68
22Q_1	0125+00	Perennial	Medium	61	0.5:1	30.5
22QQ	0113+50	Intermittent	Low	106	1:1	106
22T_D	0128+50	Intermittent	Low	8	1:1	8
22T_D1	0128+50	Intermittent	Low	34	1:1	34
22T_D2	0128+50	Intermittent	Low	92	1:1	92
22V	0118+50	Intermittent	Low	76	1:1	76
22V_1	0118+50	Intermittent	Low	39	1:1	39

Table D-2c. On-Site Stream Mitigation - Middle-Potomac-Catoctin
Alternative 10

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
22V_2	0118+50	Intermittent	Low	26	1:1	26
22Z	0198+00	Perennial	Medium	72	0.5:1	36
22Z_1	0197+00	Perennial	Medium	38	0.5:1	19
23A_1	3744+00	Perennial	High	99	0:1	0
23A_3	3758+00	Perennial	High	371	0:1	0
23AA	3749+50	Perennial	Medium	73	0.5:1	36.5
23AA_1	3751+00	Perennial	Medium	213	0.5:1	106.5
23D	3755+50	Intermittent	Medium	702	0.5:1	351
23DD	3701+50	Intermittent	Low	87	1:1	87
23K	3701+00	Perennial	Medium	132	0.5:1	66
23K_1	3692+00	Perennial	Medium	226	0.5:1	113
23K_D	3688+00	Perennial	Medium	597	0.5:1	298.5
23N	4718+00	Intermittent	Medium	275	0.5:1	137.5
23N_D	4730+00	Intermittent	Medium	32	0.5:1	16
23V	3722+00	Intermittent	Low	34	1:1	34
24A	3683+00	Perennial	High	33	0:1	0
24A_1	3683+00	Perennial	High	75	0:1	0
24D	3639+50	Perennial	Medium	14	0.5:1	7
24F_2	3627+00	Perennial	High	53	0:1	0
24F_3	3626+00	Perennial	High	49	0:1	0
25E	3561+00	Perennial	Medium	35	0.5:1	17.5
25F	3582+00	Ephemeral	Low	178	1:1	178
25G	3597+00	Intermittent	Low	129	1:1	129
25H_1	3560+50	Perennial	High	20	0:1	0
25L	3597+00	Intermittent	Low	66	1:1	66
26B	3509+00	Intermittent	Medium	37	0.5:1	18.5
26C	3525+00	Intermittent	High	96	0:1	0
26G	3534+00	Ephemeral	Medium	143	0.5:1	71.5
26G_1	3530+50	Intermittent	Medium	442	0.5:1	221
26J	3524+00	Intermittent	Medium	31	0.5:1	15.5
27A	3478+50	Perennial	High	53	0:1	0
27A_1	3480+00	Perennial	High	85	0:1	0
27A_2	3484+00	Perennial	High	58	0:1	0
27B	3479+00	Intermittent	Medium	24	0.5:1	12
27C	3476+00	Ephemeral	Medium	8	0.5:1	4
27D	3476+00	Intermittent	Medium	91	0.5:1	45.5
27K	3484+00	Ephemeral	Low	41	1:1	41
28B	3340+00	Intermittent	Low	64	1:1	64
29A_2	3340+00	Perennial	High	26	0:1	0
29B	3329+00	Perennial	High	35	0:1	0
29B_1	3329+00	Perennial	High	34	0:1	0
29D_D	3340+00	Intermittent	Low	93	1:1	93
29K	3340+00	Intermittent	Medium	12	0.5:1	6
Total						**8,152**

ALTERNATIVE 10: ONSITE STREAM MITIGATION

Table D-3c. On-Site Stream Mitigation - Patuxent
Alternative 10

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
4B	1687+50	Intermittent	Low	20	1:1	20
4BBB	1675+00	Perennial	Medium	372	0.5:1	186
4BBB_1	1672+50	Perennial	Medium	40	0.5:1	20
4BBBB	1735+00	Ephemeral	Low	71	1:1	71
4C	1687+00	Ephemeral	Low	42	1:1	42
4E	1694+00	Intermittent	Medium	36	0.5:1	18
4EE	1665+00	Perennial	Low	71	1:1	71
4GG	1745+00	Intermittent	Low	72	1:1	72
4GGG	1667+00	Ephemeral	Low	236	1:1	236
4GGGG	1733+00	Perennial	Low	11	1:1	11
4J	1744+00	Ephemeral	Low	98	1:1	98
4JJJJ	1693+00	Perennial	Low	17	1:1	17
4K	1725+50	Intermittent	Low	15	1:1	15
4L	1724+50	Intermittent	Low	19	1:1	19
4LLLL	1692+50	Ephemeral	Low	87	1:1	87
4M	1718+00	Perennial	High	105	0:1	0
4MMMM	1694+50	Ephemeral	Low	87	1:1	87
4NN	1713+50	Intermittent	Low	37	1:1	37
4NNN_1	1631+50	Intermittent	Medium	42	0.5:1	21
4O	1706+00	Intermittent	Medium	343	0.5:1	171.5
4OO	1712+00	Intermittent	Low	50	1:1	50
4OOOO	1693+50	Intermittent	Medium	72	0.5:1	36
4P	1703+00	Ephemeral	Low	40	1:1	40
4PPPP	1715+00	Perennial	Medium	232	0.5:1	116
4Q	1713+00	Perennial	Medium	144	0.5:1	72
4Q_1	1713+50	Perennial	Medium	51	0.5:1	25.5
4QQ	1708+00	Intermittent	Low	18	1:1	18
4QQQQ	1713+00	Intermittent	Medium	90	0.5:1	45
4RRR	1687+00	Intermittent	Medium	81	0.5:1	40.5
4S	1714+50	Ephemeral	Low	118	1:1	118
4T	1674+50	Intermittent	Low	40	1:1	40
4U	1675+00	Intermittent	Low	78	1:1	78
4UUU	1688+00	Intermittent	Medium	69	0.5:1	34.5
4W	1665+00	Perennial	Medium	36	0.5:1	18
4W_2	1665+50	Perennial	Medium	26	0.5:1	13
4Z_1	1631+50	Perennial	Medium	50	0.5:1	25
4Z_2	1630+50	Perennial	Medium	42	0.5:1	21
4Z_3	1623+00	Perennial	Medium	98	0.5:1	49
5BB	1547+00	Intermittent	Low	108	1:1	108
5F	1619+00	Perennial	Medium	49	0.5:1	24.5
5F_1	1620+50	Perennial	Medium	142	0.5:1	71
5J	1621+00	Intermittent	Low	5	1:1	5
5JJ	1570+00	Ephemeral	Low	10	1:1	10
5KK	1563+00	Intermittent	Low	5	1:1	5
5MM	1555+00	Intermittent	Low	20	1:1	20

Table D-3c. On-Site Stream Mitigation - Patuxent
Alternative 10

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
5N	1620+00	Intermittent	Low	122	1:1	122
5O	1596+00	Ephemeral	Low	197	1:1	197
5P	1594+00	Intermittent	Low	144	1:1	144
5Q	1554+50	Perennial	Low	943	1:1	943
5QQ	1551+00	Intermittent	Low	12	1:1	12
5S	1558+00	Perennial	Medium	70	0.5:1	35
5S_1	1558+00	Perennial	Medium	47	0.5:1	23.5
5T	1557+50	Perennial	Low	11	1:1	11
5Y	1549+00	Ephemeral	Low	111	1:1	111
6AA	1480+50	Intermittent	Low	6	1:1	6
6AAA	1527+50	Intermittent	Low	47	1:1	47
6AAA_1	1527+00	Intermittent	Low	33	1:1	33
6AAA_2	1526+00	Intermittent	Low	25	1:1	25
6AAAA	1464+50	Ephemeral	Low	9	1:1	9
6B	1511+00	Perennial	Low	9	1:1	9
6EEE	1457+50	Intermittent	Low	22	1:1	22
6FFFF_1	1526+50	Intermittent	Low	3	1:1	3
6G	1451+50	Perennial	Medium	1	0.5:1	0.5
6G_1	1467+00	Perennial	Medium	1064	0.5:1	532
6G_2	1493+00	Perennial	Medium	672	0.5:1	336
6G_3	1500+00	Perennial	Medium	1063	0.5:1	531.5
6G_6	1555+50	Perennial	Medium	270	0.5:1	135
6GGG	1543+00	Intermittent	Low	112	1:1	112
6GGG_1	1546+50	Intermittent	Low	200	1:1	200
6III	1511+00	Intermittent	Low	409	1:1	409
6J	1509+50	Ephemeral	Low	24	1:1	24
6JJJ	1513+00	Perennial	Low	32	1:1	32
6L	1521+00	Intermittent	Low	13	1:1	13
6LLL	1498+00	Perennial	Low	738	1:1	738
6MM	1539+00	Ephemeral	Low	149	1:1	149
6MMM	1496+00	Perennial	Low	33	1:1	33
6NNN_1	1496+00	Intermittent	Low	30	1:1	30
6RRR	1461+00	Intermittent	Low	52	1:1	52
6RRR_D	1460+00	Intermittent	Low	115	1:1	115
6T	1493+50	Intermittent	Low	59	1:1	59
6TTT	1479+00	Intermittent	Low	211	1:1	211
6UU	1465+00	Intermittent	Medium	35	0.5:1	17.5
6UUU	1478+00	Intermittent	Low	62	1:1	62
6V	1485+50	Ephemeral	Low	185	1:1	185
6WW	1456+50	Intermittent	Medium	61	0.5:1	30.5
6XX	1456+00	Ephemeral	Low	53	1:1	53
6YY	1456+50	Ephemeral	Low	63	1:1	63
7B	1443+50	Ephemeral	Low	482	1:1	482
Total						**8,740**

ALTERNATIVE 13B

Table D-1d. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 13B

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
1D_1	1989+50	Perennial	Medium	121	0.5:1	60.5
1D_2	1987+50	Perennial	Medium	78	0.5:1	39
1G	1994+50	Ephemeral	Low	19	1:1	19
1H	1995+00	Intermittent	Low	2	1:1	2
1H_D	1999+00	Intermittent	Low	625	1:1	625
1O	1929+00	Ephemeral	Low	227	1:1	227
1P	1931+00	Intermittent	Low	178	1:1	178
1Q	1930+00	Perennial	High	56	0:1	0
1Q_1	1927+00	Perennial	High	252	0:1	0
1R	1943+00	Perennial	Medium	482	0.5:1	241
1R_1	1936+00	Perennial	Medium	548	0.5:1	274
1RR	1958+50	Intermittent	Low	26	1:1	26
1SS	1957+00	Ephemeral	Low	317	1:1	317
1TT	1969+00	Intermittent	Low	53	1:1	53
1VV	1973+00	Perennial	Medium	39	0.5:1	19.5
1VV_1	1974+50	Perennial	Medium	18	0.5:1	9
1XX	1975+00	Ephemeral	Medium	136	0.5:1	68
1XX_1	1974+00	Intermittent	Medium	141	0.5:1	70.5
1YY	1972+00	Intermittent	Low	362	1:1	362
2A	1924+50	Ephemeral	Low	170	1:1	170
2AA	1857+00	Intermittent	Low	50	1:1	50
2D	1917+00	Ephemeral	Low	13	1:1	13
2E	1916+50	Intermittent	Low	77	1:1	77
2F	1901+00	Intermittent	Medium	669	0.5:1	334.5
2F_D	1896+00	Intermittent	Medium	499	0.5:1	249.5
2H	1870+00	Intermittent	Low	53	1:1	53
2HH	1902+50	Intermittent	Low	52	1:1	52
2I	1871+00	Intermittent	Low	244	1:1	244
2J	1864+50	Perennial	Medium	44	0.5:1	22
2J_1	1863+00	Perennial	Medium	30	0.5:1	15
2JJ	1917+00	Intermittent	Low	73	1:1	73
2L	1862+00	Intermittent	Medium	313	0.5:1	156.5
2MM	1904+00	Perennial	Medium	4	0.5:1	2
2OO	1915+00	Ephemeral	Low	33	1:1	33
2R	1870+00	Perennial	Medium	27	0.5:1	13.5
2T	1874+00	Intermittent	Medium	989	0.5:1	494.5
2V	1857+50	Perennial	Medium	16	0.5:1	8
2VV	1921+00	Intermittent	Low	17	1:1	17
2W	1914+00	Intermittent	Low	451	1:1	451
2X	1916+50	Perennial	Medium	16	0.5:1	8
2X_1	1916+50	Perennial	Medium	203	0.5:1	101.5
2Y	1928+00	Perennial	Low	241	1:1	241

Table D-1d. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 13B

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
2Y_1	1926+00	Perennial	Low	388	1:1	388
2YY	1921+00	Intermittent	Low	51	1:1	51
3A	1836+00	Perennial	Medium	44	0.5:1	22
3AA_1	1803+00	Perennial	Low	40	1:1	40
3BB	1804+00	Ephemeral	Low	120	1:1	120
3BBB	1804+00	Intermittent	Low	41	1:1	41
3CC	1819+50	Intermittent	Low	303	1:1	303
3D	1822+50	Perennial	Medium	45	0.5:1	22.5
3D_1	1820+50	Perennial	Medium	87	0.5:1	43.5
3DD	1821+00	Perennial	Medium	45	0.5:1	22.5
3F	1801+50	Ephemeral	Low	244	1:1	244
3FFF	1804+50	Intermittent	Low	52	1:1	52
3FFF_D	1805+00	Intermittent	Low	66	1:1	66
3H	1823+00	Intermittent	Low	102	1:1	102
3I	1818+00	Intermittent	Low	551	1:1	551
3JJ	1758+00	Intermittent	Low	321	1:1	321
3L	1792+50	Perennial	Medium	35	0.5:1	17.5
3L_1	1793+50	Perennial	Medium	38	0.5:1	19
3LL	1754+50	Intermittent	Low	92	1:1	92
3LL_1	1759+00	Intermittent	Low	521	1:1	521
3LLL	1794+00	Ephemeral	Low	16	1:1	16
3PP	1764+00	Ephemeral	Low	87	1:1	87
3Q	1790+00	Ephemeral	Low	73	1:1	73
3RR	1764+00	Ephemeral	Low	206	1:1	206
3S	1792+50	Perennial	Medium	183	0.5:1	91.5
3SS	1792+50	Intermittent	Low	9	1:1	9
3U	1789+50	Intermittent	Low	44	1:1	44
3UU	1817+00	Intermittent	Low	6	1:1	6
3ZZ	1764+00	Perennial	Medium	95	0.5:1	47.5
4H	1754+00	Ephemeral	Low	331	1:1	331
4YYY	1755+00	Intermittent	Low	35	1:1	35
7AA	1347+00	Intermittent	Low	102	1:1	102
7BB	1395+00	Intermittent	Low	56	1:1	56
7BB_1	1394+00	Intermittent	Low	76	1:1	76
7BB_D	1397+00	Intermittent	Low	518	1:1	518
7D	1425+50	Intermittent	Low	27	1:1	27
7E	1424+00	Perennial	Low	327	1:1	327
7F	1422+50	Intermittent	Low	32	1:1	32
7G	1431+50	Perennial	Medium	20	0.5:1	10
7G_1	1428+00	Perennial	Medium	484	0.5:1	242
7GG	1409+50	Intermittent	Low	255	1:1	255
7H	1427+00	Intermittent	Low	373	1:1	373

Table D-1d. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 13B

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
7I	1410+00	Intermittent	Medium	37	0.5:1	18.5
7JJ	1411+50	Perennial	Medium	11	0.5:1	5.5
7JJ_1	1411+00	Perennial	Medium	7	0.5:1	3.5
7MM	1347+00	Intermittent	Low	150	1:1	150
7N	1396+50	Perennial	Low	218	1:1	218
7N_1	1394+50	Perennial	Low	76	1:1	76
7NN	1347+00	Ephemeral	Low	134	1:1	134
7O	1393+00	Perennial	Low	53	1:1	53
7O_1	1394+00	Perennial	Low	41	1:1	41
7PP	1347+00	Intermittent	Low	35	1:1	35
7S	1347+00	Perennial	Medium	128	0.5:1	64
7T	1424+00	Perennial	Low	17	1:1	17
7T_1	1425+00	Perennial	Low	207	1:1	207
7V	1429+00	Ephemeral	Low	46	1:1	46
8A	1334+50	Intermittent	Low	186	1:1	186
8E	1338+50	Intermittent	Low	106	1:1	106
8F	1336+00	Intermittent	Low	70	1:1	70
8G_1	1339+00	Intermittent	Low	47	1:1	47
8HH	1347+00	Intermittent	Medium	133	0.5:1	66.5
8I	1337+50	Ephemeral	Low	45	1:1	45
8J	1328+50	Intermittent	Low	181	1:1	181
8J_2	1333+50	Perennial	Medium	29	0.5:1	14.5
8MM	1334+00	Intermittent	Low	41	1:1	41
8N	1330+00	Intermittent	Medium	112	0.5:1	56
8N_1	1332+00	Perennial	Medium	319	0.5:1	159.5
8N_D	1329+50	Intermittent	Medium	51	0.5:1	25.5
8R_D1	1282+50	Intermittent	Low	347	1:1	347
8S	1292+00	Ephemeral	Low	137	1:1	137
8S_1	1289+00	Ephemeral	Low	7	1:1	7
8T	1289+00	Ephemeral	Low	118	1:1	118
8V	1310+00	Intermittent	Low	46	1:1	46
8W	1347+00	Intermittent	Medium	211	0.5:1	105.5
8W_1	1347+00	Intermittent	Medium	502	0.5:1	251
8Z	1347+00	Perennial	Medium	60	0.5:1	30
9A	1290+00	Intermittent	Low	141	1:1	141
9C	1289+00	Intermittent	Low	196	1:1	196
9CC	1227+00	Perennial	Low	325	1:1	325
9F	1186+00	Intermittent	Low	292	1:1	292
9FF	1229+00	Ephemeral	Low	103	1:1	103
9G	1184+50	Perennial	Medium	133	0.5:1	66.5
9G_1	1184+50	Perennial	Medium	50	0.5:1	25
9GG	1228+00	Intermittent	Low	5	1:1	5

Table D-1d. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 13B

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
9J	1203+00	Perennial	Medium	49	0.5:1	24.5
9JJ	1242+50	Perennial	Medium	407	0.5:1	203.5
9LL	1245+00	Ephemeral	Low	32	1:1	32
9M	1204+00	Intermittent	Low	308	1:1	308
9M_D	1208+00	Intermittent	Low	419	1:1	419
9MM	1244+00	Intermittent	Low	106	1:1	106
9P	1202+00	Ephemeral	Low	198	1:1	198
9QQ	1200+50	Intermittent	Low	99	1:1	99
9QQ_1	1199+50	Ephemeral	Low	89	1:1	89
9R	1289+50	Intermittent	Low	589	1:1	589
9RR	1204+00	Intermittent	Low	456	1:1	456
9RR_1	1206+00	Ephemeral	Low	113	1:1	113
9T	1264+00	Intermittent	Low	18	1:1	18
9T_1	1263+00	Perennial	Low	78	1:1	78
9VV	1225+00	Intermittent	Low	119	1:1	119
9Y	1240+50	Perennial	Medium	61	0.5:1	30.5
9Y_1	1240+00	Perennial	Medium	33	0.5:1	16.5
9Z	1240+50	Intermittent	Low	31	1:1	31
10AA	1115+00	Perennial	Low	265	1:1	265
10B_1	1163+50	Intermittent	Low	48	1:1	48
10BB	1119+00	Perennial	Low	586	1:1	586
10C	1163+50	Perennial	Medium	101	0.5:1	50.5
10C_1	1165+50	Perennial	Medium	53	0.5:1	26.5
10E	1160+50	Perennial	Low	73	1:1	73
10F	1160+00	Intermittent	Low	11	1:1	11
10F_1	1162+50	Intermittent	Low	79	1:1	79
10F_2	1163+00	Intermittent	Low	53	1:1	53
10FF	1158+00	Intermittent	Low	136	1:1	136
10J	1156+00	Intermittent	Low	174	1:1	174
10JJ	1158+00	Intermittent	Low	12	1:1	12
10KK	1158+00	Intermittent	Low	200	1:1	200
10L	1145+00	Intermittent	Low	524	1:1	524
10MM	1158+00	Intermittent	Low	25	1:1	25
10MM_1	1158+00	Intermittent	Medium	342	0.5:1	171
10N	1142+50	Intermittent	Low	74	1:1	74
10N_1	1140+50	Intermittent	Low	269	1:1	269
10N_D	1142+50	Intermittent	Low	191	1:1	191
10PP	1158+00	Intermittent	Medium	28	0.5:1	14
10PP_1	1158+00	Intermittent	Medium	80	0.5:1	40
10Q	1109+00	Ephemeral	Low	123	1:1	123
10S	1112+50	Perennial	Low	450	1:1	450
10U	1114+00	Intermittent	Low	176	1:1	176

Table D-1d. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 13B

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
10X	1134+00	Ephemeral	Low	174	1:1	174
11A	1104+00	Intermittent	Low	111	1:1	111
11A_1	1103+50	Perennial	Low	30	1:1	30
11AA	1067+50	Intermittent	Low	343	1:1	343
11C	1103+00	Intermittent	Low	257	1:1	257
11CC	1069+50	Intermittent	Low	18	1:1	18
11D	1102+50	Intermittent	Low	97	1:1	97
11E_D	1097+00	Perennial	Low	915	1:1	915
11E_D2	1092+00	Perennial	Low	46	1:1	46
11G	1095+00	Intermittent	Low	861	1:1	861
11GG	1034+50	Ephemeral	Low	156	1:1	156
11H	1079+50	Intermittent	Low	16	1:1	16
11L	1071+00	Perennial	Medium	51	0.5:1	25.5
11L_2	1071+00	Perennial	Medium	81	0.5:1	40.5
11M	1068+00	Intermittent	Low	4	1:1	4
11M_1	1069+00	Intermittent	Low	211	1:1	211
11M_B	1068+50	Intermittent	Low	31	1:1	31
11R	1014+00	Perennial	Low	99	1:1	99
11R_1	1014+50	Perennial	Low	60	1:1	60
11R_D	1011+00	Intermittent	Low	593	1:1	593
11T	1013+50	Perennial	Low	21	1:1	21
11V	1072+50	Perennial	Low	191	1:1	191
11Y	1060+00	Intermittent	Low	387	1:1	387
12C	0915+00	Perennial	Low	271	1:1	271
12CCC	0923+50	Perennial	Low	175	1:1	175
12F	0918+50	Perennial	Low	33	1:1	33
12FFF	0929+00	Ephemeral	Low	422	1:1	422
12GGG	0906+50	Ephemeral	Low	79	1:1	79
12H	0908+50	Perennial	Low	44	1:1	44
12H_2	0924+00	Perennial	Low	8	1:1	8
12H_3	0926+00	Perennial	Low	286	1:1	286
12H_4	0930+00	Perennial	Low	475	1:1	475
12H_5	0933+50	Perennial	Low	22	1:1	22
12HHH	0906+00	Intermittent	Low	176	1:1	176
12HHHH	0895+50	Intermittent	Low	43	1:1	43
12II	0928+00	Perennial	High	71	0:1	0
12II_4	0938+00	Perennial	High	267	0:1	0
12II_5	0938+00	Perennial	High	91	0:1	0
12JJJ	0906+50	Perennial	Low	28	1:1	28
12K	0910+00	Perennial	Low	60	1:1	60
12K_1	0912+50	Perennial	Low	3	1:1	3
12KK	0943+00	Perennial	Low	535	1:1	535

Table D-1d. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 13B

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
12KKK	0906+50	Intermittent	Low	265	1:1	265
12LL	0951+00	Ephemeral	Low	123	1:1	123
12MM	0967+00	Intermittent	Low	402	1:1	402
12MMM	0907+00	Ephemeral	Low	34	1:1	34
12NNN	0907+50	Intermittent	Low	174	1:1	174
12O	0907+50	Intermittent	Low	147	1:1	147
12O_1	0908+00	Intermittent	Low	84	1:1	84
12OO	0976+50	Perennial	Medium	65	0.5:1	32.5
12OO_1	0976+50	Perennial	Medium	33	0.5:1	16.5
12P	0909+00	Intermittent	Low	31	1:1	31
12PPP	0939+50	Intermittent	Low	74	1:1	74
12QQQ	0939+00	Intermittent	Low	168	1:1	168
12RRR	0946+00	Perennial	Low	29	1:1	29
12S	0923+00	Intermittent	Low	351	1:1	351
12T	0923+50	Intermittent	Low	40	1:1	40
12T_D	0921+50	Intermittent	Low	386	1:1	386
12UUU	0976+00	Perennial	Low	32	1:1	32
12VVV	0931+00	Intermittent	Low	431	1:1	431
12WW	0935+00	Perennial	Low	97	1:1	97
12WW_1	0934+50	Perennial	Low	24	1:1	24
12WW_2	0931+00	Perennial	Low	35	1:1	35
12WWW	0937+00	Intermittent	Low	84	1:1	84
12WWW_1	0935+00	Intermittent	Low	90	1:1	90
12XX	0925+00	Perennial	Medium	100	0.5:1	50
12XX_1	0923+50	Perennial	Medium	15	0.5:1	7.5
12Y	0929+50	Intermittent	Low	4	1:1	4
12Y_D	0929+00	Intermittent	Low	215	1:1	215
12YYY	0934+50	Perennial	Low	843	1:1	843
12YYY_1	0931+00	Perennial	Low	160	1:1	160
12Z	0917+50	Intermittent	Low	100	1:1	100
13A	0807+50	Intermittent	Low	143	1:1	143
13C	0863+00	Intermittent	Low	145	1:1	145
13C_1	0870+00	Intermittent	Low	601	1:1	601
13E	0794+00	Ephemeral	Low	28	1:1	28
13G	0792+00	Intermittent	Low	11	1:1	11
13H	0785+50	Perennial	Low	211	1:1	211
13I	0795+00	Ephemeral	Low	154	1:1	154
13I_1	0796+50	Intermittent	Low	170	1:1	170
13J	0767+00	Intermittent	Low	59	1:1	59
13J_1	0770+00	Intermittent	Low	218	1:1	218
13J_2	0774+00	Intermittent	Low	49	1:1	49
13K	0798+50	Intermittent	Low	158	1:1	158

Table D-1d. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 13B

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
13L	0798+50	Ephemeral	Low	198	1:1	198
13M	0836+00	Perennial	Low	1528	1:1	1528
13M_1	0828+50	Perennial	Low	78	1:1	78
13M_D	0844+50	Intermittent	Low	151	1:1	151
13N	0828+00	Ephemeral	Low	58	1:1	58
13P	0797+00	Perennial	High	100	0:1	0
13P_1	0797+50	Perennial	High	256	0:1	0
13Q	0863+00	Intermittent	Low	519	1:1	519
13R	0849+00	Intermittent	Low	192	1:1	192
13S	0846+00	Intermittent	Low	23	1:1	23
13X_1	0830+00	Perennial	Low	29	1:1	29
13Y	0830+00	Perennial	Low	86	1:1	86
13Z	0869+00	Intermittent	Low	380	1:1	380
14A	0745+00	Intermittent	Medium	9	0.5:1	4.5
14A_1	0745+00	Intermittent	Medium	161	0.5:1	80.5
14E	0745+00	Perennial	Medium	41	0.5:1	20.5
14G	0707+50	Intermittent	Medium	10	0.5:1	5
14G_1	0707+50	Intermittent	Medium	16	0.5:1	8
15A	0664+00	Intermittent	Low	581	1:1	581
15B	0662+50	Intermittent	Low	99	1:1	99
15C	0686+00	Intermittent	Low	14	1:1	14
15D	0685+50	Perennial	Medium	21	0.5:1	10.5
15E	0685+00	Ephemeral	Low	7	1:1	7
16A	0604+00	Perennial	Medium	50	0.5:1	25
16A_1	0597+00	Perennial	Medium	1116	0.5:1	558
16A_2	0589+00	Perennial	Medium	81	0.5:1	40.5
16D	0599+50	Intermittent	Low	36	1:1	36
16E	0638+00	Intermittent	Low	164	1:1	164
16G	0614+00	Perennial	Medium	172	0.5:1	86
16G_1	0606+00	Perennial	Medium	165	0.5:1	82.5
16G_D	0626+00	Perennial	Medium	56	0.5:1	28
16G_D1	0619+50	Perennial	Medium	141	0.5:1	70.5
16J	0610+50	Ephemeral	Low	42	1:1	42
16J_1	0610+00	Ephemeral	Low	3	1:1	3
17B	0544+00	Ephemeral	Low	50	1:1	50
17BB	0568+00	Intermittent	Medium	31	0.5:1	15.5
17DD	0565+50	Intermittent	Medium	26	0.5:1	13
17F	0588+50	Perennial	Medium	3	0.5:1	1.5
17Y	0558+00	Intermittent	Low	31	1:1	31
17Z	0579+50	Ephemeral	Low	197	1:1	197
18A	0527+00	Intermittent	Low	13	1:1	13
18B	0526+50	Ephemeral	Low	35	1:1	35

Table D-1d. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 13B

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
18C_1	0517+50	Perennial	Medium	20	0.5:1	10
18G	0537+00	Intermittent	Low	5	1:1	5
18I	0509+00	Perennial	Low	5	1:1	5
19B	0436+00	Intermittent	Low	26	1:1	26
19C	0432+00	Perennial	Medium	33	0.5:1	16.5
19F	0434+00	Perennial	Low	104	1:1	104
19F_1	0438+00	Perennial	Low	110	1:1	110
19F_2	0441+00	Perennial	Low	67	1:1	67
19F_3	0454+00	Perennial	Low	49	1:1	49
19F_4	0468+00	Perennial	Low	4	1:1	4
19J_1	0408+00	Perennial	Low	32	1:1	32
19J_2	0410+00	Perennial	Low	67	1:1	67
19K_1	0470+00	Perennial	High	8	0:1	0
19K_2	0491+00	Perennial	Medium	135	0.5:1	67.5
19K_7	0588+50	Perennial	Medium	69	0.5:1	34.5
19K_8	0588+50	Perennial	Medium	71	0.5:1	35.5
19R	0462+50	Intermittent	Low	3	1:1	3
19R_1	0463+50	Intermittent	Low	1	1:1	1
19T	0467+50	Perennial	Low	74	1:1	74
19T_1	0468+50	Perennial	Low	121	1:1	121
19V	0490+00	Perennial	Medium	18	0.5:1	9
23G	4799+00	Perennial	Medium	1135	0.5:1	567.5
23G_1	4805+00	Perennial	Medium	56	0.5:1	28
23Q	4774+50	Intermittent	Medium	256	0.5:1	128
23Q_1	4782+00	Perennial	Medium	61	0.5:1	30.5
23Q_2	4783+50	Perennial	Medium	46	0.5:1	23
23R	4770+00	Perennial	Medium	36	0.5:1	18
23S	4796+00	Intermittent	Medium	33	0.5:1	16.5
Total						**43,475**

Table D-2d. On-Site Stream Mitigation - Middle-Potomac-Catoctin
Alternative 13B

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
20B	0342+00	Intermittent	Low	19	1:1	19
20D	0324+00	Perennial	Low	505	1:1	505
20E	0332+00	Intermittent	Low	22	1:1	22
21B	0305+00	Perennial	Medium	1024	0.5:1	512
21C	0276+00	Perennial	Medium	2298	0.5:1	1149
21C_1	0245+00	Perennial	Medium	1844	0.5:1	922
21C_2	0233+00	Perennial	Medium	406	0.5:1	203
21D	0225+50	Intermittent	Low	86	1:1	86
21D_1	0227+00	Intermittent	Low	215	1:1	215
21F	0246+00	Intermittent	Low	75	1:1	75
21G	0239+00	Intermittent	Low	57	1:1	57
21H	0247+50	Ephemeral	Low	27	1:1	27
21L_D	0278+50	Perennial	Low	71	1:1	71
21M	0262+50	Intermittent	Low	23	1:1	23
21V	0297+00	Ephemeral	Low	87	1:1	87
22A	0222+00	Intermittent	Low	140	1:1	140
22AA	0224+00	Perennial	Medium	82	0.5:1	41
22AA_1	0200+50	Perennial	Medium	16	0.5:1	8
22AA_2	0200+00	Perennial	Medium	98	0.5:1	49
22AA_3	0198+00	Perennial	Medium	188	0.5:1	94
22B	0219+00	Intermittent	Low	35	1:1	35
22C	0219+00	Intermittent	Low	50	1:1	50
22D	0218+50	Intermittent	Low	144	1:1	144
22EE	0192+00	Ephemeral	Low	45	1:1	45
22FF	0177+00	Ephemeral	Low	34	1:1	34
22H	0198+00	Intermittent	Low	7	1:1	7
22H_1	0198+00	Intermittent	Low	10	1:1	10
22HH	0132+00	Intermittent	Medium	260	0.5:1	130
22HH_1	0129+00	Intermittent	Medium	154	0.5:1	77
22HH_2	0127+50	Intermittent	Medium	117	0.5:1	58.5
22KK	0198+00	Perennial	Low	26	1:1	26
22M_1	0114+00	Perennial	Medium	30	0.5:1	15
22MM	0106+00	Perennial	High	1025	0:1	0
22MM_B	0106+00	Perennial	High	138	0:1	0
22NN	0110+00	Intermittent	Low	275	1:1	275
22NN_B	0109+00	Intermittent	Low	166	1:1	166
22P	0125+00	Intermittent	Medium	9	0.5:1	4.5
22Q	0125+00	Perennial	Medium	136	0.5:1	68
22Q_1	0125+00	Perennial	Medium	61	0.5:1	30.5
22QQ	0113+50	Intermittent	Low	106	1:1	106
22T_D	0128+50	Intermittent	Low	8	1:1	8
22T_D1	0128+50	Intermittent	Low	34	1:1	34
22T_D2	0128+50	Intermittent	Low	92	1:1	92

Table D-2d. On-Site Stream Mitigation - Middle-Potomac-Catoctin
Alternative 13B

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
22V	0118+50	Intermittent	Low	76	1:1	76
22V_1	0118+50	Intermittent	Low	39	1:1	39
22V_2	0118+50	Intermittent	Low	26	1:1	26
22Z	0198+00	Perennial	Medium	72	0.5:1	36
22Z_1	0197+00	Perennial	Medium	38	0.5:1	19
23A_1	3744+00	Perennial	High	110	0:1	0
23A_3	3758+00	Perennial	High	345	0:1	0
23AA	3749+50	Perennial	Medium	76	0.5:1	38
23AA_1	3751+00	Perennial	Medium	206	0.5:1	103
23D	3755+50	Intermittent	Medium	696	0.5:1	348
23DD	3701+50	Intermittent	Low	100	1:1	100
23K	3701+00	Perennial	Medium	55	0.5:1	27.5
23K_1	3692+00	Perennial	Medium	1	0.5:1	0.5
23K_D	3688+00	Perennial	Medium	600	0.5:1	300
23N	4718+00	Intermittent	Medium	164	0.5:1	82
23N_D	4730+00	Intermittent	Medium	32	0.5:1	16
23V	3722+00	Intermittent	Low	13	1:1	13
24A	3683+00	Perennial	High	33	0:1	0
24A_1	3683+00	Perennial	High	50	0:1	0
24D	3639+50	Perennial	Medium	15	0.5:1	7.5
24F_2	3627+00	Perennial	High	50	0:1	0
24F_3	3626+00	Perennial	High	34	0:1	0
25F	3582+00	Ephemeral	Low	203	1:1	203
25G	3597+00	Intermittent	Low	129	1:1	129
25L	3597+00	Intermittent	Low	66	1:1	66
26B	3509+00	Intermittent	Medium	37	0.5:1	18.5
26C	3525+00	Intermittent	High	96	0:1	0
26G	3534+00	Ephemeral	Medium	140	0.5:1	70
26G_1	3530+50	Intermittent	Medium	406	0.5:1	203
26J	3524+00	Intermittent	Medium	31	0.5:1	15.5
27A	3478+50	Perennial	High	34	0:1	0
27A_1	3480+00	Perennial	High	85	0:1	0
27A_2	3484+00	Perennial	High	59	0:1	0
27B	3479+00	Intermittent	Medium	16	0.5:1	8
27K	3484+00	Ephemeral	Low	41	1:1	41
28B	3340+00	Intermittent	Low	64	1:1	64
29A_2	3340+00	Perennial	High	30	0:1	0
29B	3329+00	Perennial	High	35	0:1	0
29B_1	3329+00	Perennial	High	34	0:1	0
29D_D	3340+00	Intermittent	Low	93	1:1	93
29K	3340+00	Intermittent	Medium	12	0.5:1	6
Total						**7,869**

Table D-3d. On-Site Stream Mitigation - Patuxent
Alternative 13B

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
4B	1687+50	Intermittent	Low	20	1:1	20
4BBB	1675+00	Perennial	Medium	372	0.5:1	186
4BBB_1	1672+50	Perennial	Medium	40	0.5:1	20
4BBBB	1735+00	Ephemeral	Low	71	1:1	71
4C	1687+00	Ephemeral	Low	42	1:1	42
4E	1694+00	Intermittent	Medium	36	0.5:1	18
4EE	1665+00	Perennial	Low	71	1:1	71
4GG	1745+00	Intermittent	Low	72	1:1	72
4GGG	1667+00	Ephemeral	Low	236	1:1	236
4GGGG	1733+00	Perennial	Low	11	1:1	11
4J	1744+00	Ephemeral	Low	98	1:1	98
4JJJJ	1693+00	Perennial	Low	17	1:1	17
4K	1725+50	Intermittent	Low	15	1:1	15
4L	1724+50	Intermittent	Low	19	1:1	19
4LLLL	1692+50	Ephemeral	Low	87	1:1	87
4M	1718+00	Perennial	High	105	0:1	0
4MMMM	1694+50	Ephemeral	Low	87	1:1	87
4NN	1713+50	Intermittent	Low	37	1:1	37
4NNN_1	1631+50	Intermittent	Medium	42	0.5:1	21
4O	1706+00	Intermittent	Medium	343	0.5:1	171.5
4OO	1712+00	Intermittent	Low	50	1:1	50
4OOOO	1693+50	Intermittent	Medium	72	0.5:1	36
4P	1703+00	Ephemeral	Low	40	1:1	40
4PPPP	1715+00	Perennial	Medium	232	0.5:1	116
4Q	1713+00	Perennial	Medium	144	0.5:1	72
4Q_1	1713+50	Perennial	Medium	51	0.5:1	25.5
4QQ	1708+00	Intermittent	Low	18	1:1	18
4QQQQ	1713+00	Intermittent	Medium	90	0.5:1	45
4RRR	1687+00	Intermittent	Medium	81	0.5:1	40.5
4S	1714+50	Ephemeral	Low	118	1:1	118
4T	1674+50	Intermittent	Low	40	1:1	40
4U	1675+00	Intermittent	Low	78	1:1	78
4UUU	1688+00	Intermittent	Medium	69	0.5:1	34.5
4W	1665+00	Perennial	Medium	36	0.5:1	18
4W_2	1665+50	Perennial	Medium	26	0.5:1	13
4Z_1	1631+50	Perennial	Medium	50	0.5:1	25
4Z_2	1630+50	Perennial	Medium	42	0.5:1	21
4Z_3	1623+00	Perennial	Medium	98	0.5:1	49
5BB	1547+00	Intermittent	Low	108	1:1	108
5F	1619+00	Perennial	Medium	49	0.5:1	24.5
5F_1	1620+50	Perennial	Medium	142	0.5:1	71
5J	1621+00	Intermittent	Low	5	1:1	5
5JJ	1570+00	Ephemeral	Low	10	1:1	10
5KK	1563+00	Intermittent	Low	5	1:1	5
5MM	1555+00	Intermittent	Low	20	1:1	20

ALTERNATIVE 13B: ONSITE MITIGATION

Table D-3d. On-Site Stream Mitigation - Patuxent

Alternative 13B

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
5N	1620+00	Intermittent	Low	122	1:1	122
5O	1596+00	Ephemeral	Low	197	1:1	197
5P	1594+00	Intermittent	Low	144	1:1	144
5Q	1554+50	Perennial	Low	943	1:1	943
5QQ	1551+00	Intermittent	Low	12	1:1	12
5S	1558+00	Perennial	Medium	70	0.5:1	35
5S_1	1558+00	Perennial	Medium	47	0.5:1	23.5
5T	1557+50	Perennial	Low	11	1:1	11
5Y	1549+00	Ephemeral	Low	111	1:1	111
6AA	1480+50	Intermittent	Low	6	1:1	6
6AAA	1527+50	Intermittent	Low	47	1:1	47
6AAA_1	1527+00	Intermittent	Low	33	1:1	33
6AAA_2	1526+00	Intermittent	Low	25	1:1	25
6AAAA	1464+50	Ephemeral	Low	9	1:1	9
6B	1511+00	Perennial	Low	9	1:1	9
6EEE	1457+50	Intermittent	Low	22	1:1	22
6FFFF_1	1526+50	Intermittent	Low	3	1:1	3
6G	1451+50	Perennial	Medium	1	0.5:1	0.5
6G_1	1467+00	Perennial	Medium	1064	0.5:1	532
6G_2	1493+00	Perennial	Medium	672	0.5:1	336
6G_3	1500+00	Perennial	Medium	1063	0.5:1	531.5
6G_6	1555+50	Perennial	Medium	270	0.5:1	135
6GGG	1543+00	Intermittent	Low	112	1:1	112
6GGG_1	1546+50	Intermittent	Low	200	1:1	200
6III	1511+00	Intermittent	Low	409	1:1	409
6J	1509+50	Ephemeral	Low	24	1:1	24
6JJJ	1513+00	Perennial	Low	32	1:1	32
6L	1521+00	Intermittent	Low	13	1:1	13
6LLL	1498+00	Perennial	Low	738	1:1	738
6MM	1539+00	Ephemeral	Low	149	1:1	149
6MMM	1496+00	Perennial	Low	33	1:1	33
6NNN_1	1496+00	Intermittent	Low	30	1:1	30
6RRR	1461+00	Intermittent	Low	52	1:1	52
6RRR_D	1460+00	Intermittent	Low	115	1:1	115
6T	1493+50	Intermittent	Low	59	1:1	59
6TTT	1479+00	Intermittent	Low	211	1:1	211
6UU	1465+00	Intermittent	Medium	35	0.5:1	17.5
6UUU	1478+00	Intermittent	Low	62	1:1	62
6V	1485+50	Ephemeral	Low	185	1:1	185
6WW	1456+50	Intermittent	Medium	61	0.5:1	30.5
6XX	1456+00	Ephemeral	Low	53	1:1	53
6YY	1456+50	Ephemeral	Low	63	1:1	63
7B	1443+50	Ephemeral	Low	482	1:1	482
Total						**8,740**

ALTERNATIVE 13C

Table D-1e. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 13C

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
1D_1	1989+50	Perennial	Medium	121	0.5:1	60.5
1D_2	1987+50	Perennial	Medium	78	0.5:1	39
1G	1994+50	Ephemeral	Low	19	1:1	19
1H	1995+00	Intermittent	Low	2	1:1	2
1H_D	1999+00	Intermittent	Low	625	1:1	625
1O	1929+00	Ephemeral	Low	227	1:1	227
1P	1931+00	Intermittent	Low	178	1:1	178
1Q	1930+00	Perennial	High	56	0:1	0
1Q_1	1927+00	Perennial	High	252	0:1	0
1R	1943+00	Perennial	Medium	482	0.5:1	241
1R_1	1936+00	Perennial	Medium	548	0.5:1	274
1RR	1958+50	Intermittent	Low	26	1:1	26
1SS	1957+00	Ephemeral	Low	317	1:1	317
1TT	1969+00	Intermittent	Low	53	1:1	53
1VV	1973+00	Perennial	Medium	39	0.5:1	19.5
1VV_1	1974+50	Perennial	Medium	18	0.5:1	9
1XX	1975+00	Ephemeral	Medium	136	0.5:1	68
1XX_1	1974+00	Intermittent	Medium	141	0.5:1	70.5
1YY	1972+00	Intermittent	Low	362	1:1	362
2A	1924+50	Ephemeral	Low	170	1:1	170
2AA	1857+00	Intermittent	Low	50	1:1	50
2D	1917+00	Ephemeral	Low	13	1:1	13
2E	1916+50	Intermittent	Low	77	1:1	77
2F	1901+00	Intermittent	Medium	669	0.5:1	334.5
2F_D	1896+00	Intermittent	Medium	499	0.5:1	249.5
2H	1870+00	Intermittent	Low	53	1:1	53
2HH	1902+50	Intermittent	Low	52	1:1	52
2I	1871+00	Intermittent	Low	244	1:1	244
2J	1864+50	Perennial	Medium	44	0.5:1	22
2J_1	1863+00	Perennial	Medium	30	0.5:1	15
2JJ	1917+00	Intermittent	Low	73	1:1	73
2L	1862+00	Intermittent	Medium	313	0.5:1	156.5
2MM	1904+00	Perennial	Medium	4	0.5:1	2
2OO	1915+00	Ephemeral	Low	33	1:1	33
2R	1870+00	Perennial	Medium	27	0.5:1	13.5
2T	1874+00	Intermittent	Medium	989	0.5:1	494.5
2V	1857+50	Perennial	Medium	16	0.5:1	8
2VV	1921+00	Intermittent	Low	17	1:1	17
2W	1914+00	Intermittent	Low	451	1:1	451
2X	1916+50	Perennial	Medium	16	0.5:1	8
2X_1	1916+50	Perennial	Medium	203	0.5:1	101.5
2Y	1928+00	Perennial	Low	241	1:1	241

Table D-1e. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 13C

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
2Y_1	1926+00	Perennial	Low	388	1:1	388
2YY	1921+00	Intermittent	Low	51	1:1	51
3A	1836+00	Perennial	Medium	44	0.5:1	22
3AA_1	1803+00	Perennial	Low	40	1:1	40
3BB	1804+00	Ephemeral	Low	120	1:1	120
3BBB	1804+00	Intermittent	Low	41	1:1	41
3CC	1819+50	Intermittent	Low	303	1:1	303
3D	1822+50	Perennial	Medium	45	0.5:1	22.5
3D_1	1820+50	Perennial	Medium	87	0.5:1	43.5
3DD	1821+00	Perennial	Medium	45	0.5:1	22.5
3F	1801+50	Ephemeral	Low	244	1:1	244
3FFF	1804+50	Intermittent	Low	52	1:1	52
3FFF_D	1805+00	Intermittent	Low	66	1:1	66
3H	1823+00	Intermittent	Low	102	1:1	102
3I	1818+00	Intermittent	Low	551	1:1	551
3JJ	1758+00	Intermittent	Low	321	1:1	321
3L	1792+50	Perennial	Medium	35	0.5:1	17.5
3L_1	1793+50	Perennial	Medium	38	0.5:1	19
3LL	1754+50	Intermittent	Low	92	1:1	92
3LL_1	1759+00	Intermittent	Low	521	1:1	521
3LLL	1794+00	Ephemeral	Low	16	1:1	16
3PP	1764+00	Ephemeral	Low	87	1:1	87
3Q	1790+00	Ephemeral	Low	73	1:1	73
3RR	1764+00	Ephemeral	Low	206	1:1	206
3S	1792+50	Perennial	Medium	183	0.5:1	91.5
3SS	1792+50	Intermittent	Low	9	1:1	9
3U	1789+50	Intermittent	Low	44	1:1	44
3UU	1817+00	Intermittent	Low	6	1:1	6
3ZZ	1764+00	Perennial	Medium	95	0.5:1	47.5
4H	1754+00	Ephemeral	Low	331	1:1	331
4YYY	1755+00	Intermittent	Low	35	1:1	35
7AA	1347+00	Intermittent	Low	102	1:1	102
7BB	1395+00	Intermittent	Low	56	1:1	56
7BB_1	1394+00	Intermittent	Low	76	1:1	76
7BB_D	1397+00	Intermittent	Low	518	1:1	518
7D	1425+50	Intermittent	Low	27	1:1	27
7E	1424+00	Perennial	Low	327	1:1	327
7F	1422+50	Intermittent	Low	32	1:1	32
7G	1431+50	Perennial	Medium	20	0.5:1	10
7G_1	1428+00	Perennial	Medium	484	0.5:1	242
7GG	1409+50	Intermittent	Low	255	1:1	255
7H	1427+00	Intermittent	Low	373	1:1	373

Table D-1e. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 13C

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
7I	1410+00	Intermittent	Medium	37	0.5:1	18.5
7JJ	1411+50	Perennial	Medium	11	0.5:1	5.5
7JJ_1	1411+00	Perennial	Medium	7	0.5:1	3.5
7MM	1347+00	Intermittent	Low	150	1:1	150
7N	1396+50	Perennial	Low	218	1:1	218
7N_1	1394+50	Perennial	Low	76	1:1	76
7NN	1347+00	Ephemeral	Low	134	1:1	134
7O	1393+00	Perennial	Low	53	1:1	53
7O_1	1394+00	Perennial	Low	41	1:1	41
7PP	1347+00	Intermittent	Low	35	1:1	35
7S	1347+00	Perennial	Medium	128	0.5:1	64
7T	1424+00	Perennial	Low	17	1:1	17
7T_1	1425+00	Perennial	Low	207	1:1	207
7V	1429+00	Ephemeral	Low	46	1:1	46
8A	1334+50	Intermittent	Low	186	1:1	186
8E	1338+50	Intermittent	Low	106	1:1	106
8F	1336+00	Intermittent	Low	70	1:1	70
8G_1	1339+00	Intermittent	Low	47	1:1	47
8HH	1347+00	Intermittent	Medium	133	0.5:1	66.5
8I	1337+50	Ephemeral	Low	45	1:1	45
8J	1328+50	Intermittent	Low	181	1:1	181
8J_2	1333+50	Perennial	Medium	29	0.5:1	14.5
8MM	1334+00	Intermittent	Low	41	1:1	41
8N	1330+00	Intermittent	Medium	112	0.5:1	56
8N_1	1332+00	Perennial	Medium	319	0.5:1	159.5
8N_D	1329+50	Intermittent	Medium	51	0.5:1	25.5
8R_D1	1282+50	Intermittent	Low	347	1:1	347
8S	1292+00	Ephemeral	Low	137	1:1	137
8S_1	1289+00	Ephemeral	Low	7	1:1	7
8T	1289+00	Ephemeral	Low	118	1:1	118
8V	1310+00	Intermittent	Low	46	1:1	46
8W	1347+00	Intermittent	Medium	211	0.5:1	105.5
8W_1	1347+00	Intermittent	Medium	502	0.5:1	251
8Z	1347+00	Perennial	Medium	60	0.5:1	30
9A	1290+00	Intermittent	Low	141	1:1	141
9C	1289+00	Intermittent	Low	196	1:1	196
9CC	1227+00	Perennial	Low	325	1:1	325
9F	1186+00	Intermittent	Low	292	1:1	292
9FF	1229+00	Ephemeral	Low	103	1:1	103
9G	1184+50	Perennial	Medium	133	0.5:1	66.5
9G_1	1184+50	Perennial	Medium	50	0.5:1	25
9GG	1228+00	Intermittent	Low	5	1:1	5

Table D-1e. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 13C

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
9J	1203+00	Perennial	Medium	49	0.5:1	24.5
9JJ	1242+50	Perennial	Medium	407	0.5:1	203.5
9LL	1245+00	Ephemeral	Low	32	1:1	32
9M	1204+00	Intermittent	Low	308	1:1	308
9M_D	1208+00	Intermittent	Low	419	1:1	419
9MM	1244+00	Intermittent	Low	106	1:1	106
9P	1202+00	Ephemeral	Low	198	1:1	198
9QQ	1200+50	Intermittent	Low	99	1:1	99
9QQ_1	1199+50	Ephemeral	Low	89	1:1	89
9R	1289+50	Intermittent	Low	589	1:1	589
9RR	1204+00	Intermittent	Low	456	1:1	456
9RR_1	1206+00	Ephemeral	Low	113	1:1	113
9T	1264+00	Intermittent	Low	18	1:1	18
9T_1	1263+00	Perennial	Low	78	1:1	78
9VV	1225+00	Intermittent	Low	119	1:1	119
9Y	1240+50	Perennial	Medium	61	0.5:1	30.5
9Y_1	1240+00	Perennial	Medium	33	0.5:1	16.5
9Z	1240+50	Intermittent	Low	31	1:1	31
10AA	1115+00	Perennial	Low	265	1:1	265
10B_1	1163+50	Intermittent	Low	48	1:1	48
10BB	1119+00	Perennial	Low	586	1:1	586
10C	1163+50	Perennial	Medium	101	0.5:1	50.5
10C_1	1165+50	Perennial	Medium	53	0.5:1	26.5
10E	1160+50	Perennial	Low	73	1:1	73
10F	1160+00	Intermittent	Low	11	1:1	11
10F_1	1162+50	Intermittent	Low	79	1:1	79
10F_2	1163+00	Intermittent	Low	53	1:1	53
10FF	1158+00	Intermittent	Low	136	1:1	136
10J	1156+00	Intermittent	Low	174	1:1	174
10JJ	1158+00	Intermittent	Low	12	1:1	12
10KK	1158+00	Intermittent	Low	200	1:1	200
10L	1145+00	Intermittent	Low	524	1:1	524
10MM	1158+00	Intermittent	Low	25	1:1	25
10MM_1	1158+00	Intermittent	Medium	342	0.5:1	171
10N	1142+50	Intermittent	Low	74	1:1	74
10N_1	1140+50	Intermittent	Low	269	1:1	269
10N_D	1142+50	Intermittent	Low	191	1:1	191
10PP	1158+00	Intermittent	Medium	28	0.5:1	14
10PP_1	1158+00	Intermittent	Medium	80	0.5:1	40
10Q	1109+00	Ephemeral	Low	123	1:1	123
10S	1112+50	Perennial	Low	450	1:1	450
10U	1114+00	Intermittent	Low	176	1:1	176

Table D-1e. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 13C

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
10X	1134+00	Ephemeral	Low	174	1:1	174
11A	1104+00	Intermittent	Low	111	1:1	111
11A_1	1103+50	Perennial	Low	30	1:1	30
11AA	1067+50	Intermittent	Low	343	1:1	343
11C	1103+00	Intermittent	Low	257	1:1	257
11CC	1069+50	Intermittent	Low	18	1:1	18
11D	1102+50	Intermittent	Low	97	1:1	97
11E_D	1097+00	Perennial	Low	915	1:1	915
11E_D2	1092+00	Perennial	Low	46	1:1	46
11G	1095+00	Intermittent	Low	861	1:1	861
11GG	1034+50	Ephemeral	Low	156	1:1	156
11H	1079+50	Intermittent	Low	16	1:1	16
11L	1071+00	Perennial	Medium	51	0.5:1	25.5
11L_2	1071+00	Perennial	Medium	81	0.5:1	40.5
11M	1068+00	Intermittent	Low	4	1:1	4
11M_1	1069+00	Intermittent	Low	211	1:1	211
11M_B	1068+50	Intermittent	Low	31	1:1	31
11R	1014+00	Perennial	Low	99	1:1	99
11R_1	1014+50	Perennial	Low	60	1:1	60
11R_D	1011+00	Intermittent	Low	593	1:1	593
11T	1013+50	Perennial	Low	21	1:1	21
11V	1072+50	Perennial	Low	191	1:1	191
11Y	1060+00	Intermittent	Low	387	1:1	387
12C	0915+00	Perennial	Low	271	1:1	271
12CCC	0923+50	Perennial	Low	175	1:1	175
12F	0918+50	Perennial	Low	33	1:1	33
12FFF	0929+00	Ephemeral	Low	422	1:1	422
12GGG	0906+50	Ephemeral	Low	79	1:1	79
12H	0908+50	Perennial	Low	44	1:1	44
12H_2	0924+00	Perennial	Low	8	1:1	8
12H_3	0926+00	Perennial	Low	286	1:1	286
12H_4	0930+00	Perennial	Low	475	1:1	475
12H_5	0933+50	Perennial	Low	22	1:1	22
12HHH	0906+00	Intermittent	Low	176	1:1	176
12HHHH	0895+50	Intermittent	Low	43	1:1	43
12II	0928+00	Perennial	High	71	0:1	0
12II_4	0938+00	Perennial	High	267	0:1	0
12II_5	0938+00	Perennial	High	91	0:1	0
12JJJ	0906+50	Perennial	Low	28	1:1	28
12K	0910+00	Perennial	Low	60	1:1	60
12K_1	0912+50	Perennial	Low	3	1:1	3
12KK	0943+00	Perennial	Low	535	1:1	535

Table D-1e. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 13C

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
12KKK	0906+50	Intermittent	Low	265	1:1	265
12LL	0951+00	Ephemeral	Low	123	1:1	123
12MM	0967+00	Intermittent	Low	402	1:1	402
12MMM	0907+00	Ephemeral	Low	34	1:1	34
12NNN	0907+50	Intermittent	Low	174	1:1	174
12O	0907+50	Intermittent	Low	147	1:1	147
12O_1	0908+00	Intermittent	Low	84	1:1	84
12OO	0976+50	Perennial	Medium	65	0.5:1	32.5
12OO_1	0976+50	Perennial	Medium	33	0.5:1	16.5
12P	0909+00	Intermittent	Low	31	1:1	31
12PPP	0939+50	Intermittent	Low	74	1:1	74
12QQQ	0939+00	Intermittent	Low	168	1:1	168
12RRR	0946+00	Perennial	Low	29	1:1	29
12S	0923+00	Intermittent	Low	351	1:1	351
12T	0923+50	Intermittent	Low	40	1:1	40
12T_D	0921+50	Intermittent	Low	386	1:1	386
12UUU	0976+00	Perennial	Low	32	1:1	32
12VVV	0931+00	Intermittent	Low	431	1:1	431
12WW	0935+00	Perennial	Low	97	1:1	97
12WW_1	0934+50	Perennial	Low	24	1:1	24
12WW_2	0931+00	Perennial	Low	35	1:1	35
12WWW	0937+00	Intermittent	Low	84	1:1	84
12WWW_1	0935+00	Intermittent	Low	90	1:1	90
12XX	0925+00	Perennial	Medium	100	0.5:1	50
12XX_1	0923+50	Perennial	Medium	15	0.5:1	7.5
12Y	0929+50	Intermittent	Low	4	1:1	4
12Y_D	0929+00	Intermittent	Low	215	1:1	215
12YYY	0934+50	Perennial	Low	843	1:1	843
12YYY_1	0931+00	Perennial	Low	160	1:1	160
12Z	0917+50	Intermittent	Low	100	1:1	100
13A	0807+50	Intermittent	Low	143	1:1	143
13C	0863+00	Intermittent	Low	145	1:1	145
13C_1	0870+00	Intermittent	Low	601	1:1	601
13E	0794+00	Ephemeral	Low	28	1:1	28
13G	0792+00	Intermittent	Low	11	1:1	11
13H	0785+50	Perennial	Low	211	1:1	211
13I	0795+00	Ephemeral	Low	154	1:1	154
13I_1	0796+50	Intermittent	Low	170	1:1	170
13J	0767+00	Intermittent	Low	59	1:1	59
13J_1	0770+00	Intermittent	Low	218	1:1	218
13J_2	0774+00	Intermittent	Low	49	1:1	49
13K	0798+50	Intermittent	Low	158	1:1	158

Table D-1e. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 13C

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
13L	0798+50	Ephemeral	Low	198	1:1	198
13M	0836+00	Perennial	Low	1528	1:1	1528
13M_1	0828+50	Perennial	Low	78	1:1	78
13M_D	0844+50	Intermittent	Low	151	1:1	151
13N	0828+00	Ephemeral	Low	58	1:1	58
13P	0797+00	Perennial	High	100	0:1	0
13P_1	0797+50	Perennial	High	256	0:1	0
13Q	0863+00	Intermittent	Low	519	1:1	519
13R	0849+00	Intermittent	Low	192	1:1	192
13S	0846+00	Intermittent	Low	23	1:1	23
13X_1	0830+00	Perennial	Low	29	1:1	29
13Y	0830+00	Perennial	Low	86	1:1	86
13Z	0869+00	Intermittent	Low	380	1:1	380
14A	0745+00	Intermittent	Medium	9	0.5:1	4.5
14A_1	0745+00	Intermittent	Medium	161	0.5:1	80.5
14E	0745+00	Perennial	Medium	41	0.5:1	20.5
14G	0707+50	Intermittent	Medium	10	0.5:1	5
14G_1	0707+50	Intermittent	Medium	16	0.5:1	8
15A	0664+00	Intermittent	Low	581	1:1	581
15B	0662+50	Intermittent	Low	99	1:1	99
15C	0686+00	Intermittent	Low	14	1:1	14
15D	0685+50	Perennial	Medium	21	0.5:1	10.5
15E	0685+00	Ephemeral	Low	7	1:1	7
16A	0604+00	Perennial	Medium	50	0.5:1	25
16A_1	0597+00	Perennial	Medium	1116	0.5:1	558
16A_2	0589+00	Perennial	Medium	81	0.5:1	40.5
16D	0599+50	Intermittent	Low	36	1:1	36
16E	0638+00	Intermittent	Low	164	1:1	164
16G	0614+00	Perennial	Medium	172	0.5:1	86
16G_1	0606+00	Perennial	Medium	165	0.5:1	82.5
16G_D	0626+00	Perennial	Medium	56	0.5:1	28
16G_D1	0619+50	Perennial	Medium	141	0.5:1	70.5
16J	0610+50	Ephemeral	Low	42	1:1	42
16J_1	0610+00	Ephemeral	Low	3	1:1	3
17B	0544+00	Ephemeral	Low	50	1:1	50
17BB	0568+00	Intermittent	Medium	31	0.5:1	15.5
17DD	0565+50	Intermittent	Medium	26	0.5:1	13
17F	0588+50	Perennial	Medium	3	0.5:1	1.5
17Y	0558+00	Intermittent	Low	31	1:1	31
17Z	0579+50	Ephemeral	Low	197	1:1	197
18A	0527+00	Intermittent	Low	13	1:1	13
18B	0526+50	Ephemeral	Low	35	1:1	35

Table D-1e. On-Site Stream Mitigation - Middle-Potomac-Anacostia-Occoquan
Alternative 13C

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
18C_1	0517+50	Perennial	Medium	20	0.5:1	10
18G	0537+00	Intermittent	Low	5	1:1	5
18I	0509+00	Perennial	Low	5	1:1	5
19B	0436+00	Intermittent	Low	26	1:1	26
19C	0432+00	Perennial	Medium	33	0.5:1	16.5
19F	0434+00	Perennial	Low	104	1:1	104
19F_1	0438+00	Perennial	Low	110	1:1	110
19F_2	0441+00	Perennial	Low	67	1:1	67
19F_3	0454+00	Perennial	Low	49	1:1	49
19F_4	0468+00	Perennial	Low	4	1:1	4
19J_1	0408+00	Perennial	Low	32	1:1	32
19J_2	0410+00	Perennial	Low	67	1:1	67
19K_1	0470+00	Perennial	High	8	0:1	0
19K_2	0491+00	Perennial	Medium	135	0.5:1	67.5
19K_7	0588+50	Perennial	Medium	69	0.5:1	34.5
19K_8	0588+50	Perennial	Medium	71	0.5:1	35.5
19R	0462+50	Intermittent	Low	3	1:1	3
19R_1	0463+50	Intermittent	Low	1	1:1	1
19T	0467+50	Perennial	Low	74	1:1	74
19T_1	0468+50	Perennial	Low	121	1:1	121
19V	0490+00	Perennial	Medium	18	0.5:1	9
23G	4799+00	Perennial	Medium	1162	0.5:1	581
23G_1	4805+00	Perennial	Medium	56	0.5:1	28
23Q	4774+50	Intermittent	Medium	279	0.5:1	139.5
23Q_1	4782+00	Perennial	Medium	58	0.5:1	29
23Q_2	4783+50	Perennial	Medium	56	0.5:1	28
23R	4770+00	Perennial	Medium	131	0.5:1	65.5
23S	4796+00	Intermittent	Medium	24	0.5:1	12
Total						**43,546**

ALTERNATIVE 13C: ONSITE MITIGATION

Table D-2e. On-Site Stream Mitigation - Middle-Potomac-Catoctin

Alternative 13C

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
20B	0342+00	Intermittent	Low	19	1:1	19
20D	0324+00	Perennial	Low	505	1:1	505
20E	0332+00	Intermittent	Low	22	1:1	22
21B	0305+00	Perennial	Medium	1024	0.5:1	512
21C	0276+00	Perennial	Medium	2298	0.5:1	1149
21C_1	0245+00	Perennial	Medium	1844	0.5:1	922
21C_2	0233+00	Perennial	Medium	406	0.5:1	203
21D	0225+50	Intermittent	Low	86	1:1	86
21D_1	0227+00	Intermittent	Low	215	1:1	215
21F	0246+00	Intermittent	Low	75	1:1	75
21G	0239+00	Intermittent	Low	57	1:1	57
21H	0247+50	Ephemeral	Low	27	1:1	27
21L_D	0278+50	Perennial	Low	71	1:1	71
21M	0262+50	Intermittent	Low	23	1:1	23
21V	0297+00	Ephemeral	Low	87	1:1	87
22A	0222+00	Intermittent	Low	140	1:1	140
22AA	0224+00	Perennial	Medium	82	0.5:1	41
22AA_1	0200+50	Perennial	Medium	16	0.5:1	8
22AA_2	0200+00	Perennial	Medium	98	0.5:1	49
22AA_3	0198+00	Perennial	Medium	188	0.5:1	94
22B	0219+00	Intermittent	Low	35	1:1	35
22C	0219+00	Intermittent	Low	50	1:1	50
22D	0218+50	Intermittent	Low	144	1:1	144
22EE	0192+00	Ephemeral	Low	45	1:1	45
22FF	0177+00	Ephemeral	Low	34	1:1	34
22H	0198+00	Intermittent	Low	7	1:1	7
22H_1	0198+00	Intermittent	Low	10	1:1	10
22HH	0132+00	Intermittent	Medium	260	0.5:1	130
22HH_1	0129+00	Intermittent	Medium	154	0.5:1	77
22HH_2	0127+50	Intermittent	Medium	117	0.5:1	58.5
22KK	0198+00	Perennial	Low	26	1:1	26
22M_1	0114+00	Perennial	Medium	30	0.5:1	15
22MM	0106+00	Perennial	High	1025	0:1	0
22MM_B	0106+00	Perennial	High	138	0:1	0
22NN	0110+00	Intermittent	Low	275	1:1	275
22NN_B	0109+00	Intermittent	Low	166	1:1	166
22P	0125+00	Intermittent	Medium	9	0.5:1	4.5
22Q	0125+00	Perennial	Medium	136	0.5:1	68
22Q_1	0125+00	Perennial	Medium	61	0.5:1	30.5
22QQ	0113+50	Intermittent	Low	106	1:1	106
22T_D	0128+50	Intermittent	Low	8	1:1	8
22T_D1	0128+50	Intermittent	Low	34	1:1	34
22T_D2	0128+50	Intermittent	Low	92	1:1	92
22V	0118+50	Intermittent	Low	76	1:1	76
22V_1	0118+50	Intermittent	Low	39	1:1	39

ALTERNATIVE 13C: ONSITE MITIGATION

Table D-2e. On-Site Stream Mitigation - Middle-Potomac-Catoctin

Alternative 13C

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
22V_2	0118+50	Intermittent	Low	26	1:1	26
22Z	0198+00	Perennial	Medium	72	0.5:1	36
22Z_1	0197+00	Perennial	Medium	38	0.5:1	19
23A_1	3744+00	Perennial	High	99	0:1	0
23A_3	3758+00	Perennial	High	353	0:1	0
23AA	3749+50	Perennial	Medium	76	0.5:1	38
23AA_1	3751+00	Perennial	Medium	213	0.5:1	106.5
23D	3755+50	Intermittent	Medium	700	0.5:1	350
23DD	3701+50	Intermittent	Low	89	1:1	89
23K	3701+00	Perennial	Medium	152	0.5:1	76
23K_1	3692+00	Perennial	Medium	233	0.5:1	116.5
23K_D	3688+00	Perennial	Medium	596	0.5:1	298
23N	4718+00	Intermittent	Medium	204	0.5:1	102
23N_D	4730+00	Intermittent	Medium	32	0.5:1	16
23V	3722+00	Intermittent	Low	24	1:1	24
24A	3683+00	Perennial	High	33	0:1	0
24A_1	3683+00	Perennial	High	50	0:1	0
24D	3639+50	Perennial	Medium	15	0.5:1	7.5
24F_2	3627+00	Perennial	High	50	0:1	0
24F_3	3626+00	Perennial	High	34	0:1	0
25E	3560+50	Perennial	Medium	21	0.5:1	10.5
25F	3582+00	Ephemeral	Low	193	1:1	193
25G	3597+00	Intermittent	Low	129	1:1	129
25H_1	3560+00	Perennial	High	15	0:1	0
25L	3597+00	Intermittent	Low	66	1:1	66
26B	3509+00	Intermittent	Medium	37	0.5:1	18.5
26C	3525+00	Intermittent	High	96	0:1	0
26G	3534+00	Ephemeral	Medium	145	0.5:1	72.5
26G_1	3530+50	Intermittent	Medium	414	0.5:1	207
26J	3524+00	Intermittent	Medium	31	0.5:1	15.5
27A	3478+50	Perennial	High	50	0:1	0
27A_1	3480+00	Perennial	High	85	0:1	0
27A_2	3484+00	Perennial	High	58	0:1	0
27B	3479+00	Intermittent	Medium	22	0.5:1	11
27C	3475+50	Ephemeral	Medium	14	0.5:1	7
27D	3476+00	Intermittent	Medium	72	0.5:1	36
27K	3484+00	Ephemeral	Low	41	1:1	41
28B	3340+00	Intermittent	Low	64	1:1	64
29A_2	3340+00	Perennial	High	25	0:1	0
29B	3329+00	Perennial	High	35	0:1	0
29B_1	3329+00	Perennial	High	34	0:1	0
29D_D	3340+00	Intermittent	Low	93	1:1	93
29K	3340+00	Intermittent	Medium	12	0.5:1	6
Total						**8,110**

ALTERNATIVE 13C: ONSITE MITIGATION

Table D-3e. On-Site Stream Mitigation - Patuxent

Alternative 13C

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
4B	1687+50	Intermittent	Low	20	1:1	20
4BBB	1675+00	Perennial	Medium	372	0.5:1	186
4BBB_1	1672+50	Perennial	Medium	40	0.5:1	20
4BBBB	1735+00	Ephemeral	Low	71	1:1	71
4C	1687+00	Ephemeral	Low	42	1:1	42
4E	1694+00	Intermittent	Medium	36	0.5:1	18
4EE	1665+00	Perennial	Low	71	1:1	71
4GG	1745+00	Intermittent	Low	72	1:1	72
4GGG	1667+00	Ephemeral	Low	236	1:1	236
4GGGG	1733+00	Perennial	Low	11	1:1	11
4J	1744+00	Ephemeral	Low	98	1:1	98
4JJJJ	1693+00	Perennial	Low	17	1:1	17
4K	1725+50	Intermittent	Low	15	1:1	15
4L	1724+50	Intermittent	Low	19	1:1	19
4LLLL	1692+50	Ephemeral	Low	87	1:1	87
4M	1718+00	Perennial	High	105	0:1	0
4MMMM	1694+50	Ephemeral	Low	87	1:1	87
4NN	1713+50	Intermittent	Low	37	1:1	37
4NNN_1	1631+50	Intermittent	Medium	42	0.5:1	21
4O	1706+00	Intermittent	Medium	343	0.5:1	171.5
4OO	1712+00	Intermittent	Low	50	1:1	50
4OOOO	1693+50	Intermittent	Medium	72	0.5:1	36
4P	1703+00	Ephemeral	Low	40	1:1	40
4PPPP	1715+00	Perennial	Medium	232	0.5:1	116
4Q	1713+00	Perennial	Medium	144	0.5:1	72
4Q_1	1713+50	Perennial	Medium	51	0.5:1	25.5
4QQ	1708+00	Intermittent	Low	18	1:1	18
4QQQQ	1713+00	Intermittent	Medium	90	0.5:1	45
4RRR	1687+00	Intermittent	Medium	81	0.5:1	40.5
4S	1714+50	Ephemeral	Low	118	1:1	118
4T	1674+50	Intermittent	Low	40	1:1	40
4U	1675+00	Intermittent	Low	78	1:1	78
4UUU	1688+00	Intermittent	Medium	69	0.5:1	34.5
4W	1665+00	Perennial	Medium	36	0.5:1	18
4W_2	1665+50	Perennial	Medium	26	0.5:1	13
4Z_1	1631+50	Perennial	Medium	50	0.5:1	25
4Z_2	1630+50	Perennial	Medium	42	0.5:1	21
4Z_3	1623+00	Perennial	Medium	98	0.5:1	49
5BB	1547+00	Intermittent	Low	108	1:1	108
5F	1619+00	Perennial	Medium	49	0.5:1	24.5
5F_1	1620+50	Perennial	Medium	142	0.5:1	71
5J	1621+00	Intermittent	Low	5	1:1	5
5JJ	1570+00	Ephemeral	Low	10	1:1	10
5KK	1563+00	Intermittent	Low	5	1:1	5
5MM	1555+00	Intermittent	Low	20	1:1	20

ALTERNATIVE 13C: ONSITE MITIGATION

Table D-3e. On-Site Stream Mitigation - Patuxent

Alternative 13C

ID	Station	Type	Function	Proposed Open Channel Length (LF)	Credit Ratio	Proposed Onsite Mitigation Credit (LF)
5N	1620+00	Intermittent	Low	122	1:1	122
5O	1596+00	Ephemeral	Low	197	1:1	197
5P	1594+00	Intermittent	Low	144	1:1	144
5Q	1554+50	Perennial	Low	943	1:1	943
5QQ	1551+00	Intermittent	Low	12	1:1	12
5S	1558+00	Perennial	Medium	70	0.5:1	35
5S_1	1558+00	Perennial	Medium	47	0.5:1	23.5
5T	1557+50	Perennial	Low	11	1:1	11
5Y	1549+00	Ephemeral	Low	111	1:1	111
6AA	1480+50	Intermittent	Low	6	1:1	6
6AAA	1527+50	Intermittent	Low	47	1:1	47
6AAA_1	1527+00	Intermittent	Low	33	1:1	33
6AAA_2	1526+00	Intermittent	Low	25	1:1	25
6AAAA	1464+50	Ephemeral	Low	9	1:1	9
6B	1511+00	Perennial	Low	9	1:1	9
6EEE	1457+50	Intermittent	Low	22	1:1	22
6FFFF_1	1526+50	Intermittent	Low	3	1:1	3
6G	1451+50	Perennial	Medium	1	0.5:1	0.5
6G_1	1467+00	Perennial	Medium	1064	0.5:1	532
6G_2	1493+00	Perennial	Medium	672	0.5:1	336
6G_3	1500+00	Perennial	Medium	1063	0.5:1	531.5
6G_6	1555+50	Perennial	Medium	270	0.5:1	135
6GGG	1543+00	Intermittent	Low	112	1:1	112
6GGG_1	1546+50	Intermittent	Low	200	1:1	200
6III	1511+00	Intermittent	Low	409	1:1	409
6J	1509+50	Ephemeral	Low	24	1:1	24
6JJJ	1513+00	Perennial	Low	32	1:1	32
6L	1521+00	Intermittent	Low	13	1:1	13
6LLL	1498+00	Perennial	Low	738	1:1	738
6MM	1539+00	Ephemeral	Low	149	1:1	149
6MMM	1496+00	Perennial	Low	33	1:1	33
6NNN_1	1496+00	Intermittent	Low	30	1:1	30
6RRR	1461+00	Intermittent	Low	52	1:1	52
6RRR_D	1460+00	Intermittent	Low	115	1:1	115
6T	1493+50	Intermittent	Low	59	1:1	59
6TTT	1479+00	Intermittent	Low	211	1:1	211
6UU	1465+00	Intermittent	Medium	35	0.5:1	17.5
6UUU	1478+00	Intermittent	Low	62	1:1	62
6V	1485+50	Ephemeral	Low	185	1:1	185
6WW	1456+50	Intermittent	Medium	61	0.5:1	30.5
6XX	1456+00	Ephemeral	Low	53	1:1	53
6YY	1456+50	Ephemeral	Low	63	1:1	63
7B	1443+50	Ephemeral	Low	482	1:1	482
Total						**8,740**

APPENDIX E: PUBLIC SITE WALKTHROUGH RATING CRITERIA & FIELD ASSESSMENT FORMS

WETLAND MITIGATION RATING CRITERIA & FIELD SITE ASSESSMENT FORMS

Wetland Mitigation Field Site Assessment Rating Criteria

Instructions

Mitigation Site Number

First four letters of the 8-digit federal HUC watershed name followed by 4 digits. For example, CHOP0001 would represent site 1 of the Choptank watershed.

Estimated Mitigation Needs

Provide the acres of mitigation needed to satisfy the impacts using current replacement ratios or other agency agreed upon ratios for your

Soils Criteria

Estimate percentage from soil map or GIS. Describe any feature or field observation that may verify that the mapping is correct or incorrect. This criteria should be considered when evaluating the Depth of Excavation citeria.

Vegetation

Decribe the vegetation that characterizes the area being considered as potential mitigation. Decribe the dominant species, any invasive species that seem problematic, density of trees and shrubs, maturity of trees, etc. Record a photo to document typical condition.

Hydrology

Determine and describe any hydrologic connectivity that may exist. This criteria should be considered when evaluating the Depth of Excavation criteria

Land Use

Describe how the land is currently being utilized. Make any note if that use is intended to change in the near future.

100 Year Floodplain

Note whether the site is located within a floodplain and how frequently it may be flooded. Absence of a floodplain will score low but does preclude a site from consideration when other factors are considered.

Habitat Value

Describe the surrounding area. Is it large enough to provide significant habitat value? Could the area benefit from a wetland creation?

Geomorphic Position

Describe where the site is within the landscape. Consider whether its position is conducive to creating and sustaining a wetland.

Ease of Access

Judge how easy/difficult it would be for construction access. Consider whether existing paths already exist or whether significant clearing would be needed. Record a photo of the likely access or the deterence to it.

Estimate cut to wetland hydrology

Estimate how much depth of excavation may be needed to reach requisite hydrology for a successful wetland creation/restoration, etc. Evaluator should consider time of year of evaluation, existing soils, surfacewater contributions, and/or other site conditions which provide evidence of the depth of excavation needed to create a wetland.

Utilities Present

Look for and note any utilities that may be in the immediate area and which could affect optimizing the site for wetland creation or serve as an obsticle to construction activity.

Wetland Mitigation Field Site Assessment Form

Project Details

Project Name:	I-495/I-270 Managed Lanes Study	**Mitigation Site Number:**	MPAO0008
Estimated Mitigation Needs (ac):	TBD		
Date:	4/3/2019	**Consultant Firm/Investigator(s):**	KJH, BM

Site Location Details

County:	Prince George's	**Cross Roads:**	Sellman Road and E Line Road		
Basin (HUC 8):	Middle Potomoac-Catoctin		**MDE Watershed (8 digit):**	02070010	
Proximity to Impacted Wetland (mi.):	0.35		**Lat/Long:**	39.026019	-76.930444

Site Data

Parcel Size (ac):	502	**Potential Creation Area (ac):**	0.0
Lat/Long:	39.026019 -76.930444	**Potential Preservation Area (ac):**	6.8
Land Use:	Agricultural and Forested	**Adjacent Land Use:**	Agricultural and Forested
Mapped Soils:	Water		
Property Address:	Spellman Road, Beltsville, MD		
Property Owner(s):	BARC		

Additional Field Observations

RTE species present? (explain below)	TBD	**Evidence of disturbance? (explain below)**	
Is site currently a wetland?	Yes	**Was site formerly a wetland?**	

Condition: See photos	**Condition:** Site consists of open water man made pond with fringe wetland

Mitigation Site Rating

Criteria	Score	Criteria	Score
Soils	10	**Vegetation**	5
10 - Greater than 50% hydric soil 5 - 10% to 50% hydric soil 1 - Less than 10% hydric soil		10 - Herbaceous cover 5 - Scrub-shrub cover 1 - Mostly forested	
Describe: Water - permanently inundated with fringe wetland		Describe: Surrounded by scrub shrub - river birch, bradford pear, red maple, and sycamore.	
Hydrology	10	**Land Use**	10
10 - Abuts wetland or stream 5 - Adjacent to wetland or stream 1 - No connection to wetland or stream		10 - Agricultural or Open Space 5 - Mariginal Pasture 1 - Old field	
Describe: Majority of site is open water surrounded by PEM fringe.		Describe: Surrounded by agricultural land and scrub shrub.	
100-Year Floodplain	1	**Habitat Value**	1
10 - Yes (active evidence of flooding) 5-Yes (mapped but no eveidence of active flooding) 1 - No		10 - Contiguous to wetland/upland forest > 100 ac 5 - Contiguous to wetland/upland forest 25-100 ac 1 - Contiguous to wetland/upland forest < 25 ac	
Describe: No evidence of flooding. Berm surrounds pond.		Describe: Western side = active agricultural fiels. Eastern side = narrow hedgerow.	
Geomorphic Position	10	**Ease of Access**	1
10 - Low or concave topography 5 - Flat topography 1 - High topography/steep slopes		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Manmade pond		Describe: Clearing of scrub-shrub required.	
Estimated cut to wetland hydrology	10	**Utilities Present**	5
10 - Less than 2' 5-between 3' - 5' 1 - greater than 5'		10 - No utilities on site 5 - Utilities but not within creation area 1 - Utilities within potential creation area	
Describe: Open water 4"-2' deep.		Describe: Powerlines adjacent to site.	
		Total Score out of 100	**63**

Map

Site No.	MPAO0008		Scale: 1 in. =	2,000

Site Photos

Wetland Mitigation Field Site Assessment Form

Project Details

Project Name:	I-495/I-270 Managed Lanes Study	**Mitigation Site Number:**	MPAO0032
Estimated Mitigation Needs (ac):	TBD		
Date:	8/14/2019	**Consultant Firm/Investigator(s):**	RKK; KJH/AJN

Site Location Details

County:	Montgomery	**Cross Roads:**	Mahaska Drive and Oskaloosa Drive
Basin (HUC 8):	Middle Potomac-Anacostia-Occoquan	**MDE Watershed (8 digit):**	02140206
Proximity to Impacted Wetland (mi.):	1.83	**Lat/Long:**	39.115265 -77.145699

Site Data

Parcel Size (ac):	12.2, 5.7, 80.4, 9.7	**Potential Creation Area (ac):**	1.6
Lat/Long:	39.11553546 -77.14594816	**Potential Preservation Area (ac):**	2.1
Land Use:	Forest	**Adjacent Land Use:**	Low to high density residential
Mapped Soils:	Hatboro silt loam & Baile silt loam		
Property Address:	Crabbs Branch Way		
Property Owner(s):	Maryland National Park & Planning Commission		

Additional Field Observations

RTE species present? (explain below)	TBD	**Evidence of disturbance? (explain below)**	
Is site currently a wetland?		**Was site formerly a wetland?**	

Condition: Entire site in Crabbs Branch 100-year FEMA floodplain dominated by reed canary wetlands with scattered trees.	Condition: High quality seep wetland at north western end of site.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Soils	10	**Vegetation**	10
10 - Greater than 50% hydric soil 5 - 10% to 50% hydric soil 1 - Less than 10% hydric soil		10 - Herbaceous cover 5 - Scrub-shrub cover 1 - Mostly forested	
Describe: Entire site located in mapped hydric soils. Hydric soils verified in the field.		Describe: Majority of site is reed canary floodplain with scattered trees.	
Hydrology	10	**Land Use**	5
10 - Abuts wetland or stream 5 - Adjacent to wetland or stream 1 - No connection to wetland or stream		10 - Agricultural or Open Space 5 - Mariginal Pasture 1 - Old field	
Describe: Perennial channel flows through site. Existing wetlands in northern and southern floodplain		Describe: Site located in Crabbs Branch SVP. Mostly reed canary grass.	
100-Year Floodplain	5	**Habitat Value**	10
10 - Yes (active evidence of flooding) 5-Yes (mapped but no evidence of active flooding) 1 - No		10 - Contiguous to wetland/upland forest > 100 ac 5 - Contiguous to wetland/upland forest 25-100 ac 1 - Contiguous to wetland/upland forest < 25 ac	
Describe: Located in 100-year FEMA mapped floodplain. No evidence of flooding.		Describe: Adjacent to 110 acres of contiguous upland forest.	
Geomorphic Position	10	**Ease of Access**	5
10 - Low or concave topography 5 - Flat topography 1 - High topography/steep slopes		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Entire site is low topography in floodplain.		Describe: Site is open, but no existing access. Potential access from maintained HOA roads.	
Estimated cut to wetland hydrology	5	**Utilities Present**	1
10 - Less than 2' 5-between 3' - 5' 1 - greater than 5'		10 - No utilities on site 5 - Utilities but not within creation area 1 - Utilities within potential creation area	
Describe: Groundwater estimated at 3.5' below surface in non-wetland areas.		Describe: Sewerline runs throughout floodplain.	
		Total Score out of 100	**71**

Map

Site No.	MPAO0032		Scale: 1 in. =	2,000

Site Photos

Wetland Mitigation Field Site Assessment Form

Project Details

Project Name:	I-495/I-270 Managed Lanes Study	**Mitigation Site Number:**	MPOC0001
Estimated Mitigation Needs (ac):	TBD		
Date:	3/27/2019	**Consultant Firm/Investigator(s):**	RK&K/KJH, DB

Site Location Details

County:	Montgomery	**Cross Roads:**	River Rd. & Hunting Quarter Rd.
Basin (HUC 8):	Middle Potomac-Catoctin	**MDE Watershed (8 digit):**	02140202
Proximity to Impacted Wetland (mi.):	14	**Lat/Long:**	39.079584 -77.392588

Site Data

Parcel Size (ac):	2,655	**Potential Creation Area (ac):**	7.30
Lat/Long:	39.079584 -77.392588	**Potential Preservation Area (ac):**	0.0
Land Use:	Agriculture	**Adjacent Land Use:**	Forest, Wetlands
Mapped Soils:	Huntington silt loam, 0 to 3 %, occasionally flooded, Lindside silt loam, 0 to 3 %, occasionally flooded, Melvin silt loam, 0 to 2 %, occasionally flooded		
Property Address:	0-0000 River Rd.		
Property Owner(s):	Maryland Department of Natural Resources		

Additional Field Observations

RTE species present? (explain below)	TBD	**Evidence of disturbance? (explain below)**	Yes
Is site currently a wetland?	Partially	**Was site formerly a wetland?**	Possibly

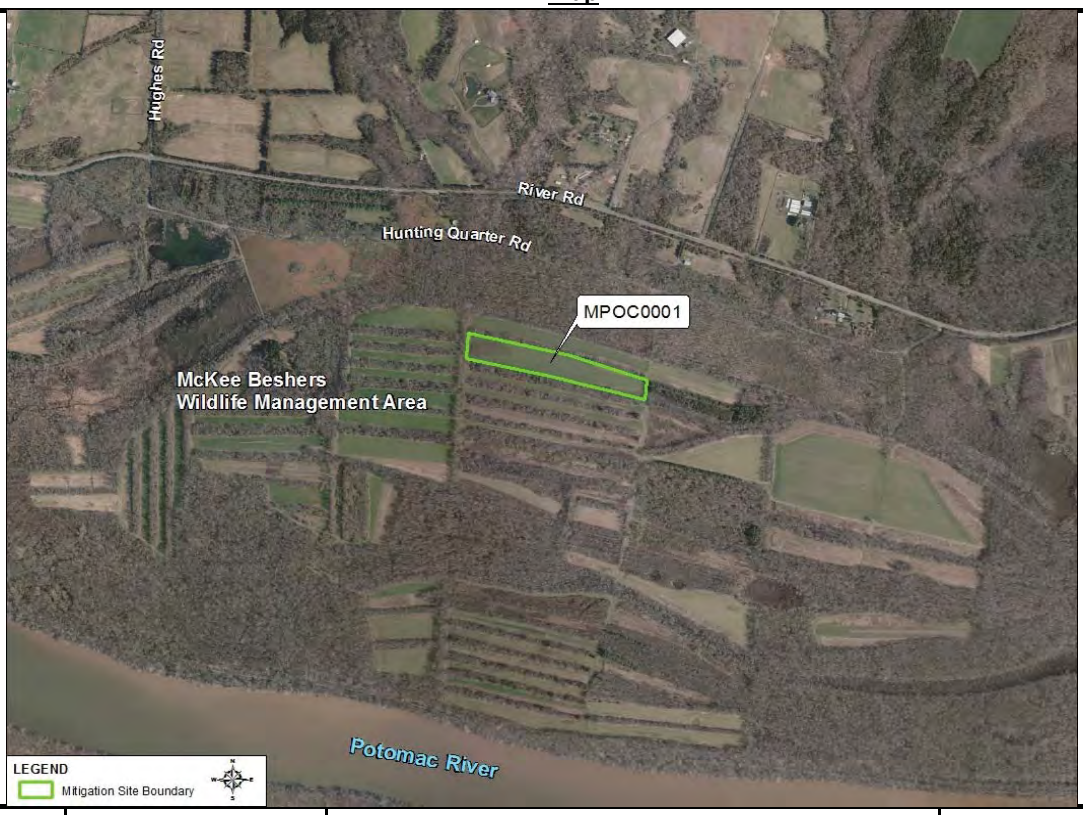
Condition: Site is located in the McKee Beshers Wildlife Management Area. Site consists of active farm field that is partially open water/saturated in the Potomac River 100 YR floodplain.

Condition: Site surrounded by hedgerows that are maintained by DNR for wildlife purposes. Hedgerow to southeast of site consists of PFO wetland. Large PFO just north of site managed for wood duck habitat.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Soils	10	**Vegetation**	10
10 - Greater than 50% hydric soil 5 - 10% to 50% hydric soil 1 - Less than 10% hydric soil		10 - Herbaceous cover 5 - Scrub-shrub cover 1 - Mostly forested	
Describe: 100% of site is mapped as hydric soils. No hydric soil indicators observed during site walk, likely due to active farming of field.		Describe: Active farm field - Remnant soy beans throughout site. No wet veg observed.	
Hydrology	10	**Land Use**	10
10 - Abuts wetland or stream 5 - Adjacent to wetland or stream 1 - No connection to wetland or stream		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field	
Describe: PFO wetland abutting southeast corner of site. Extensive open water areas within site.		Describe: Active farm field - Remnant soy beans throughout site. No wet veg observed.	
100-Year Floodplain	5	**Habitat Value**	10
10 - Yes (active evidence of flooding) 5-Yes (mapped but no evidence of active flooding) 1 - No		10 - Contiguous to wetland/upland forest > 100 ac 5 - Contiguous to wetland/upland forest 25-100 ac 1 - Contiguous to wetland/upland forest < 25 ac	
Describe: Entire site is located in Potomac River 100 YR FEMA floodplain. No evidence of flooding within site.		Describe: Site located in McKee Besher Wildlife Management Area (>100 acres of forest).	
Geomorphic Position	10	**Ease of Access**	10
10 - Low or concave topography 5 - Flat topography 1 - High topography/steep slopes		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Site consists of low/flat topography with gradual open water depressions.		Describe: Existing maintained access just east of site that connects to Hunting Quarter Rd.	
Estimated cut to wetland hydrology	10	**Utilities Present**	10
10 - Less than 2' 5-between 3' - 5' 1 - greater than 5'		10 - No utilities on site 5 - Utilities but not within creation area 1 - Utilities within potential creation area	
Describe: Groundwater observed 14" below ground surface in non-saturated areas.		Describe: No evidence of utilities observed within or adjacent to the site.	
		Total Score out of 100	**95**

Map



Site No.	MPOC0001		Scale: 1 in. =	2,000

Site Photos

Wetland Mitigation Field Site Assessment Form

Project Details

Project Name:	I-495/I-270 Managed Lanes Study	**Mitigation Site Number:**	MPOC0002
Estimated Mitigation Needs (ac):	TBD		
Date:	3/27/2019	**Consultant Firm/Investigator(s):**	RK&K/KJH, DB

Site Location Details

County:	Montgomery	**Cross Roads:**	River Rd. & Pennyfield Lock Rd.
Basin (HUC 8):	Middle Potomac-Catoctin	**MDE Watershed (8 digit):**	02140202
Proximity to Impacted Wetland (mi.):	9	**Lat/Long:**	39.057434 -77.298221

Site Data

Parcel Size (ac):	2,655	**Potential Creation Area (ac):**	0.0
Lat/Long:	39.057434 -77.298221	**Potential Preservation Area (ac):**	12.2
Land Use:	Wildlife Management	**Adjacent Land Use:**	Forest, River
Mapped Soils:	Melvin silt loam, 0 to 2 %, occasionally flooded, Huntington silt loam, 0 to 3 %, occasionally flooded, Water		
Property Address:	0-0000 River Rd.		
Property Owner(s):	Maryland Department of Natural Resources		

Additional Field Observations

RTE species present? (explain below)	TBD	**Evidence of disturbance? (explain below)**	Yes
Is site currently a wetland?	Partially	**Was site formerly a wetland?**	Possibly

Condition: Site is located in the Dierssen Wildlife Management Area. Site consists of two man-made impoundments managed for waterfowl. Siphons connecting site and C&O canal are not functioning.	**Condition:** Site is surrounded by the C&O canal/path to the north and the Potomac River to the south. Site is located in Potomac River 100 YR floodplain and consists of open water and reed canary wetlands.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Soils	10	**Vegetation**	10
10 - Greater than 50% hydric soil 5 - 10% to 50% hydric soil 1 - Less than 10% hydric soil		10 - Herbaceous cover 5 - Scrub-shrub cover 1 - Mostly forested	
Describe: 100% of site is mapped as hydric soils. Hydric soil indicators observed throughout impoundments during site walk.		Describe: Site dominated by reed canary grass with sparse cattail and black willow.	
Hydrology	10	**Land Use**	5
10 - Abuts wetland or stream 5 - Adjacent to wetland or stream 1 - No connection to wetland or stream		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field	
Describe: Impoundments consist of open water and reed canary wetlands that drain to the Potomac River.		Describe: Site managed for waterfowl. Dominated by reed canary grass with sparse cattail and black willow.	
100-Year Floodplain	5	**Habitat Value**	10
10 - Yes (active evidence of flooding) 5-Yes (mapped but no evidence of active flooding) 1 - No		10 - Contiguous to wetland/upland forest > 100 ac 5 - Contiguous to wetland/upland forest 25-100 ac 1 - Contiguous to wetland/upland forest < 25 ac	
Describe: Entire site is located in Potomac River 100 YR FEMA floodplain. No evidence of flooding within site.		Describe: Site located in Dierssen Wildlife Management Area (40 acres) that connects to other forested parkland along the Potomac (>100 acres of forest).	
Geomorphic Position	10	**Ease of Access**	1
10 - Low or concave topography 5 - Flat topography 1 - High topography/steep slopes		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Site consists of concave manmade impoundment.		Describe: Access is very limited. Would need to go through 10' wide C&O canal trail that would require crossing two foot bridges. One bridge needs replacement.	
Estimated cut to wetland hydrology	10	**Utilities Present**	10
10 - Less than 2' 5-between 3' - 5' 1 - greater than 5'		10 - No utilities on site 5 - Utilities but not within creation area 1 - Utilities within potential creation area	
Describe: Groundwater observed 0-3" below ground surface throughout site.		Describe: No evidence of utilities observed within or adjacent to the site.	
		Total Score out of 100	**81**

Map

Site No.	MPOC0002		Scale: 1 in. =	2,000

Site Photos

Wetland Mitigation Field Site Assessment Form

Project Details

Project Name:	I-495/I-270 Managed Lanes Study	**Mitigation Site Number:**	WSS-150069
Estimated Mitigation Needs (ac):	TBD		
Date:	11/12/2018	**Consultant Firm/Investigator(s):**	RK&K/KJH, CAS

Site Location Details

County:	Montgomery	**Cross Roads:**	Schaeffer Rd. & White Ground Rd.
Basin (HUC 8):	Middle Potomac-Catoctin	**MDE Watershed (8 digit):**	02140208
Proximity to Impacted Wetland (mi.):	6.7	**Lat/Long:**	39.15145062 -77.3353438

Site Data

Parcel Size (ac):	4 parcels - 12.0, 11.5, 12.0 & 12.0	**Potential Creation Area (ac):**	0.0
Lat/Long:	39.15145062 -77.3353438	**Potential Preservation Area (ac):**	0.4
Land Use:	Forest	**Adjacent Land Use:**	Agriculture & Forest
Mapped Soils:	Hatboro silt loam, 0 to 3 percent slopes		
Property Address:	0-000 Schaeffer Rd.		
Property Owner(s):	Maryland National Capital Park & Planning Commission		

Additional Field Observations

RTE species present? (explain below)	TBD	**Evidence of disturbance? (explain below)**	No
Is site currently a wetland?	Yes	**Was site formerly a wetland?**	NA

Condition: Majority of site consists of a PSS wetland located in the Little Seneca Creek 100 YR floodplain. There is an upland island in the center of the site that is dominated by red cedar.

Condition: Site vegetation is a mix of natives and invasives. A 1-3 ' wide perennial channel flows along the western edge of the site boundary.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Soils	10	**Vegetation**	5
10 - Greater than 50% hydric soil 5 - 10% to 50% hydric soil 1 - Less than 10% hydric soil		10 - Herbaceous cover 5 - Scrub-shrub cover 1 - Mostly forested	
Describe: Entire site is located in mapped hydric soils. Hydric soils were verified in the field.		Describe: Majority of site is PSS wetland dominated by persimmon, button bush, black willow, river birch, sycamore, arthraxon, soft rush, swamp rose, and sensitive fern. Upland areas within site dominated by Eastern red cedar saplings.	
Hydrology	10	**Land Use**	1
10 - Abuts wetland or stream 5 - Adjacent to wetland or stream 1 - No connection to wetland or stream		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field	
Describe: Majority of site is wetland located between two perennial channels. 0-2 inches of surface water observed throughout wetland during site investigation.		Describe: Site is located in Little Seneca Stream Valley Park and consists of floodplain with dense herbaceous vegetation and scattered tree and shrub saplings.	
100-Year Floodplain	5	**Habitat Value**	10
10 - Yes (active evidence of flooding) 5-Yes (mapped but no evidence of active flooding) 1 - No		10 - Contiguous to wetland/upland forest > 100 ac 5 - Contiguous to wetland/upland forest 25-100 ac 1 - Contiguous to wetland/upland forest < 25 ac	
Describe: Site located within 100-year FEMA floodplain. No active evidence of flooding observed during site visit.		Describe: Site connects to Seneca Creek State Park (>100 acres of forest).	
Geomorphic Position	10	**Ease of Access**	1
10 - Low or concave topography 5 - Flat topography 1 - High topography/steep slopes		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Low topography. Site located in 100-YR FEMA floodplain.		Describe: Site is is accessible from Schaeffer Rd, however access within the site would require tree clearing.	
Estimated cut to wetland hydrology	10	**Utilities Present**	10
10 - Less than 2' 5-between 3' - 5' 1 - greater than 5'		10 - No utilities on site 5 - Utilities but not within creation area 1 - Utilities within potential creation area	
Describe: Majority of site is already wetland. 0-2 inches of surface water observed throughout most of site in November.		Describe: No evidence of utilities observed within or adjacent to the site.	
		Total Score out of 100	**72**

Map

Site No.	WSS-150069		Scale: 1 in. = 2,000	

Site Photos

Wetland Mitigation Field Site Assessment Form

Project Details

Project Name:	I-495/I-270 Managed Lanes Study	**Mitigation Site Number:**	WSS-150087
Estimated Mitigation Needs (ac):	TBD		
Date:	12/10/2018	**Consultant Firm/Investigator(s):**	RK&K/KJH, CAS

Site Location Details

County:	Montgomery	**Cross Roads:**	River Rd. & Hunting Quarter Rd.
Basin (HUC 8):	Middle Potomac-Catoctin	**MDE Watershed (8 digit):**	02140202
Proximity to Impacted Wetland (mi.):	14	**Lat/Long:**	39.07594861 -77.41050967

Site Data

Parcel Size (ac):	2,655	**Potential Creation Area (ac):**	5.8
Lat/Long:	39.07594861 -77.41050967	**Potential Preservation Area (ac):**	0.7
Land Use:	Agriculture	**Adjacent Land Use:**	Forest, Wetlands
Mapped Soils:	Lindside silt loam, 0 to 3 percent slopes, occasionally flooded, Melvin silt loam, 0 to 2 percent slopes, occasionally floodec		
Property Address:	0-0000 River Rd.		
Property Owner(s):	Maryland Department of Natural Resources		

Additional Field Observations

RTE species present? (explain below)	TBD	**Evidence of disturbance? (explain below)**	No
Is site currently a wetland?	Partially	**Was site formerly a wetland?**	Possibly

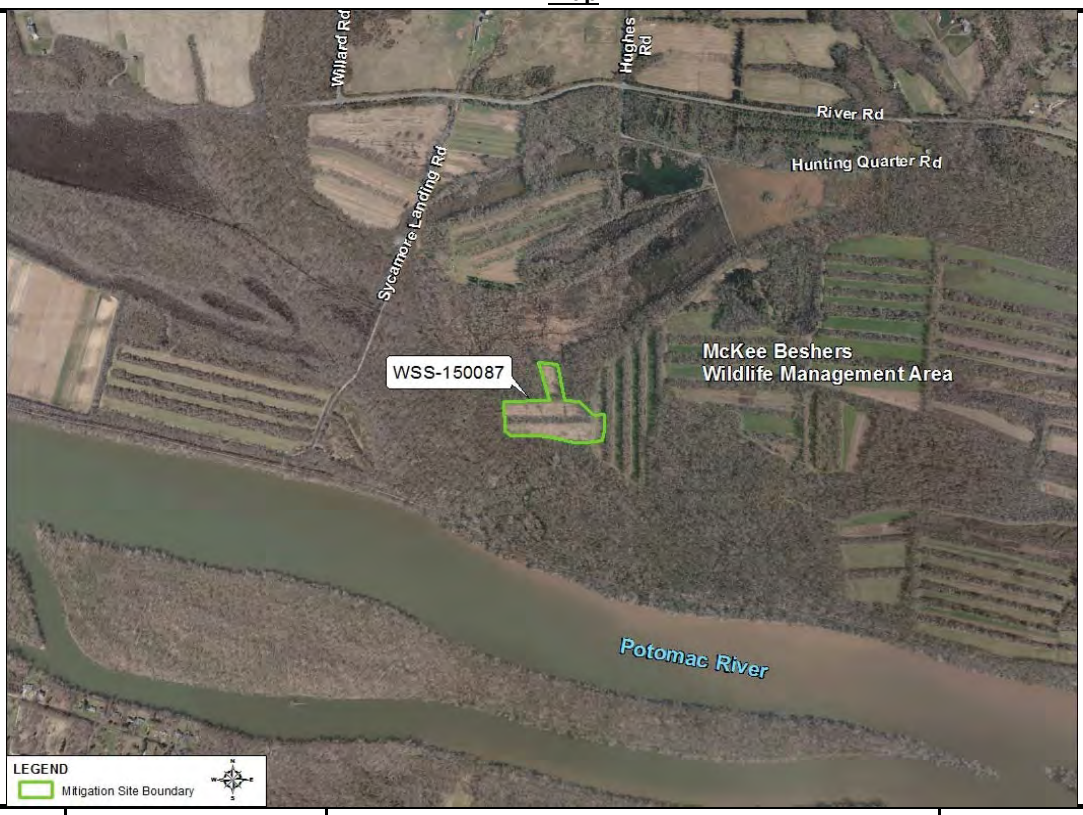
Condition: Site is located in the McKee Beshers Wildlife Management Area. Majority of site consists of dry old field in the Potomac River 100 YR floodplain.

Condition: Site surrounded by PFO wetlands. Couple of wetlands drain through site. Some areas within site appear to have been used for agriculture in the past.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Soils	10	**Vegetation**	10
10 - Greater than 50% hydric soil 5 - 10% to 50% hydric soil 1 - Less than 10% hydric soil		10 - Herbaceous cover 5 - Scrub-shrub cover 1 - Mostly forested	
Describe: 60% of site is mapped as predominately hydric soils. Majority of site is dry field, however a couple of wetlands drain through the site.		Describe: Majority of site is dominated by teasel, reed canary grass, golden rod, and dogbane. Narrow strip of trees runs through the center of the site. Scattered tree saplings and shrubs were observed in the southern field.	
Hydrology	10	**Land Use**	1
10 - Abuts wetland or stream 5 - Adjacent to wetland or stream 1 - No connection to wetland or stream		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field	
Describe: Site is surrounded by PFO wetlands and a couple of PEM wetlands drain through the site.		Describe: Site is located in the McKee Beshers Wildlife Management Area and consists mostly of old field.	
100-Year Floodplain	10	**Habitat Value**	10
10 - Yes (active evidence of flooding) 5-Yes (mapped but no evidence of active flooding) 1 - No		10 - Contiguous to wetland/upland forest > 100 ac 5 - Contiguous to wetland/upland forest 25-100 ac 1 - Contiguous to wetland/upland forest < 25 ac	
Describe: Entire site is located in Potomac River 100 YR FEMA floodplain. Active evidence (debris) of flooding at the southern boundary of the site.		Describe: Site located in McKee Besher Wildlife Management Area (>100 acres of forest).	
Geomorphic Position	10	**Ease of Access**	10
10 - Low or concave topography 5 - Flat topography 1 - High topography/steep slopes		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Site consists of low topography surrounded by wetlands.		Describe: Existing maintained access along edge of adjacent farm fields that connects to Hunting Quarter Rd.	
Estimated cut to wetland hydrology	10	**Utilities Present**	10
10 - Less than 2' 5-between 3' - 5' 1 - greater than 5'		10 - No utilities on site 5 - Utilities but not within creation area 1 - Utilities within potential creation area	
Describe: Groundwater observed 6" - 2' below ground surface.		Describe: No evidence of utilities observed within or adjacent to the site.	
		Total Score out of 100	**91**

Map



Site No.	WSS-150087		Scale: 1 in. =	2,000

Site Photos

Wetland Mitigation Field Site Assessment Form

Project Details

Project Name:	I-495/I-270 Managed Lanes Study	**Mitigation Site Number:**	WSS-150133
Estimated Mitigation Needs (ac):	TBD		
Date: 11/12/18		**Consultant Firm/Investigator(s):**	RK&K/KJH, CAS

Site Location Details

County:	Montgomery	**Cross Roads:**	Great Seneca Hwy & Mateny Rd.
Basin (HUC 8):	Middle Potomac-Catoctin	**MDE Watershed (8 digit):**	02140208
Proximity to Impacted Wetland (mi.):	3.25	**Lat/Long:**	39.14076147 -77.27203494

Site Data

Parcel Size (ac):	1,411.40	**Potential Creation Area (ac):**	0.9
Lat/Long:	39.14076147 -77.27203494	**Potential Preservation Area (ac):**	0.5
Land Use:	Agriculture	**Adjacent Land Use:**	Institutional & Forest
Mapped Soils:	Glenelg silt loam, 3 to 9 percent slopes; Baile silt loam, 0 to 3 percent slopes; & Glenville silt loam, 3 to 8 percent slopes		
Property Address:	11900 Clopper Rd.		
Property Owner(s):	Maryland Department of Natural Resources		

Additional Field Observations

RTE species present? (explain below)	TBD	**Evidence of disturbance? (explain below)**	Yes
Is site currently a wetland?	Partially	**Was site formerly a wetland?**	Possibly

Condition: Western portion of site consists of existing PEM (2.1 acres) with scattered trees that receives drainage from upstream sewage treatment plant.

Condition: Center portion of site (1.8 acres) consists of dry upland on a hillslope dominated by autumn olive. Eastern portion of site (0.9 acres) consists of low area dominated by reed canary that may partially be wetland.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Soils	5	**Vegetation**	10
10 - Greater than 50% hydric soil 5 - 10% to 50% hydric soil 1 - Less than 10% hydric soil		10 - Herbaceous cover 5 - Scrub-shrub cover 1 - Mostly forested	
Describe: 46% of site is mapped as predominately hydric soils. This area consits of existing PEM wetland.		Describe: Majority of PEM wetland is dominated by stilt grass, arthraxon and reed canary grass with scattered black willow, pin oak & autumn olive. Upland area is dominated by autumn olive.	
Hydrology	10	**Land Use**	5
10 - Abuts wetland or stream 5 - Adjacent to wetland or stream 1 - No connection to wetland or stream		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field	
Describe: Portions of site are existing PEM wetland. Source of hydrology is upstream sewage treatment plant. Eastern portion of site appears to abut wetland just south of site.		Describe: Site is located in Seneca Creek State Park and consists mostly of PEM wetland and upland scrub shrub dominated by invasives. Not accessible to public.	
100-Year Floodplain	5	**Habitat Value**	1
10 - Yes (active evidence of flooding) 5-Yes (mapped but no evidence of active flooding) 1 - No		10 - Contiguous to wetland/upland forest > 100 ac 5 - Contiguous to wetland/upland forest 25-100 ac 1 - Contiguous to wetland/upland forest < 25 ac	
Describe: Western portion of site is located in 100 YR FEMA floodplain. No evidence of active flooding.		Describe: Powerlines run between the site and Seneca Creek State Park.	
Geomorphic Position	5	**Ease of Access**	5
10 - Low or concave topography 5 - Flat topography 1 - High topography/steep slopes		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Eastern and western portion of site consist of concave topography. Center portion of site consists of high topography w/ gradual slopes.		Describe: Existing access road from Seneca Creek Hwy to powerlines. Access to rest of site will require access under powerlines or scrub/shrub clearing.	
Estimated cut to wetland hydrology	5	**Utilities Present**	1
10 - Less than 2' 5-between 3' - 5' 1 - greater than 5'		10 - No utilities on site 5 - Utilities but not within creation area 1 - Utilities within potential creation area	
Describe: Eastern and western portion of site would require 0-2' cut to groundwater, however center portion of site would likely require greater than 3' cut to groundwater.		Describe: Gas line and overhead powerlines run along southern border of site.	
		Total Score out of 100	**52**

Map

Site No.	WSS-150133		Scale: 1 in. = 2,000	

Site Photos

Wetland Mitigation Field Site Assessment Form

Project Details

Project Name:	I-495/I-270 Managed Lanes Study	**Mitigation Site Number:**	WSS-150147A
Estimated Mitigation Needs (ac):	TBD		
Date:	11/29/2018	**Consultant Firm/Investigator(s):**	RK&K/KJH, SLY

Site Location Details

County:	Montgomery	**Cross Roads:**	Watkins Rd. & Woodfield Rd.
Basin (HUC 8):	Middle Potomac-Catoctin	**MDE Watershed (8 digit):**	02140208
Proximity to Impacted Wetland (mi.):	6.9	**Lat/Long:**	39.23278219 -77.18832166

Site Data

Parcel Size (ac):	2 Parcels - 42.0 & 24.4	**Potential Creation Area (ac):**	3.98, 3.09
Lat/Long:	39.23278219 -77.18832166	**Potential Preservation Area (ac):**	0.9
Land Use:	Agriculture	**Adjacent Land Use:**	Forest & Low Density Residential
Mapped Soils:	Hatboro silt loam, 0 to 3 percent slopes, frequently flooded		
Property Address:	0-0000 Woodfield Rd. & Watkins Rd. Gaithersburg 20882-0000		
Property Owner(s):	Maryland National Capital Park & Planning Commission		

Additional Field Observations

RTE species present? (explain below)	TBD	**Evidence of disturbance? (explain below)**	No
Is site currently a wetland?	Partially	**Was site formerly a wetland?**	Likely

Condition: Entire site is located in the 100 YR floodplain to Magruder Branch. There are two large PEM wetlands dominated by cattail and reed canary grass in the western floodplain.

Condition: The entire eastern side and portions of the western side of the floodplain are dry and dominated by reed canary grass. There are scattered black willow, black walnut, and pin oak trees within the site.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Soils	10	**Vegetation**	10
10 - Greater than 50% hydric soil 5 - 10% to 50% hydric soil 1 - Less than 10% hydric soil		10 - Herbaceous cover 5 - Scrub-shrub cover 1 - Mostly forested	
Describe: Entire site is located in mapped hydric soils. Two large PEM wetlands were identified in the western floodplain.		Describe: Majority of the site is dominated by reed canary grass with scattered black willow, black walnut and pin oak. Large PEM in northwestern corner of site is dominated by cattail. Inclusions of false nettle and common milkweed observed in floodplain.	
Hydrology	10	**Land Use**	5
10 - Abuts wetland or stream 5 - Adjacent to wetland or stream 1 - No connection to wetland or stream		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field	
Describe: Existing PEM wetlands in site's western floodplain. Perennial channel (Magruder Branch) flows through site.		Describe: Site is located in Lower Magruder Branch Park and consists of reed canary dominated floodplain with scattered black willow and black walnut.	
100-Year Floodplain	10	**Habitat Value**	10
10 - Yes (active evidence of flooding) 5-Yes (mapped but no evidence of active flooding) 1 - No		10 - Contiguous to wetland/upland forest > 100 ac 5 - Contiguous to wetland/upland forest 25-100 ac 1 - Contiguous to wetland/upland forest < 25 ac	
Describe: Majority of site is located in Magruder Branch 100 YR FEMA floodplain. Active evidence of flooding (matted down veg & water staining).		Describe: Site connects downstream to Great Seneca Creek Park (>100 acres of forest).	
Geomorphic Position	10	**Ease of Access**	5
10 - Low or concave topography 5 - Flat topography 1 - High topography/steep slopes		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Site consists of low topography surrounded by upland slopes. Entire site within 100YR floodplain.		Describe: Site is open, but no existing vehicular access. Potential access directly off Watkins Road.	
Estimated cut to wetland hydrology	5	**Utilities Present**	10
10 - Less than 2' 5-between 3' - 5' 1 - greater than 5'		10 - No utilities on site 5 - Utilities but not within creation area 1 - Utilities within potential creation area	
Describe: Groundwater observed 2.5' below ground surface in non-wetland floodplain areas.		Describe: No utilities observed within site, however overhead powerlines along watkins road just outside site boundaries.	
		Total Score out of 100	**85**

Map

Site No.	WSS-150147A		Scale: 1 in. = 2,000	

Site Photos

Wetland Mitigation Field Site Assessment Form

Project Details

Project Name:	I-495/I-270 Managed Lanes Study	**Mitigation Site Number:**	WSS-150147B
Estimated Mitigation Needs (ac):	TBD		
Date:	11/12/2018	**Consultant Firm/Investigator(s):**	RK&K/KJH, CAS

Site Location Details

County:	Montgomery	**Cross Roads:**	Watkins Rd. & Woodfield Rd.
Basin (HUC 8):	Middle Potomac-Catoctin	**MDE Watershed (8 digit):**	02140208
Proximity to Impacted Wetland (mi.):	6.9	**Lat/Long:**	39.23521278 -77.18778527

Site Data

Parcel Size (ac):	2 Parcels - 24.7 & 16.3	**Potential Creation Area (ac):**	1.49
Lat/Long:	39.23521278 -77.18778527	**Potential Preservation Area (ac):**	0.9, 0.2
Land Use:	Forest & Agriculture	**Adjacent Land Use:**	Low Density Residential
Mapped Soils:	Hatboro silt loam, 0 to 3 percent slopes, frequently flooded		
Property Address:	0-0000 Watkins Rd. & 0-0000 Woodfield Rd.		
Property Owner(s):	Maryland National Capital Park & Planning Commission		

Additional Field Observations

RTE species present? (explain below)	TBD	**Evidence of disturbance? (explain below)**	No
Is site currently a wetland?	Partially	**Was site formerly a wetland?**	Likely

Condition: Entire site is located in the 100 YR floodplain to Magruder Branch. Large portions of floodplain consist of PEM wetland dominated by reed canary grass.	**Condition:** Drier portions of floodplain are dominated by reed canary grass or golden rod. Seep wetlands along toe of valley slopes at edge of floodplain. High quality PSS wetland along southeastern side of site.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Soils	10	**Vegetation**	10
10 - Greater than 50% hydric soil 5 - 10% to 50% hydric soil 1 - Less than 10% hydric soil		10 - Herbaceous cover 5 - Scrub-shrub cover 1 - Mostly forested	
Describe: Entire site is located in mapped hydric soils. Large portions of the site were verified as hydric soils in the field.		Describe: Majority of site is dominated by reed canary grass, with scattered black willow. Large area in northeastern corner of site dominated by Canada goldenrod.	
Hydrology	10	**Land Use**	5
10 - Abuts wetland or stream 5 - Adjacent to wetland or stream 1 - No connection to wetland or stream		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field	
Describe: Existing PEM and PSS wetlands within and abutting site. Perennial channel (Magruder Branch) flow through site.		Describe: Site is located in Lower Magruder Branch Park and consists of reed canary dominated floodplain with scattered black willow.	
100-Year Floodplain	10	**Habitat Value**	10
10 - Yes (active evidence of flooding) 5-Yes (mapped but no evidence of active flooding) 1 - No		10 - Contiguous to wetland/upland forest > 100 ac 5 - Contiguous to wetland/upland forest 25-100 ac 1 - Contiguous to wetland/upland forest < 25 ac	
Describe: Entire site is located in Magruder Branch 100 YR FEMA floodplain. Active evidence of flooding at upstream end of site (matted down veg & sediment deposition).		Describe: Site connects upstream to Lower Magruder Branch Park (>100 acres of forest).	
Geomorphic Position	10	**Ease of Access**	5
10 - Low or concave topography 5 - Flat topography 1 - High topography/steep slopes		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Site consists of low topography surrounded by upland slopes. Entire site within 100YR floodplain.		Describe: Site is open, but no existing vehicular access. Potential access directly off Watkins Road.	
Estimated cut to wetland hydrology	5	**Utilities Present**	10
10 - Less than 2' 5-between 3' - 5' 1 - greater than 5'		10 - No utilities on site 5 - Utilities but not within creation area 1 - Utilities within potential creation area	
Describe: Groundwater observed 2-3' below ground surface in non-wetland floodplain areas.		Describe: No utilities observed within site.	
		Total Score out of 100	**85**

Map

Site No.	WSS-150147B		Scale: 1 in. = 2,000	

Site Photos

STREAM MITIGATION RATING CRITERIA & FIELD SITE ASSESSMENT FORMS

Stream Mitigation Field Site Assessment Rating Criteria

Mitigation Rating Instructions

Estimated bank erosion within reach
Determine what percent of bank erosion exist within the reach being assessed. Record a photo that represents the condition.

Degree of Channel Incision
On average, what is the depth of bank height or incision of channel within its valley, i.e., distance from channel invert to top of bank.

Floodplain Access
Estimate how frequent floodplain is being accessed. Factors to consider include: rack lines, flattened grasses or forbs, bank height or gauge data . If easily available. Knowledge of any recent high flows in the area. Any landowner observations may be helpful.

Opportunity for Floodplain Development
Determine whether site conditions allow for the development/creation of a floodplain that can be frequently accessed. Consider any obstacles to creating a floodplain such as existing structures/infrastructure, improved properties or land use.

Drainage Area Evaluation
Using the drainage area calculated and recorded in the **Site Data** section of the form, provide a score which corresponds with the calculated drainage area.

Vegetation
Describe the existing vegetation cover that exists along the channel and within the area on which construction would take place to perform the mitigation. Describe any difficulty the vegetation may play in accessing and constructing the restoration. Record a photo to show typical condition.

Land Use
Characterize the land use along the stream reach and/or floodplain area. Describe condition.

Opportunity for Ecological Lift
Consider what opportunities for ecological lift may exist, such as, sediment reduction, temperature regulation, floodplain connectivity, fish passage, habitat for fish and/or benthics, and water chemistry (quality). Equally consider whether the lift can be realistically achieved and sustained. Consider what obstacles that would need to be overcome to achieve lift. Are the obstacles within SHA's control?

Ease of Access
Consider how easy/difficult it may be to access stream to perform construction or restoration effort. Does considerable clearing or access road construction need to be performed?

Utilities Present
Do utilities exist within or nearby the stream and do they present an issue that may effect construction, access, or reforestation efforts. Describe what utilities are seen such as overhead wires vs. under ground utilities such as sewer lines, gas lines or cables.

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MO-00029

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/16/2018 **Consultant Firm/Investigator(s):** CRI/MD, SJ

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Old Spring Rd & Beach Dr

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140206

Proximity to Impacted Stream (mi.): 0.04 **Lat/Long:** 39.013798 -77.075727

Site Data

Parcel Size (ac): 5 parcels - 9.5, 72.6, 6.5, 1.7, 4.1 **Potential Restoration Reach (LF):** 4,948

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 1.71

Land Use: Forest, Other Developed Lands **Mapped Soils:** Codorus silt loam

Property Address: Middle Parcel - Kensington Parkway, Kensington, MD 20895

Property Owner(s): Maryland National Capital Park & Planning Commission

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	**Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain**
Explain:	Explain:
Yes, previous stabilization evident. Several road crossing over the reach. Exposed sewer crossing in stream, may be a fish passage concern. Manhole riser in center of stream.	Yes, stream on MNCPPC property. Roadways on either side of the site make for good access to the study reach.

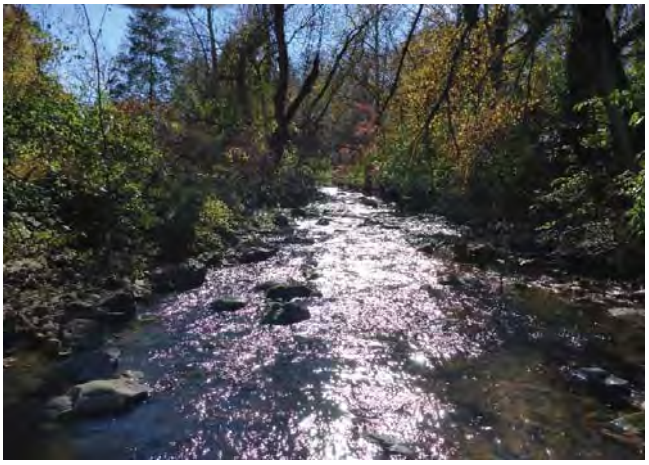
Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	10
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Approximately 15% of stream banks are eroded.		Describe: Stream is surrounded by mowed lawn.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Banks are ~4-6 ft. tall.		Describe: Stream flows parallel to residential road in neighborhood.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: In general, channel is incised ~4-6 feet. Channel is more incised downstream of Beach Dr.		Describe: Site is between two roadways, thus limited potential buffer. Several crossings make bed elevation poor, little room for floodplain connection.	
Opportunity for Floodplain Development	1	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Potential for 3 times stream width, would require clearing. Contained by two roads Kensington Pkwy. & Kingston Rd.		Describe: Directly off Kensington Pkwy. & Kingston Rd.	
Drainage Area Evaluation	5	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 1.71 square miles.		Describe: Several exposed crossings in stream.	
		Total Score out of 100	53

Map

Site No.	MO-00029		Scale: 1 in. = 2,000

Site Photos



Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MO-00034

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/16/2018 **Consultant Firm/Investigator(s):** CRI/MD, SJ

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Campbell Pl. & Campbell Dr.

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140206

Proximity to Impacted Stream (mi.): 0 **Lat/Long:** 39.014726 -77.059196

Site Data

Parcel Size (ac): 3 parcels - 1.2, 1.0, 6.8 **Potential Restoration Reach (LF):** 882

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.68

Land Use: Forest, Transportation **Mapped Soils:** Glenelg silt loam, Brinklow-Blocktown channery silt loams

Property Address: Main Parcel - Campbell Drive, Silver Spring, MD 20910

Property Owner(s): Maryland National Capital Park & Planning Commission

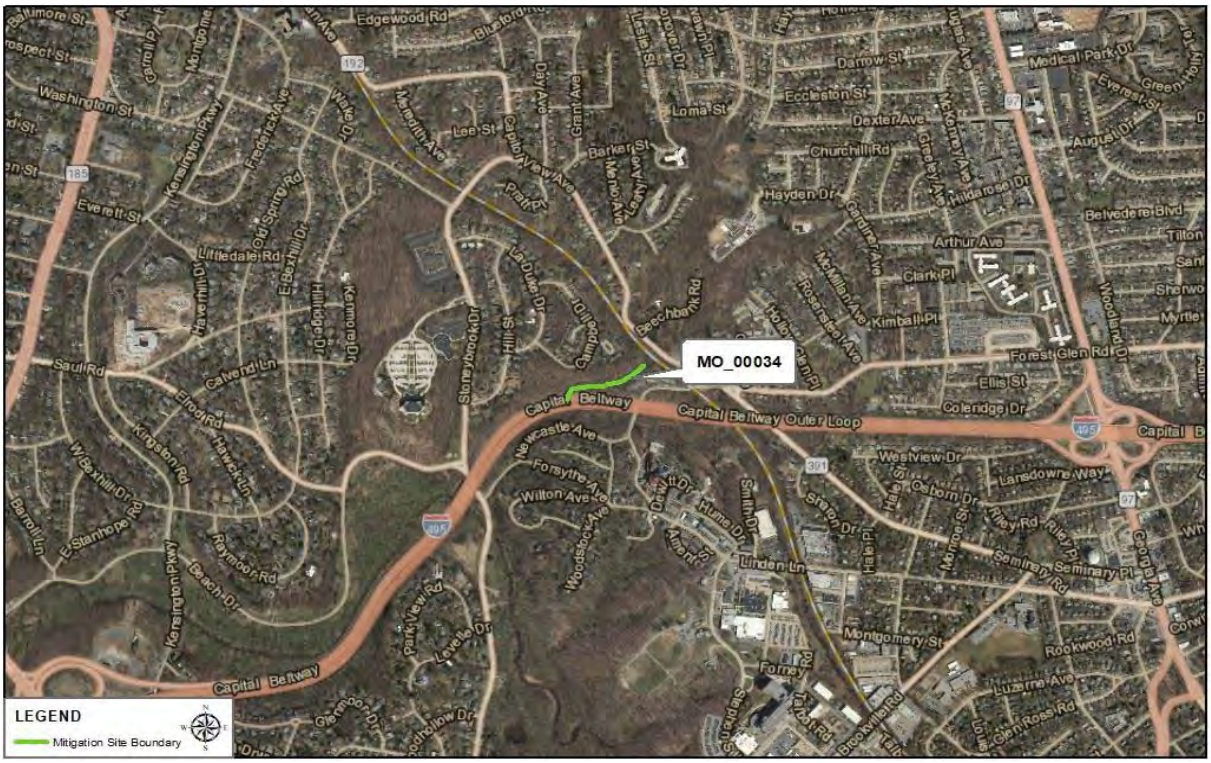
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes, exposed manhole riser on left bank.	No. Will require access through neighborhood at Campbell Dr at the top of the steep, forested valley.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Banks and bed controlled by bedrock and large boulders.		Describe: Stream is surrounded by mature forest.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Banks are ~3-5 ft. tall.		Describe: Stream is surrounded by residential and commercial uses.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of out of bank flooding. Stream is a "V" channel.		Describe: Stable "V" channel, no floodplain reconnection. Bedrock would make construction difficult.	
Opportunity for Floodplain Development	1	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Stream is a "V" channel, confined valley controlled by bedrock.		Describe: Steep, confined forested valley. Only access is through neighborhood adjacent to housing.	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 0.68 square miles.		Describe: Sewer line adjacent to stream channel.	
		Total Score out of 100	36

Map



Site No.	MO-00034		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MO-00038

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/14/2018 **Consultant Firm/Investigator(s):** CRI/MD, DS

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Layhill Rd. & Chapel Hill Rd.

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 6.9 **Lat/Long:** 39.116035 -77.040559

Site Data

Parcel Size (ac): 4 parcels - 11.4, 4.7, 4.4, 4.9 **Potential Restoration Reach (LF):** 2,912

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion ___X___Riparian Buffer Planting _X__Habitat Enhancement ___Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (sq. mi.) 3.39

Land Use: Medium Density Residential, Forest **Mapped Soils:** Codorus silt loam, Brinklow-Blocktown channery silt loams

Property Address: Middle Parcel - Chapel Hill Road, Silver Spring, MD 20906

Property Owner(s): Maryland National Capital Park & Planning Commission

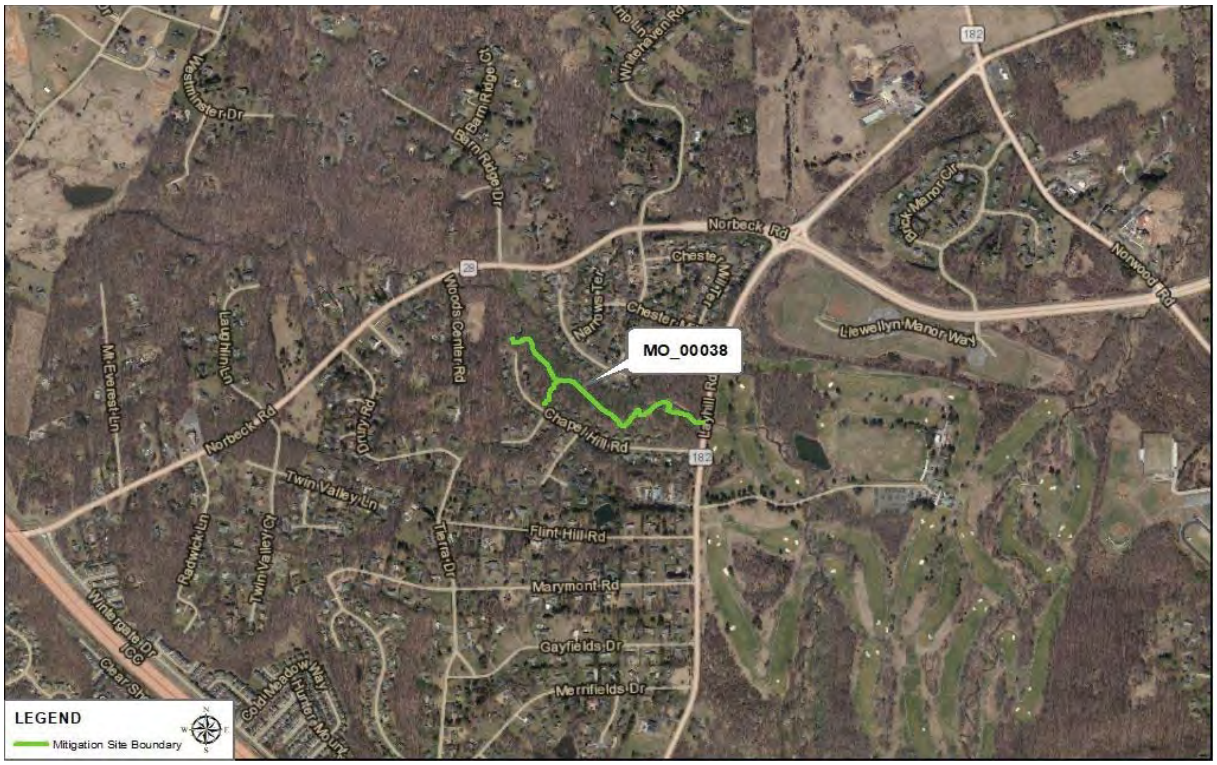
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes; Restoration in 1,100 linear ft. of downstream section. Three sewer crossings present upstream of road crossing.	Yes; Can be done in parcel, could extend upstream within property access.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Approximately 40% of banks eroded. Large stretches of moderate-to-severe erosion on outside meanders, from 4-8 ft. tall.		Describe: Mostly mature forest, areas where restoration has taken place are mostly herbaceous cover on banks.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Banks are ~4 ft. tall on average. Some in-channel benches are forming.		Describe: Mostly forested, within residential areas encroaching on upstream end.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Evidence of high water much lower from top of bank.		Describe: Large upstream sediment source, habitat enhancement upstream, floodplain reconnection is low, increase riparian cover, unstable geomorphology.	
Opportunity for Floodplain Development	1	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Floodplain development limited by mature forest and residential properties at upstream end of reach.		Describe: Some access to sections of stream from Chapel Hill Road, but clearing needed for haul roads and upstream access.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 3.39 square miles.		Describe: Three sewer crossings, in-stream manholes observed along banks.	
		Total Score out of 100	31

Map



Site No.	MO-00038		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MO-00042

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/14/2018 **Consultant Firm/Investigator(s):** CRI/MD, DS

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Adrian St. & Turkey Branch Pkwy.

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140206

Proximity to Impacted Stream (mi.): 2.48 **Lat/Long:** 39.067483 -77.084188

Site Data

Parcel Size (ac): 4 parcels - 5.7, 13.2, 9.0, 35.0 **Potential Restoration Reach (LF):** 6,936

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting _X__Habitat Enhancement ___Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 3.66

Land Use: Medium Density Residential, Forest **Mapped Soils:** Glenelg-Urban land complex, Hatboro silt loam, Baile silt loam

Property Address: Middle Parcel - Turkey Branch Parkway, Silver Spring, MD 20906

Property Owner(s): Maryland DNR

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes; Evidence of stream restoration throughout, several sewer crossings.	Yes; the stream is contained with in the parcel and the parcel can be accessed directly from ROW

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Approximately 60% of banks are eroded, ranging from 5-15 ft. tall. Moderate-to-severe erosion present.		Forested park, less than 100 ft. buffer on right bank in downstream section.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
Banks are ~7 ft. tall on average.		Immediate land use is forested park, drainage area is highly impervious.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
A few low benches present throughout site provide relief during storm flows.		Increase geomorphic stability, bank stability; however, urban watershed will make improvements to biological water quality difficult.	
Opportunity for Floodplain Development	5	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
Over widened channel could be narrowed and low benches installed to provide out-of-bank flows in some areas.		Clearing will be required to access entire reach, areas off of Turkey Branch Pkwy. could be used for access.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
Drainage area - 3.66 square miles.		Several sewer line crossings, overhead power lines present in sections.	
		Total Score out of 100	35

Map

MO_00042
LEGEND
Mitigation Site Boundary
Wissahican Ave
Falcon St
Mercury Dr
Lystra Rd
Adrian St
Vera Mill Rd
Rosebud Dr
Plaza Pl
Parkland Dr
Delancy Dr
Jolliet St
Kelsey St
Jeffry St
Fogel Ln
Matthew Henson Tri
Federal St
Elizabeth St
Middle Rd
Selfridge Rd
Gridley Rd
Randolph Rd
Minden Rd
Ilford Rd
Colle Dr
Camden St
Clay St
Delaney St
Weiler Rd
Delewood Dr
Haverford Rd
Haines Rd
Goodhill Rd
Harrell St
Easton St
Fairfax St
Connecticut Ave
Atherton Dr
Bisney Dr
Elby St
Conger St
Barbara Rd
Haviland St
Limeton St
Bayard St
Caldwell St
Robindale Dr
Weiss St
Lurkin Pl
Farcot Pl
Tallahassee Ave
Pacific Ave
Adele Ave
Malmo Dr
Cecil St
Aspen Hill Rd
Cambria St
Oriental St
Jupiter St
Ives St
Independence St
Vandalia Dr
Dumbarton Dr
Stafford St
Bartram St
Glassboro Dr
Marcellus Ave
Hallett St
Dunbar Rd
Everett Rd
Stratford Dr
Dauphine St
Salvey St
Olympic St
Nursery St
May Ct
May St
Nilca St
Georgia Ave
Helsel Dr
Regina Dr
Verona
Mursey St
Leverton St
Kenway St
Crawford Rd
Ryan Rd
Valleywood Dr
Chilhill Rd
Kayson St
Mabey Rd
Jamestrid
Rodrigo Rd
Estelle Rd
Estelle
Randolph Rd
Camden St
Clay St
Delaney St
Berry St
Goodhill Rd
Mill St
Purser St
Johnson St
Cedar Ave
Dewey Rd
Dewey Dr
Fairfax St
Farthing Dr
Greenly Dr
Greenly St
Haines Rd
Haviland St
Barbara Rd
Weiler Rd
Delewood Dr
Haverford Rd
Goodhill Rd
Harrell St
Easton St
Atherton Dr
Bisney Dr
Elby St
Minden Rd
Ilford Rd
Colle Dr
Randolph Rd
Delaney St
Camden St
Clay St
Purser St
Johnson St
Mill St
Goodhill Rd
Berry St
Middle Rd
Selfridge Rd
Gridley Rd
Matthew Henson Tri
Federal St
Elizabeth St
Kelsey St
Jeffry St
Fogel Ln
Jolliet St
Delancy Dr
Limeton St
Bayard St
Caldwell St
Robindale Dr
Weiss St
Parkland Dr
Rosebud Dr
Plaza Pl
Vera Mill Rd
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Falcon St
Mercury Dr
Lystra Rd
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Tallahassee Ave
Pacific Ave
Adele Ave
Malmo Dr
Cecil St
Aspen Hill Rd
Cambria St
Oriental St
Jupiter St
Ives St
Independence St
Vandalia Dr
Dumbarton Dr
Stafford St
Bartram St
Glassboro Dr
Marcellus Ave
Hallett St
Dunbar Rd
Everett Rd
Stratford Dr
Dauphine St
Salvey St
Olympic St
Nursery St
May Ct
May St
Nilca St
Georgia Ave
Helsel Dr
Regina Dr
Verona
Mursey St
Leverton St
Kenway St
Crawford Rd
Ryan Rd
Valleywood Dr
Chilhill Rd
Kayson St
Mabey Rd
Jamestrid
Rodrigo Rd
Estelle Rd
Estelle
Weiler Rd
Delewood Dr
Haverford Rd
Haines Rd
Goodhill Rd
Harrell St
Easton St
Fairfax St
Connecticut Ave

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0001

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 4/3/2019 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** 495 & Cherry Hill Road

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 0 **Lat/Long:** 39.018526 -76.949208

Site Data

Parcel Size (ac): 363 **Potential Restoration Reach (LF):** 1,202

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion ___X___Riparian Buffer Planting _X__Habitat Enhancement __X__Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.17

Land Use: Agriculture and Forested **Mapped Soils:** Russett-Christiana complex

Property Address: Orchard Loop Road, College Park, MD

Property Owner(s): BARC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Concrete-lined channel in upstream reach. Tires dumped in culvert in downstream reach. Riprap further downstream. Concrete poured onto banks near sewer line.	Explain: Yes - entire stream within BARC property.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	5
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Downstream reach relatively stable with vegetation on banks. Upstream reach has moderate to severe bank erosion and is unstable.		Describe: Downstream - scrub/shrub Midstream - agricultural field Upstream - mid-successional forest	
Degree of Channel Incision	5	**Land Use**	5
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 3 to 8 feet tall, on average 6 to 8 feet tall.		Describe: Agricultural and forested	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of floodplain connection; channel deeply incised.		Describe: No floodplain potential, no water quality potential. In the upstream reach, potential exists for channel stabilization and instream habitat uplift.	
Opportunity for Floodplain Development	1	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Downstream = adjacent agricultural fields in use by BARC Upstream = steep slopes and narrow valley		Describe: Downstream = existing access through agricultural field Upstream = forested and steep slopes	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 0.17 square miles		Describe: Exposed sewer crossing. Gas line and power lines run parallel to stream.	
		Total Score out of 100	52

Map

Site No.	MPAO0001		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0002

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 4/3/2019 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** 495 & Cherry Hill Road

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 0.13 **Lat/Long:** 39.014569 -76.943005

Site Data

Parcel Size (ac): 363 **Potential Restoration Reach (LF):** 4,795

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion ___X___Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 17.5

Land Use: Agriculture **Mapped Soils:** CF

Property Address: S Farm Dr and National Agricultural Research Rd, College Park, MD

Property Owner(s): BARC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Localized rip-rap areas along stream banks. Two concrete sewer crossings across channel.	Yes. All on BARC property.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	5
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Majority of banks are stabilized by sycamore roots & rip-rap. 3 localized severe bank erosion areas		Describe: Majority of reach consists of narrow sycamore hedgerow.	
Degree of Channel Incision	10	**Land Use**	10
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 8-12' tall		Describe: Agricultural fields and narrow strip of sycamore hedgerow around stream	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of flooding. Manmade berm surround channel to prevent flooding onto agricultural fields.		Describe: Limited potential for tree plantings in buffer. No potential for floodplain or water quality improvements. Minimal potential for bank stabilization. No habitat potential.	
Opportunity for Floodplain Development	1	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Adjacent areas are used for USDA agricultural purposes.		Describe: Existing open access along channel.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 17.5 square miles		Describe: 2 sewer line crossings. Stormwater pipes. Overhead powerlines.	
		Total Score out of 100	50

Map

Site No.	MPAO0002		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0003

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 4/3/2019 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** 495 & Cherry Hill Road

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02070010

Proximity to Impacted Stream (mi.): 0.5 **Lat/Long:** 39.012977 -76.945156

Site Data

Parcel Size (ac): 363 **Potential Restoration Reach (LF):** 1,987

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting _X__Habitat Enhancement __X__Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.11

Land Use: Agriculture and Forested **Mapped Soils:** Russett-Christiana complex

Property Address: National Agricultural Research Rd, College Park, MD

Property Owner(s): BARC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
3 culverts along reach. Areas with issues ~ 500LF	Yes - entire stream within BARC property.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Majority of site consists on incised channel with banks stabilized by vegetation. Downstream and upstream segments are only unstable areas		Midstream - scrub-shrub. Upstream and downstream - forested	
Degree of Channel Incision	5	**Land Use**	5
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
0-10' tall banks. Downstream - 10' tall. Midstream - 4-6' tall. Upstream - 0-8' tall.		Midstream - Agricultural. Upstream and downstream - forested.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
Deeply incised channel. No evidence of floodplain access in downstream and midstream. Very minor evidence in upstream.		No floodplain potential, no water quality potential. Some bank stabilization, fish passage instream habitat, and invasive treatment potential	
Opportunity for Floodplain Development	1	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
Upstream - steep slopes. Downstream - steep slopes. Midstream - active agricultural field.		Midstream - agricultural field Upstream and downstream - forested and steep slopes	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
0.11 square miles		Powerlines north of culvert. Sewer line at downstream end. Waterline in midstream.	
		Total Score out of 100	44

Map

Site No.	MPAO0003		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0004A

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 4/9/2019 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Sellman Road & E Line Road

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02070010

Proximity to Impacted Stream (mi.): 0.22 **Lat/Long:** 39.026726 -76.929588

Site Data

Parcel Size (ac): 502 **Potential Restoration Reach (LF):** 4,212

Site Opportunities: ___Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting _X__Habitat Enhancement ___Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 10

Land Use: Agriculture **Mapped Soils:** CF

Property Address: Sellman Road, Beltsville, MD

Property Owner(s): BARC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Bridge. Rip-rap in channel and along banks downstream of bridge.	Yes - entire stream within BARC property.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	5
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Very minor erosion. Majority of banks are stabilized by vegetation, especially river birch tree roots.		Surrounded by thin strip of early to mid-successional trees. River birch and Bradford Pear	
Degree of Channel Incision	5	**Land Use**	10
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
6-10' tall banks. Adjacent floodplain berm		Adjacent BARC agricultural fields. Thin strip of trees around channel.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
No evidence of flooding. Manmade berm surrounds channel.		Limited potential for habitat improvement. No potential for floodplain development, bank stabilization, or water quality improvement.	
Opportunity for Floodplain Development	1	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
Surrounded by active BARC agricultural fields.		Majority of channel surrounded by thin strip of trees	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
10 square miles		1 sewer crossing, waste water effluent. Several powerline crossings. Sewer and powerlines run parallel to stream.	
		Total Score out of 100	36

Map

Site No.	MPAO0004A		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0004B

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 4/9/2019 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Sellman Road & E Line Road

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02070010

Proximity to Impacted Stream (mi.): 0.03 **Lat/Long:** 39.021452 -76.931587

Site Data

Parcel Size (ac): 502 **Potential Restoration Reach (LF):** 1,124

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 10.2

Land Use: Forested **Mapped Soils:** CF

Property Address: South of Yuma St, Beltsville, MD

Property Owner(s): BARC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Downstream culvert.	Yes - entire stream within BARC property.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: ~20% bank erosion - mostly minor erosion. Localized moderate-severe erosion.		Describe: Mostly mid-successional forest (river birch, sycamore, tulip poplar). Small section of agricultural field.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Bank height 3-6'. Mostly stable with roots.		Describe: Forested - mid successional. Small section of agricultural land.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Old rack lines and sand deposition on banks and floodplain.		Describe: Limited potential for floodplain, stability, instream habitat, and water quality	
Opportunity for Floodplain Development	5	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Limited potential downstream and in eastern floodplain		Describe: Surrounded by forest	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 10.2 square miles		Describe: Sewer line runs parallel to stream	
		Total Score out of 100	26

Map

Site No.	MPAO0004B		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0005

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 6/12/2019 **Consultant Firm/Investigator(s):** CRI/MD, DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Sunnyside Ave. & Edmonston Rd.

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi 0.36 **Lat/Long:** 39.021837 -76.903277

Site Data

Parcel Size (ac): 247 **Potential Restoration Reach (LF):** 5,773

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting _X__Habitat Enhancement ___Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 9.75

Land Use: Forest **Mapped Soils:** Zekiah and Issue soils

Property Address: GSA Office Comm Pub Building. 18th & F St. NW. Washington DC 20405

Property Owner(s): BARC, USDA

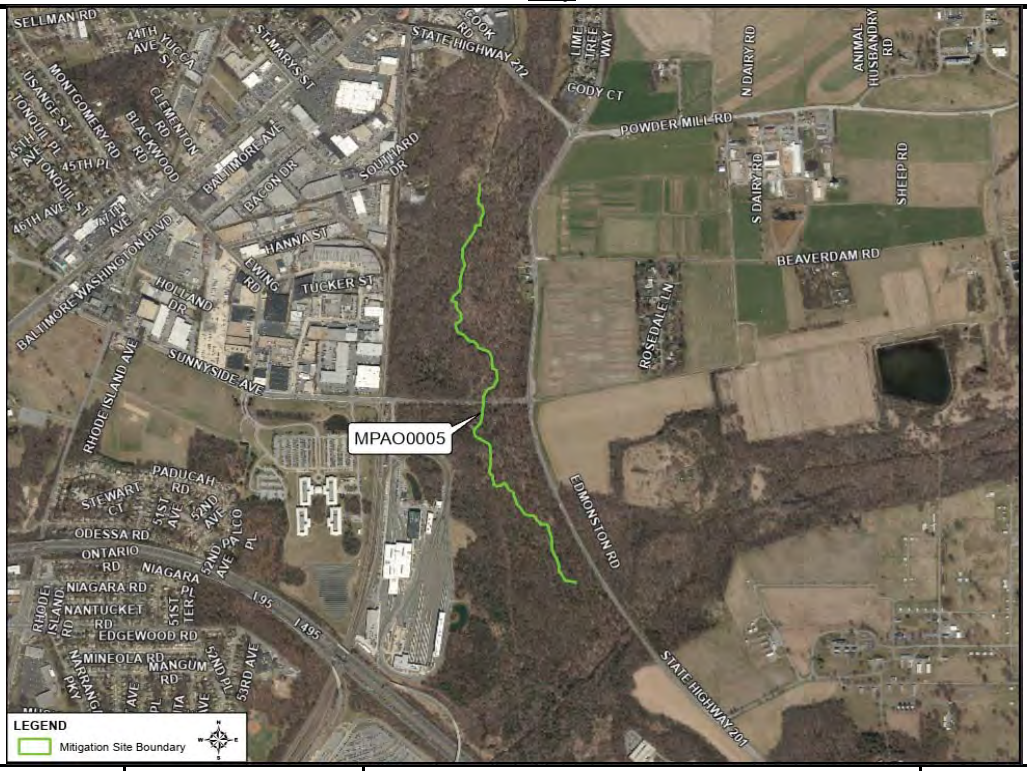
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc? Explain	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Road crossing (Sunnyside Ave, Powder Mill Rd), extensive powerline refuse	Yes, the stream is within 2 BARC parcels

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Little erosion present, select locations making up around 5% of the total site		All stream corridor is young/mature deciduous forest with some adjacent wetlands present	
Degree of Channel Incision	1	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
Banks are very low throughout the majority of the site. Braids of the stream are present		Stream corridor is forest	
Existing Floodplain Access	1	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
Banks are generally low, allowing access to the floodplain with multiple channels and braids throughout.		Habitat improvements possible, most lift aspects are relatively stable	
Opportunity for Floodplain Development	10	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
Space exists and existing floodplain is already 10 times stream width in most of the reach		Possibly access from Sunnyside Ave. for middle of reach. Access at top of site fr	
Drainage Area Evaluation	1	**Utilities Present**	5
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
DA = 9.75		One visible utility adjacent to the stream	
		Total Score out of 100	27

Map



Site No.	MPAO0005		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/270 Managed Lanes Study **Mitigation Site Number:** MPAO0006

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 6/12/2019 **Consultant Firm/Investigator(s):** CRI/MD, DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** MD-201 (Edmonston Road)

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 0.16 **Lat/Long:** 39.014942 -76.898731

Site Data

Parcel Size (ac): 116.74 **Potential Restoration Reach (LF):** 1,407

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting _X__Habitat Enhancement ___Fish Passage

Stream Order: 4th **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 23.9

Land Use: Forest **Mapped Soils:** Zekiah and Issue

Property Address: 5601 Sunnyside Ave, Beltsville MD 20405

Property Owner(s): Beltsville Agricultural Research Center, USDA

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Road crossing/culvert at Edmonston Road providing channelization.	Yes, the stream reach is comprised completely within BARC property.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Upstream of the braided area has consistent 3' eroded banks downstream of Edmonston Rd. Throughout braided reach, erosion located on alternating outer meanders.		Describe: Stream corridor is forested (young/mature deciduous).	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Overall channel incision for the entire site is about 4 feet.		Describe: Forested, young/mature deciduous tree impacts.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Infrequent out-of-bank flow evident by rack lines and deposition, especially within braided area.		Describe: Lateral stability, habitat enhancement, floodplain reconnection, bedform diversity.	
Opportunity for Floodplain Development	10	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Space for floodplain exists, but tree impacts may limit.		Describe: No existing access, field on left bank outside of riparian is a potential access point but clearing to the stream would be needed.	
Drainage Area Evaluation	1	**Utilities Present**	10
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: DA = 23.9 mi^2		Describe: No utilities were visible	
		Total Score out of 100	44

Map

Site No.	MPAO0006		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0007

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 6/12/2019 **Consultant Firm/Investigator(s):** CRI/MD, DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Powder Mill Rd. & Beaver Dam Rd.

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 1.67 **Lat/Long:** 39.028099 -76.869391

Site Data

Parcel Size (ac): 2,241 **Potential Restoration Reach (LF):** 3,859

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting _X__Habitat Enhancement __X__Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.66

Land Use: Forested **Mapped Soils:** Russett-Christiana complex; Christiana-Downer complex; Zekiah and Issue

Property Address: Beaver Dam Rd and Bio Control Rd Beltsville, MD 20705

Property Owner(s): Beltsville Agricultural Research Center, USDA

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
A 1.4' fish blockage at Powder Mill Road culvert. Land use historically agriculture causing years of downcutting. Utilities evident (inactive and active). Footbridge present	Yes, stream segment is all on BARC property.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Upper 2/3 of site is 100% eroded due to downcutting, lower 1/3 alternating erosion average ~4'.		Forested stream corridor, mix of mostly young and mature deciduous trees.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
Upper 2/3 of site has ~6' high eroded banks, while the lower 1/3 average ~4' high.		Mostly forested within stream corridor.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
Some areas of floodplain access within old down cut channel at upper 2/3 of site. Lower 1/3 features more frequent access to floodplain.		Opportunities for floodplain access, vertical and lateral stability, habitat creation.	
Opportunity for Floodplain Development	10	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
Space exists but mature forest may limit expansive floodplain development.		Some existing direct vehicle access from BARC roadways and Powder Mill/Beaver Dam Rd. Clearing needed to access other portions of the reach.	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
DA = 0.66mi^2		Remnant utilities present as well as active sewer crossing and manholes.	
		Total Score out of 100	53

Map

Site No.	MPAO0007		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0009

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/30/2019 **Consultant Firm/Investigator(s):** CRI/DS, SN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Sligo Creek Parkway and Piney Branch Road

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 1.01 **Lat/Long:** 38.996538 -77.009364

Site Data

Parcel Size (ac): 3 parcels - 15.7, 3.1, 28.5 **Potential Restoration Reach (LF):** 2,668

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement _X__Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 6.12

Land Use: Parkland **Mapped Soils:** Codorus silt loam, 0 to 3 percent slopes, occasionally flooded

Property Address: 8639 Sligo Creek Parkway, Takoma Park MD

Property Owner(s): MNCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Riprap along 70-80% of banks; restoration at upstream footbridge	No; There is no clear start/stop location or need.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: 20-30% eroded		Describe: Forest	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: ~5'		Describe: Forest	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Certain sections have soft sediment on upper banks		Describe: Lots of riprap, not a lot of existing instabilities.	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Space available. Constricted by adjacent roadway to the east and path/development to the west.		Describe: Next to multiple trails with parking and roads.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 6.12 sq. mi		Describe: Multiple sewer crossings and outfalls.	
		Total Score out of 100	30

Map

Site No.	MPAO0009		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0010

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/30/2019 **Consultant Firm/Investigator(s):** CRI/DS, SN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Bruce Drive and Burnett Ave

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 0.26 **Lat/Long:** 39.010793 -77.02182

Site Data

Parcel Size (ac): 16 ac; ROW along Burnett Ave **Potential Restoration Reach (LF):** 644

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting ____Habitat Enhancement ___Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.29

Land Use: Parkland **Mapped Soils:** Codorus silt loam; Brinklow-Blocktown channery silt loam; Glenelg silt loam

Property Address: 9406 Bruce Drive, Silver Spring MD

Property Owner(s): MNCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Culvert under road, 4 at head of stream, riprap throughout the stream.	No; downstream is confluence with Sligo Creek, upstream is culvert.

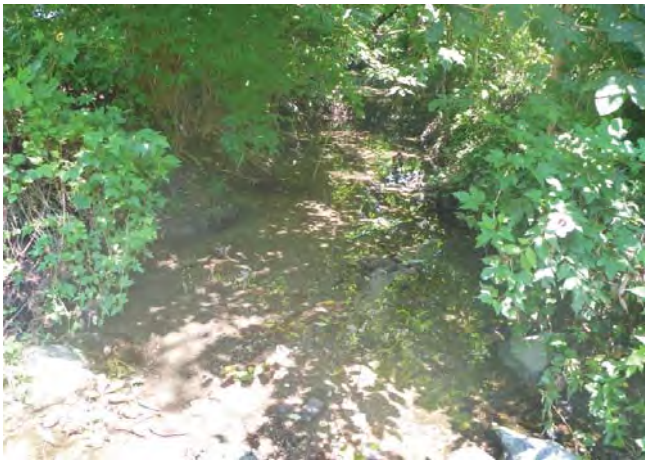
Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	5
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: ~10%, mostly riprap.		Describe: Mix between scrub/shrub and small buffer of forest.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Average 3ft with some small areas of 5' and some with lower floodplain bench.		Describe: Roadway, forest, scrub-shrub.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Low bench in upstream section.		Describe: Right bank is along road, but uplift lateral stability and habitat.	
Opportunity for Floodplain Development	5	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Constrained to the east by adjacent roadway. Opportunity exists to the west.		Describe: Along roadway and at MNCPPC entrance, with adjacent open field on the downstream right bank.	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 0.29 sq. miles		Describe: 1; 1 sewer crossing at MNCPPC entrance	
		Total Score out of 100	48

Map

Site No.	MPAO0010		Scale: 1 in. =	2,000

Site Photos



Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0011

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/25/2019 **Consultant Firm/Investigator(s):** CRI/SJ, MD

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** University Blvd and Sligo Creek Parkway

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 1.24 **Lat/Long:** 39.035736 -77.030943

Site Data

Parcel Size (ac): 2 parcels - 9.2, 1.2 **Potential Restoration Reach (LF):** 546

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting _X_Habitat Enhancement _X__Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.87

Land Use: Forest **Mapped Soils:** Hatboro silt loam, 0-3 percent slopes, frequently flooded

Property Address: 1167 University Blvd Silver Spring MD

Property Owner(s): MNCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes, riprap and culvert	Yes. Entirely on one parcel.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: ~40%		Describe: Forested park	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: ~4.5 feet		Describe: Forested park	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Gets out on bars, but not out of overall channel.		Describe: Fish passage, lateral migration, floodplain access, bedform diversity.	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Confined by trail and roadway.		Describe: Some clearing required.	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 0.87 sq. miles		Describe:	
		Total Score out of 100	43

Map

Site No.	MPAO0011		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0012

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/25/2019 **Consultant Firm/Investigator(s):** RKK KJH&AJN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Redland Road and Crabbs Branch Way

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140206

Proximity to Impacted Stream (mi.): 1.75 **Lat/Long:** 39.11553546 -77.14594816

Site Data

Parcel Size (ac): 96.5 **Potential Restoration Reach (LF):** 7,657

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting _X__Habitat Enhancement ___Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (sq. mi.) 1.89

Land Use: Forested Parkland **Mapped Soils:** Hatboro silt loam

Property Address: Redland Road and Derwood Road

Property Owner(s): M-NCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes, rip-rap bank stabilization.	Yes, all on MNCPPC property. MNCPPC recommendation.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	10
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Severe erosion throughout reach. Torturous meanders.		Describe: Mostly herbaceous. Scattered trees on US forested end.	
Degree of Channel Incision	5	**Land Use**	5
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Bank height 3-8'. Average of 5'. Deeply incised.		Describe: Park floodplain dominated by reed canary grass.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of out of bank flooding.		Describe: Opportunities exist for sediment reduction, floodplain connectivity, aquatic habitat, riparian buffer plantings, and water quality.	
Opportunity for Floodplain Development	10	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Greater than 100' wide floodplain on both sides of channel.		Describe: Reed-canary floodplain with scattered trees.	
Drainage Area Evaluation	5	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 1.89 square miles		Describe: Sewer line present throughout reach.	
		Total Score out of 100	71

Map

Site No.	MPAO0012		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0013

Projects Estimated Stream Mitigation Needs (LF):

Date of Field Assessment: 7/17/2019 **Consultant Firm/Investigator(s):** RK&K; KJH, AJN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Layhill Road and Flint Hill Road

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 6.55 **Lat/Long:** 39.110435 -77.032964

Site Data

Parcel Size (ac): 286 **Potential Restoration Reach (LF):** 1,014

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting __Habitat Enhancement _X_Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (sq. mi.) 4.87

Land Use: Forested **Mapped Soils:** Hatboro silt loam

Property Address: Layhill Road

Property Owner(s): M-NCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Old stone toes, cross vanes, and riffle grade control.	All on MNCPPC property. MNCPPC recommendation.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Localized moderate to severe erosion. Mostly stable		Describe: Forested parkland. Mid-successional; red maple, sycamore, tulip polar.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Most banks 5' tall		Describe: Forested/ golf course	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence observed		Describe: Limited opportunity for sediment reduction and floodplain development	
Opportunity for Floodplain Development	5	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Western and northern floodplain limited by golf course. Some potential in eastern floodplain.		Describe: Mostly dense forest. Small upstream segment adjacent to golf course is open.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 4.87 square miles		Describe: Sewerlines present throughout floodplain	
		Total Score out of 100	35

Map

Site No.	MPAO0013		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0014

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/25/2019 **Consultant Firm/Investigator(s):** RKK KJH&AJN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Bonifant Road and Notley Road

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 4.86 **Lat/Long:** 39.092946 -77.016077

Site Data

Parcel Size (ac): 29 **Potential Restoration Reach (LF):** 5,967

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting __X_Habitat Enhancement _X__Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (sq. mi.) 1.05

Land Use: Forested Parkland **Mapped Soils:** Hatboro silt loam

Property Address: Old Stone Road. Stonewall Drive

Property Owner(s): MNCPPC & South Stonegate HOA

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes, rip-rap and exposed sewer line.	Work would require access to M-NCPPC and South Stonegate HOA properties.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Severe erosion throughout		Describe: Disturbed forested land. Lots of dead ash and invasives.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Bank Height 3-8', Average of 6'		Describe: Forested parkland	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence. Deeply incised channel.		Describe: Opportunities for sediment reduction, floodplain connectivity, fish passage, water quality, invasive treatment, and aquatic habitat.	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Limited in western floodplain due to valley slope		Describe: Access through old restoration access route that is currently covered with invasives. Requires small tree impacts.	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 1.05 square miles		Describe: Sewer line throughout reach	
		Total Score out of 100	58

Map

Site No.	MPAO0014		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0015

Projects Estimated Stream Mitigation Needs (LF):

Date of Field Assessment: 7/17/2019 **Consultant Firm/Investigator(s):** RK&K; KJH, AJN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Twinbrook Pkwy and Veirs Mill Rd.

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140206

Proximity to Impacted Stream (mi.): 2.45 **Lat/Long:** 39.071546 -77.110477

Site Data

Parcel Size (ac): 24 **Potential Restoration Reach (LF):** 720

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting __Habitat Enhancement _X_Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 35.8

Land Use: Forested **Mapped Soils:** Hatboro silt loam

Property Address: Veirs Mill Road

Property Owner(s): M-NCPPC

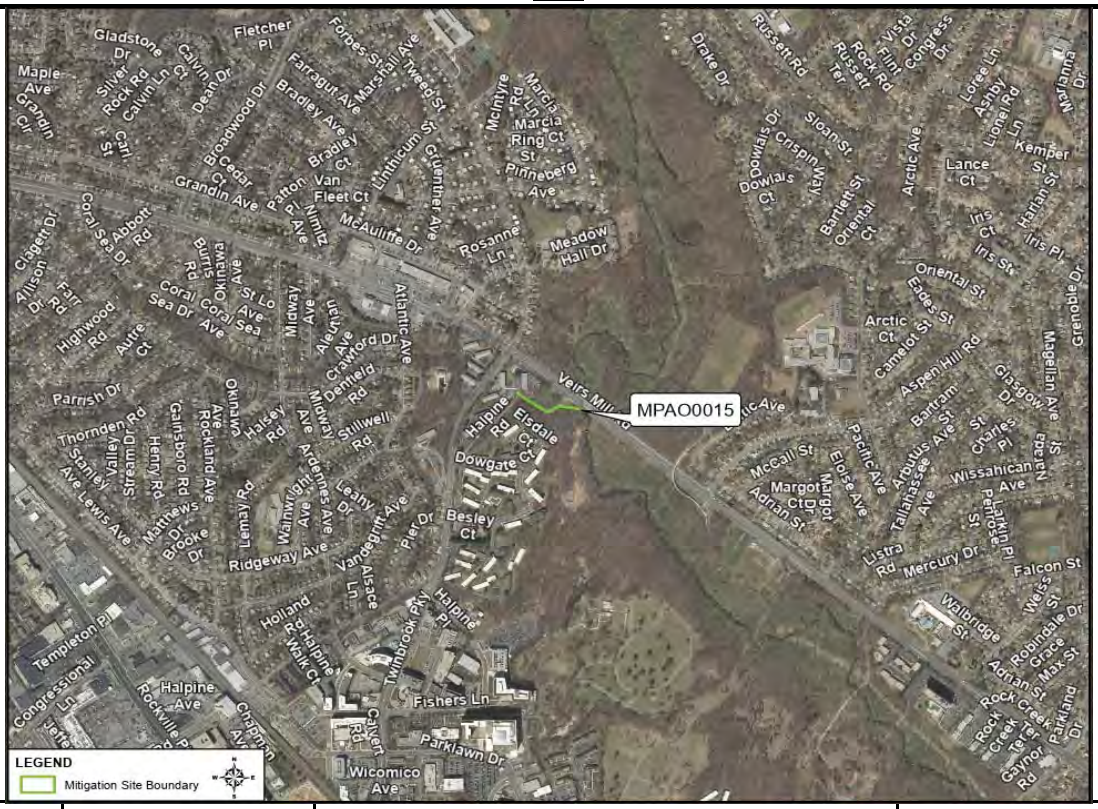
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Failed culvert and imbricated wall. Sewer crossing.	Yes, all MNCPPC land. MNCPPC recommendation.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Minor erosion throughout. 3 areas of localized severe erosion.		Mid successional forest; tulip poplar, cottonwood, red maple	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
3-10' tall banks		Forested parkland	
Existing Floodplain Access	1	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
Debris-racks and scour on northern floodplain		Opportunity for sediment reduction. Good existing in-stream habitat. Limited potential for floodplain development.	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
No potential in southern floodplain - valley slope. Limited potential in northern FP.		Existing sewerline access with small tree plantings	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
35.8 square miles		Sewerlines/sewer crossing	
		Total Score out of 100	22

Map



Site No.	MPAO0015		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0016

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/17/2019 **Consultant Firm/Investigator(s):** RKK KJH&AJN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Imperial Drive and Woodman Ave

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 0.3 **Lat/Long:** 39.020457 -77.03309

Site Data

Parcel Size (ac): 5.2 **Potential Restoration Reach (LF):** 177

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion ___X___Riparian Buffer Planting ___Habitat Enhancement _X__Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 1.32

Land Use: Forested Parkland **Mapped Soils:** Hatboro silt loam

Property Address: Joseph Park, Woodman Ave.

Property Owner(s): M-NCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Old ford at US end of site. Combine with MPAO0031.	Yes. M-NCPPC Recommendation.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Localized minor to moderate erosion		Describe: Mid successional upland forest. Extensive invasives.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 4-8' tall banks.		Describe: Forested parkland	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of flooding.		Describe: Opportunities for sediment reduction and riparian buffer plantings.	
Opportunity for Floodplain Development	1	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Limited by adjacent trail and sligo creek		Describe: Forest with patchy open invasive areas. Potential access along trail.	
Drainage Area Evaluation	5	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 1.32 square miles		Describe: Sewerline in floodplain	
		Total Score out of 100	39

Map

Site No.	MPAO0016		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0017

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/25/2019 **Consultant Firm/Investigator(s):** CRI/DS, SN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Bruce Drive and Burnett Ave

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 0.3 **Lat/Long:** 39.009773 -77.021112

Site Data

Parcel Size (ac): 16 **Potential Restoration Reach (LF):** 283

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting _X_Habitat Enhancement ___Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.0864

Land Use: Parkland **Mapped Soils:** Codorus silt loam, 0-3 percent slopes, occasionally flooded

Property Address: 9406 Bruce Drive Silver Spring MD

Property Owner(s): MNCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Culvert. Need to clean culvert ASAP.	No - Downstream culvert goes to Sligo Creek and originates at perched culvert

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	5
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Just at perched culvert outfall, maybe some previously at downstream end		Describe: Small buffer with trees but only ~10', then open grass/yard.	
Degree of Channel Incision	5	**Land Use**	10
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Limited access to downstream end		Describe: Marginal forest with cleared park area - potential to be restored.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: 5' at upstream end, 2' at downstream end, ~3' or less on average		Describe: Buffer, vertical lateral at perched pipe	
Opportunity for Floodplain Development	10	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Open field along right bank		Describe: Adjacent to road and open field	
Drainage Area Evaluation	10	**Utilities Present**	5
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 0.0864 sq. mi		Describe: Sewer line parallel	
		Total Score out of 100	61

Map

Site No.	MPAO0017		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0018

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/24/2019 **Consultant Firm/Investigator(s):** CRI/MD, SN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** 2000 Shorefield Rd Silver Spring MD

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): **Lat/Long:** 39.055863 -77.040362

Site Data

Parcel Size (ac): 2 parcels - 16.9, 18 **Potential Restoration Reach (LF):** 530

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (sq. mi.) 0.39

Land Use: Forest **Mapped Soils:** Glenelg silt loam, 8 to 15 percent slopes

Property Address: 2000 Shorefield Rd Silver Spring MD

Property Owner(s): MNCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes; Stabilization used DS of culvert across trail	Yes; Ephemeral channel located entirely in MNCPPC Park, can't extend

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Approximately 70% of banks are eroded, ranging from 4-7 ft. tall downstream, and 4' tall upstream.		Describe: Mature Forest	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Upstream banks are 4 ft. tall, and downstream		Describe: Forested parkland	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Very incised ephemeral channel. Lots of bedrock and sand deposition.		Describe: Ephemeral, vertical stability, stable headcut preventing sediment transport to pond downstream.	
Opportunity for Floodplain Development	5	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: 3-10 but would require tree impacts.		Describe: Paved park trail parallel to channel, easy to cut across floodplain.	
Drainage Area Evaluation	10	**Utilities Present**	10
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 0.39 square miles.		Describe: None observed	
		Total Score out of 100	63

Map

Site No.	MPAO0018		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0019

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/25/2019 **Consultant Firm/Investigator(s):** CRI/SJ, MD

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** 10721 Columbia Pike Silver Spring MD

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 0.88 **Lat/Long:** 39.034176 -77.010231

Site Data

Parcel Size (ac): 2 parcels - 2.7, 34 **Potential Restoration Reach (LF):** 3,616

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting _X_Habitat Enhancement _X__Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (sq. mi.) 26.9

Land Use: Parkland **Mapped Soils:** Blocktown channery silt loam, 25-45% slopes, very rocky; Gaila silt loam

Property Address: 10721 Columbia Pike Silver Spring MD

Property Owner(s): MNCPPC

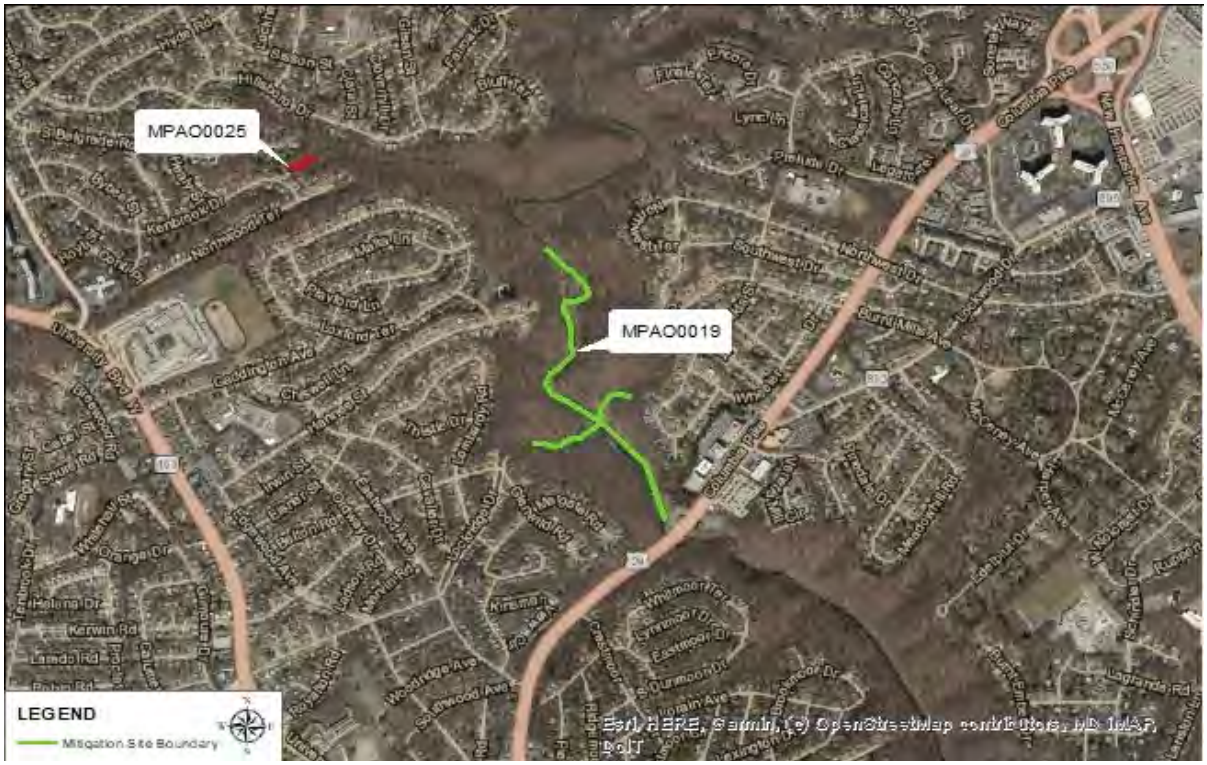
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes, dam and riprap	Yes. All within 1 parcel

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: ~15% alternating meander		Describe: Mature forest	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: ~4' lower towards dam		Describe: Mature forest	
Existing Floodplain Access	1	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Sand deposits		Describe: Provide access to aquatic species, change ecology, still-flow, release trapped sediment, bank stabilization	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Tree impacts expected		Describe: Some clearing required	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 26.9 sq. mi		Describe: Sewer line	
		Total Score out of 100	35

Map



Site No.	MPAO0019		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0020

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/24/2019 **Consultant Firm/Investigator(s):** CRI/SN, MD

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Randolph Rd and Kemp Mill Rd

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 3.21 **Lat/Long:** 39.065186 -77.028844

Site Data

Parcel Size (ac): 2 parcels - 2.7, 34 **Potential Restoration Reach (LF):** 448

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting _X_Habitat Enhancement _X__Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (sq. mi.) 21.2

Land Use: Forest **Mapped Soils:** Hatboro silt loam, 0-3% slopes, frequently flooded

Property Address: 932 Randolph RD Silver Spring MD

Property Owner(s): MNCPPC

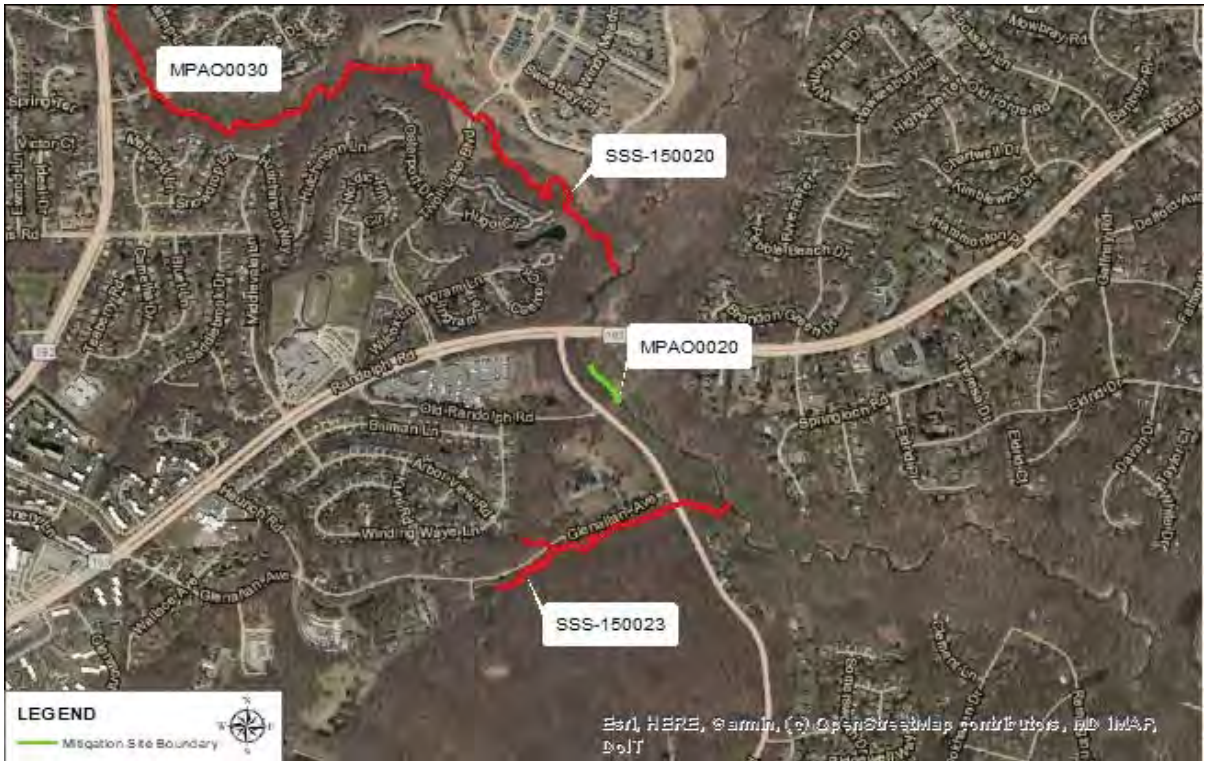
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Road crossing (Randolph Rd); USGS Gage - weir and house; Old mill race - Kemp Mill	Very limited length, can't extend downstream further - previous restoration

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: 40% slumped banks with deposition; 60% stabilization		Describe: Mature forest with some wetland	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Averaging 8-10ft		Describe: Mature forest - utility easements and access road	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Loose fine sediment evident on top terrace		Describe: Fish passage at USGS Gage - partial blockage; habitat; vertical incision; some riparian floodplain access; lateral migration with large drainage area	
Opportunity for Floodplain Development	5	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Not quite 10x width, confined by steep valley and roadway		Describe: Utility access road to a stream crossing	
Drainage Area Evaluation	1	**Utilities Present**	5
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 21.2 sq. mi		Describe: Overhead powerline at downstream road crossing	
		Total Score out of 100	43

Map



Site No.	MPAO0020		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0021

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/24/2019 **Consultant Firm/Investigator(s):** CRI/SN, MD

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Randolph Rd and Kemp Mill Rd

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 1.98 **Lat/Long:** 39.065186 -77.028844

Site Data

Parcel Size (ac): 3 parcels - 64.3, 10.1, 3.6 **Potential Restoration Reach (LF):** 4,832

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting _X_Habitat Enhancement ___Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (sq. mi.) 0.55

Land Use: Forest **Mapped Soils:** Blocktown channery silt loam, very rocky, Glenelg silt loam

Property Address: 200 Lamberton Drive Silver Spring MD

Property Owner(s): MNCPPC & Mo. County

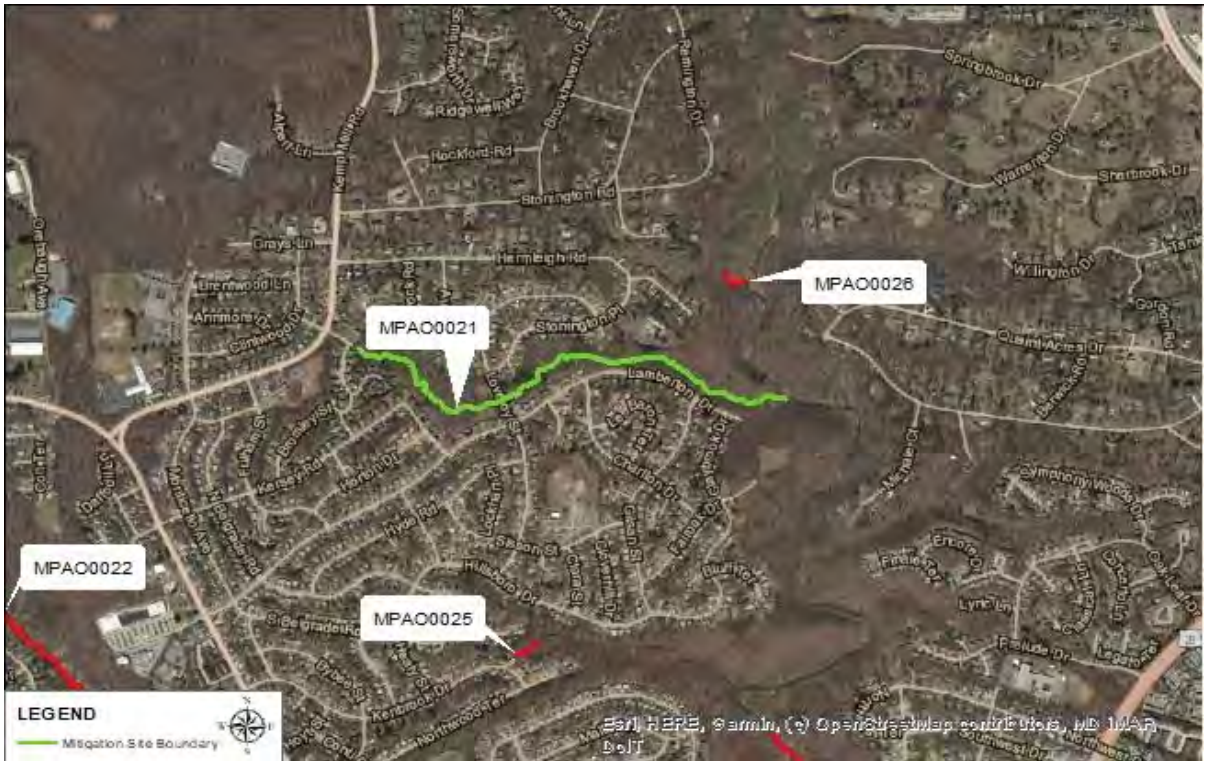
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Utility crossings and riprap armor	Majority of site is located on M-NCPPC parkland, except for upstream segment within Mo. County ROW.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Greater than 50%		Describe: Mature forest	
Degree of Channel Incision	10	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Some areas slightly lower than 10		Describe: Mature forest	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of out of bank flow		Describe: Lateral migration, geomorphic stability, habitat enhancement, bedform diversity	
Opportunity for Floodplain Development	1	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Steep valley, confined by utility and mature forest buffer		Describe: Several access points off trails, some tree clearing required at roadways (Bromley St, Lovejoy St, Lamberton Dr)	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 0.55 sq. mi		Describe: Utilities throughout reach	
		Total Score out of 100	54

Map



Site No.	MPAO0021		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0022

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/24/2019 **Consultant Firm/Investigator(s):** CRI/SN, MD

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** 1399 Lamberton Drive Silver Spring MD

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 1.47 **Lat/Long:** 39.041527 -77.036395

Site Data

Parcel Size (ac): 7 parcels (totaling 63.7ac) and ROW **Potential Restoration Reach (LF):** 3,218

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting __Habitat Enhancement ___Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.69

Land Use: Forest **Mapped Soils:** Hatboro silt loam, 0 to 3 percent slopes, frequently flooded

Property Address: 1399 Lamberton Drive Silver Spring MD

Property Owner(s): MNCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes, dam at downstream extent, culvert outfall at top, multiple utility crossing work sections	No, all can be done on MNCPPC between culvert and dam

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Consistent vertical banks and active erosion at every outside meander		Describe: Mature forest with some wetlands, especially on the right bank	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Average 5'		Describe: Forest with wetlands on terrace	
Existing Floodplain Access	1	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Many wrack lines and sediment deposition on floodplain		Describe: Lateral and vertical instability, floodplain reconnection on upstream end	
Opportunity for Floodplain Development	10	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Greater than 10, potential to raise bed to access existing floodplain more often		Describe: Some wide trails will get close to stream with utility access and open mature forest for remaining area	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 0.69 sq. mi		Describe: Water and sewer crossing	
		Total Score out of 100	49

Map

Site No.	MPAO0022		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0023

Projects Estimated Stream Mitigation Needs (LF):

Date of Field Assessment: 7/17/2019 **Consultant Firm/Investigator(s):** RK&K; KJH, AJN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Denfeld Ave and Halsey St.

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140206

Proximity to Impacted Stream (mi.): 1.63 **Lat/Long:** 39.037829 -77.080548

Site Data

Parcel Size (ac): 1.45 **Potential Restoration Reach (LF):** 1,078

Site Opportunities: ___Channel Restoration ___Livestock Exclusion __X___Riparian Buffer Planting __Habitat Enhancement _X_Fish Passage

Stream Order: 1st **Stream Hydrology:** Ephemeral **Stream Use:**

Drainage Area to Reach (sq. mi.) 0.05

Land Use: Maintained lawn **Mapped Soils:** Glenelg-Urban land complex

Property Address: County ROW within Denfeld Ave.

Property Owner(s): Montgomery County

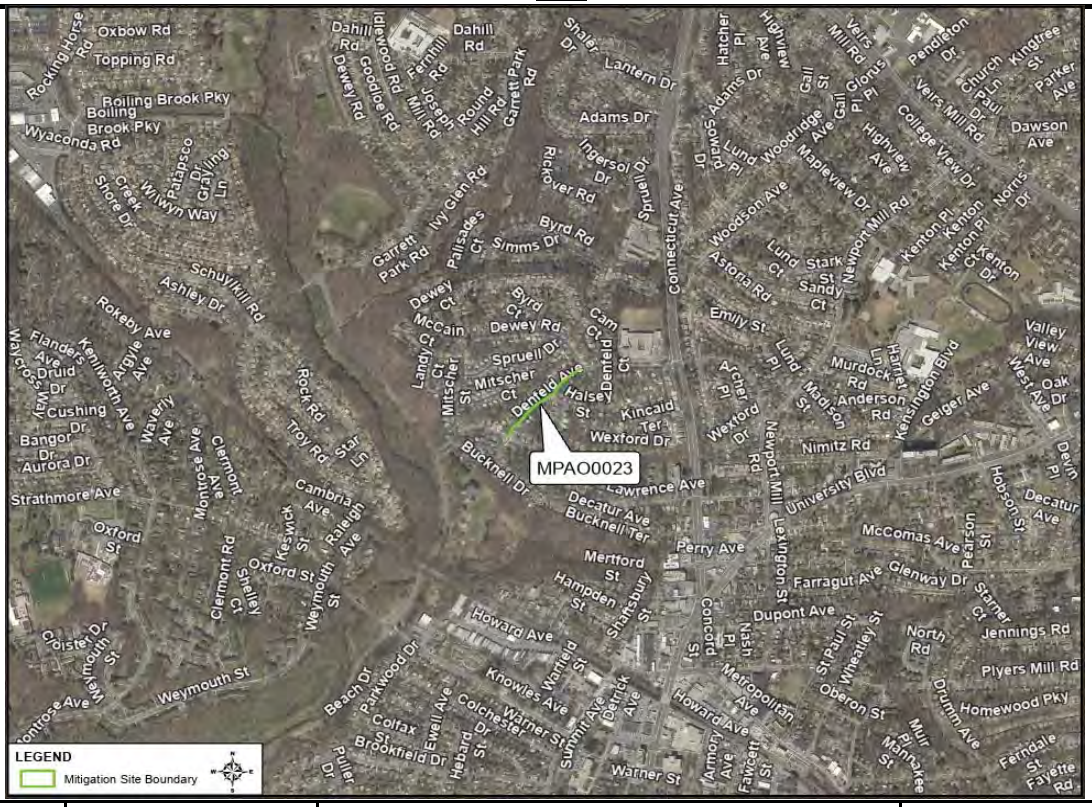
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Imbricated walls and rip-rap throughout site.	Explain: County ROW. MNCPPC recommendation. Ephemeral channel.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	10
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Minor erosion within site		Describe: Mostly maintained lawn with scattered large trees	
Degree of Channel Incision	1	**Land Use**	10
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 1-3' tall banks		Describe: Maintained ROW	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No floodplain exists - ephmeral channel		Describe: No opportunities - ephemeral channel	
Opportunity for Floodplain Development	1	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: County Row between roads and houses		Describe: Open lawn with scattered large trees	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 0.05 square miles		Describe: Sewerlines in floodplain	
		Total Score out of 100	55

Map



Site No.	MPAO0023		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0024

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/24/2019 **Consultant Firm/Investigator(s):** CRI/SN, MD

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** 1399 Lamberton Drive Silver Spring MD

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 3.37 **Lat/Long:** 39.066586 -76.991351

Site Data

Parcel Size (ac): 3 parcels - 18.2, 1.2. 0.6 **Potential Restoration Reach (LF):** 462

Site Opportunities: ___Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting __Habitat Enhancement _X__Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.)

Land Use: Forest **Mapped Soils:** Baile silt loam, 0 to 3 percent slopes; Brinklow-Blocktown channery silt loam

Property Address: 12820 Maple Street Silver Spring MD

Property Owner(s): MNCPPC

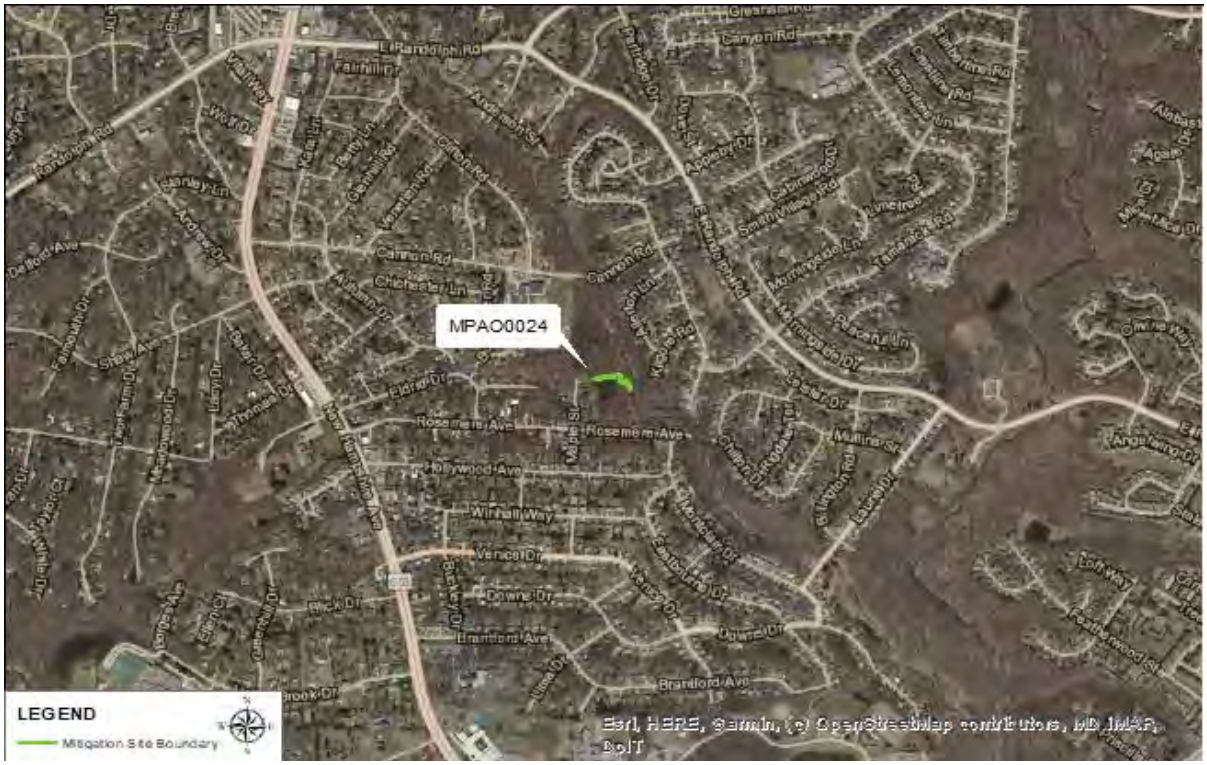
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Culvert at upstream end, concrete downstream of culvert	Explain: Yes. All within M-NCPPC property

Mitigation Site Rating

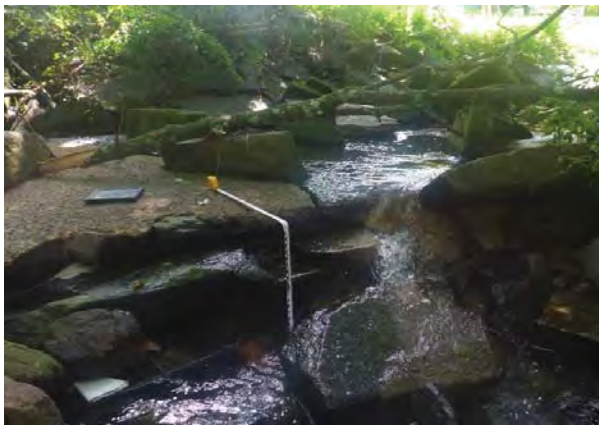
Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: 75%-100% eroded banks		Describe: Forested buffer, bamboo stands on right bank	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 8-9' incised channel		Describe: Forested land use immediately adjacent to stream, residential outside buffer area	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Flows completely confined in channel		Describe: Vertical/lateral	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Mature forest buffer will limit floodplain		Describe: Access from Maple Street, some tree impacts to access entire length off of Maple Street	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 0.35 sq mi		Describe: Manhole exposed on left bank	
		Total Score out of 100	53

Map



Site No.	MPAO0024		Scale: 1 in. =	2,000

Site Photos



Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lane Study **Mitigation Site Number:** MPAO0025

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 8/26/2019 **Consultant Firm/Investigator(s):** CRI/ SJ, MD

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Kenbrook Dr and Northwood Dr

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 1.5 **Lat/Long:** 39.04022 -77.01838

Site Data

Parcel Size (ac): 9.5 **Potential Restoration Reach (LF):** 266

Site Opportunities: ___Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (sq. mi.) 0.15

Land Use: Forest **Mapped Soils:** Brinlow-Blocktown channery silt loams

Property Address: 606 Kenbrook Drive Silver Spring MD

Property Owner(s): M-NCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc? Explain	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Yes, Utilities and constructed plunge pool in the channel.	Explain: Yes access through near by trail.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Approximately 60% eroded, mostly on the left bank. Eroded banks average 5' tall.		Describe: Mature Forest	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Left bank approximately 5'. Right bank approximately 4'.		Describe: Mostly forested some developed.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence.		Describe: Lateral Migration and Vertical Stability	
Opportunity for Floodplain Development	5	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Tree impacts expected.		Describe: Able to use the trail off of Hillsboro Dr.	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 0.15 sq.mi		Describe: Sewer utilities within the potential restoration area.	
		Total Score out of 100	49

Map

Site No.	MPAO0025		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAOO0026

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/26/2019 **Consultant Firm/Investigator(s):** CRI - SJ/MD

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** 200 Lamberton Dr, Silver Spring

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 2.27 **Lat/Long:** 39.050182 -77.011505

Site Data

Parcel Size (ac): 15.8 **Potential Restoration Reach (LF):** 238

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting _X__Habitat Enhancement ___Fish Passage

Stream Order: 2nd **Stream Hydrology:** Ephemeral **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.00305

Land Use: Forest **Mapped Soils:** Blacktown channery silt loam

Property Address: 200 Lamberton Dr, Silver Spring, MD

Property Owner(s): MNCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc? Explain	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Yes; Utility ROWs	Explain: Yes. M-NCPPC Recommendation

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Bank erosion of approximately 0%; No channel observed; flow dispersed into wetland		Describe: Wetland and forest	
Degree of Channel Incision	1	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: No channel incision		Describe: Forest	
Existing Floodplain Access	1	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Flow dispersed into wetland		Describe: Restoration would cause more disturbance than the site requires	
Opportunity for Floodplain Development	10	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Already very wide flood plain		Describe: Clearing of mature forest for access	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage Area - .00305		Describe: Outfall present; photo 6	
		Total Score out of 100	28

Map

Site No.	MPAOO0026		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/270 Managed Lane Study **Mitigation Site Number:** MPAO0027

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/30/2019 **Consultant Firm/Investigator(s):** CRI - DS/SN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Flora Terrace and Flora Ln

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 0.04 **Lat/Long:** 39.01234 -77.034252

Site Data

Parcel Size (ac): 2 parcels (8.4, 1.4) **Potential Restoration Reach (LF):** 1,369

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting _X_Habitat Enhancement _X_Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.37

Land Use: Parkland/Forest **Mapped Soils:** Baile, hatboro and channery silt loams

Property Address: 1400 Flora Terrace, Silver Spring, MD

Property Owner(s): MNCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes; Culverts, concrete weirs and rip-rap bank protection is present	Removing the concrete weirs, confirming more weirs are not further downstream; There is potential to extend downstream with the proper owner coordination.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Approximately 40% of the banks are eroded.		Describe: There is a park and shrubs with invasive species on the edge of the forest in a residential area.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Banks range from approximately 4-8 feet tall.		Describe: Site consists of developed forest.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: There is no significant evidence of flooding.		Describe: Fish blockage; Lateral and vertical stability is present; Habitat; Bed form diversity with floodplain reconnection.	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Trails located on either side and road located at downstream end.		Describe: Access is adjacent to road and trail with minimal clearing necessary.	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage Area - 0.37		Describe: There are multiple utility crossings along with low overheard powerlines. Gas and sewer lines are also present.	
		Total Score out of 100	43

Map

Site No.	MPAO0027		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name:	I-495/270 Managed lane study	**Mitigation Site Number:**	MPAO0028
Projects Estimated Stream Mitigation Needs (L	TBD		
Date of Field Assessmer	7/30/2019	**Consultant Firm/Investigator(s):**	CRI - DS/SN

Site Location Details-taken from desktop review

County:	Montgomery	**Cross Roads:**	Sligo Creek Pkwy & Doomer Ave		
Basin (HUC 8):	Middle Potomac-Anacostia-Occoquan	**MDE Watershed (8 digit):**	2140205		
Proximity to Impacted Stream (mi.):	1.28	**Lat/Long:**	38.993594	-77.005321	

Site Data

Parcel Size (ac):	21.6	**Potential Restoration Reach (LF):**	766		
Site Opportunities:	__X__Channel Restoration	____Livestock Exclusion	___X___Riparian Buffer Planting	___Habitat Enhancement	_X_Fish Passage
Stream Order:	2nd	**Stream Hydrology:**	Perennial	**Stream Use:**	I
Drainage Area to Reach (sq. mi.)			6.23 sq mi		
Land Use:	Parkland	**Mapped Soils:**	Hatboro Silt Loam, 0 to 3 % slopes		
Property Address:	Sligo Creek Parkway and Doomerville Avenue, Tacoma Park, MD				
Property Owner(s):	MNCPPC				

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert,	**Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain**
Explain:	Explain:
Yes; asset stabilization and a lot of placed rip-rap boulders	Yes; it could extend if needed stability all the way to next WSSC exposed asset

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Mostly rip-rap/boulder protection		Describe: Forest	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Approximately 5 feet		Describe: Forested	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Some evidenece of flooding on trail		Describe: Fish passage; vertical stability	
Opportunity for Floodplain Development	1	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Steep valley; trail; road		Describe: Adjacent to road and paved trail	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 6.23 square miles		Describe: Sewer crossing fish blockage	
		Total Score out of 100	26

Map

Site No.	MPAO0028		Scale: 1 in. = 20,000 ft

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/270 **Mitigation Site Number:** MPAO0029

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/30/2019 **Consultant Firm/Investigator(s):** CRI - DS/SN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Piney Branch Parkway and Barron Street

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 0.6 **Lat/Long:** 39.00188 -76.999002

Site Data

Parcel Size (ac): 9 parcels (1, 0.6, 0.5, 1.03, 0.47, 0.94, 2.17, 8.74, 2.4) **Potential Restoration Reach (LF):** 2,575

Site Opportunities: _x___Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting _x__Habitat Enhancement _x__Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.62 sq. mi

Land Use: Park/forest **Mapped Soils:** Hatboro silt loam

Property Address: 8700 Piney Branch Parkway, Silver Spring, MD 20901

Property Owner(s): MNCPPC

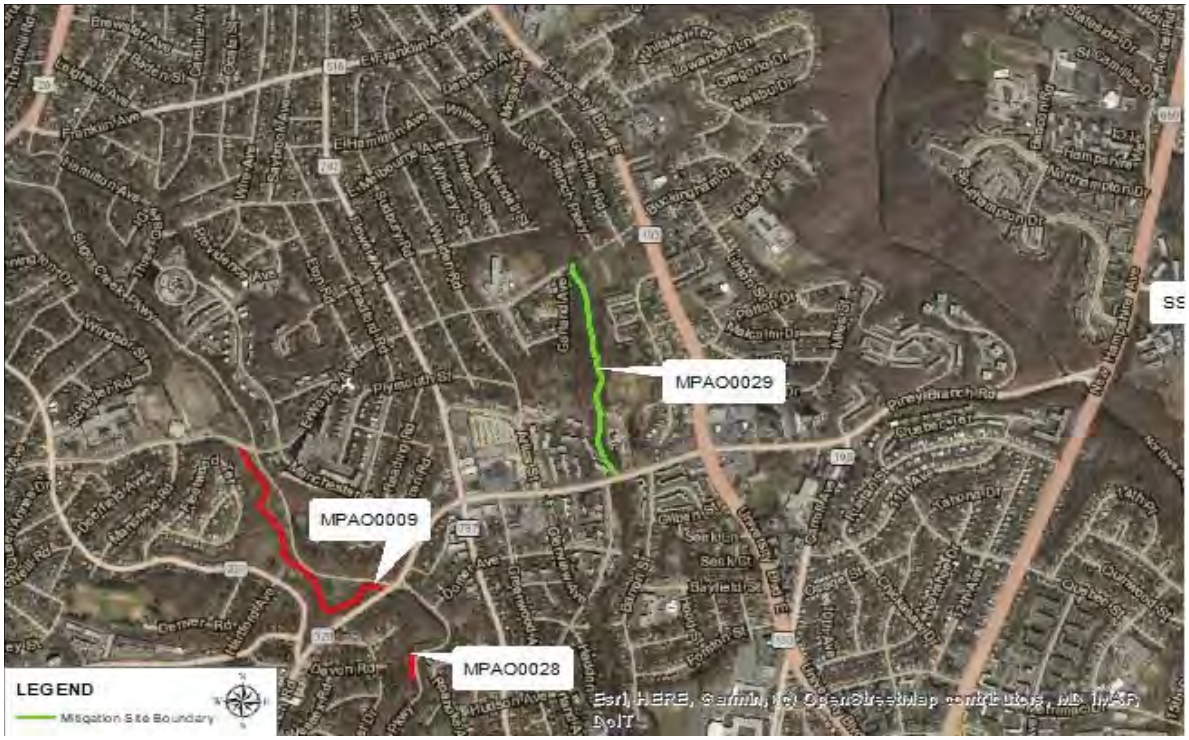
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc.?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
There is evidence of restoration near upstream culvert and work has started at downstream end; Mattresses and couches present in stream.	Downstream end appears to be actively worked on. Confirmation is needed to confirm project extent

Mitigation Site Rating

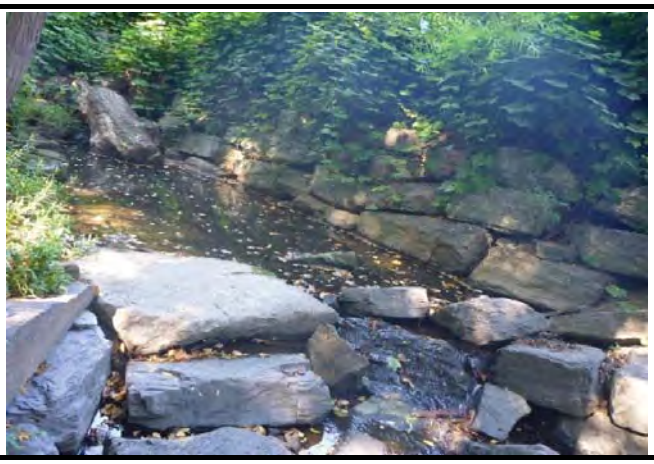
Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: 20% restored; Restoration planned at downstream end		Describe: Forest corridor	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Approximately 4-7 feet		Describe: Forest corridor	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: There is some evidence of flooding primarily In the restored reach		Describe: Lateral and vertical stability; Floodplain reconnection with invasive species	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: FP width varies with park and residential along banks, consistently ~3+		Describe: There is easy access for the upstream and downstream section coming from the left bank community center and park. Clearing is required.	
Drainage Area Evaluation	10	**Utilities Present**	5
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 0.62 square miles		Describe: Multiple sewer line markers visible; No exposed crossings observed	
		Total Score out of 100	47

Map



Site No.	MPAO0029		Scale: 1 in. =	2,000

Site Photos



Stream Mitigation Field Site Assessment Form

Project Details

Project Name: 1-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0030

Projects Estimated Stream Mitigation Needs (LF):

Date of Field Assessment: 7/24/2019 **Consultant Firm/Investigator(s):** CRI- MD/SN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Hugo Circle

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 4 **Lat/Long:** 39.072737 -77.038804

Site Data

Parcel Size (ac): 6 parcels (8.4, 14.7, 9.6, 8.0, 3.8, 57.5) **Potential Restoration Reach (LF):** 5,800

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion ___X___Riparian Buffer Planting _X__Habitat Enhancement __X__Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (sq. mi.) 4.3 sq. mi

Land Use: Forest **Mapped Soils:** Hatboro silt loam

Property Address: 1607 Hugo Circle Dr

Property Owner(s): MNCPPC

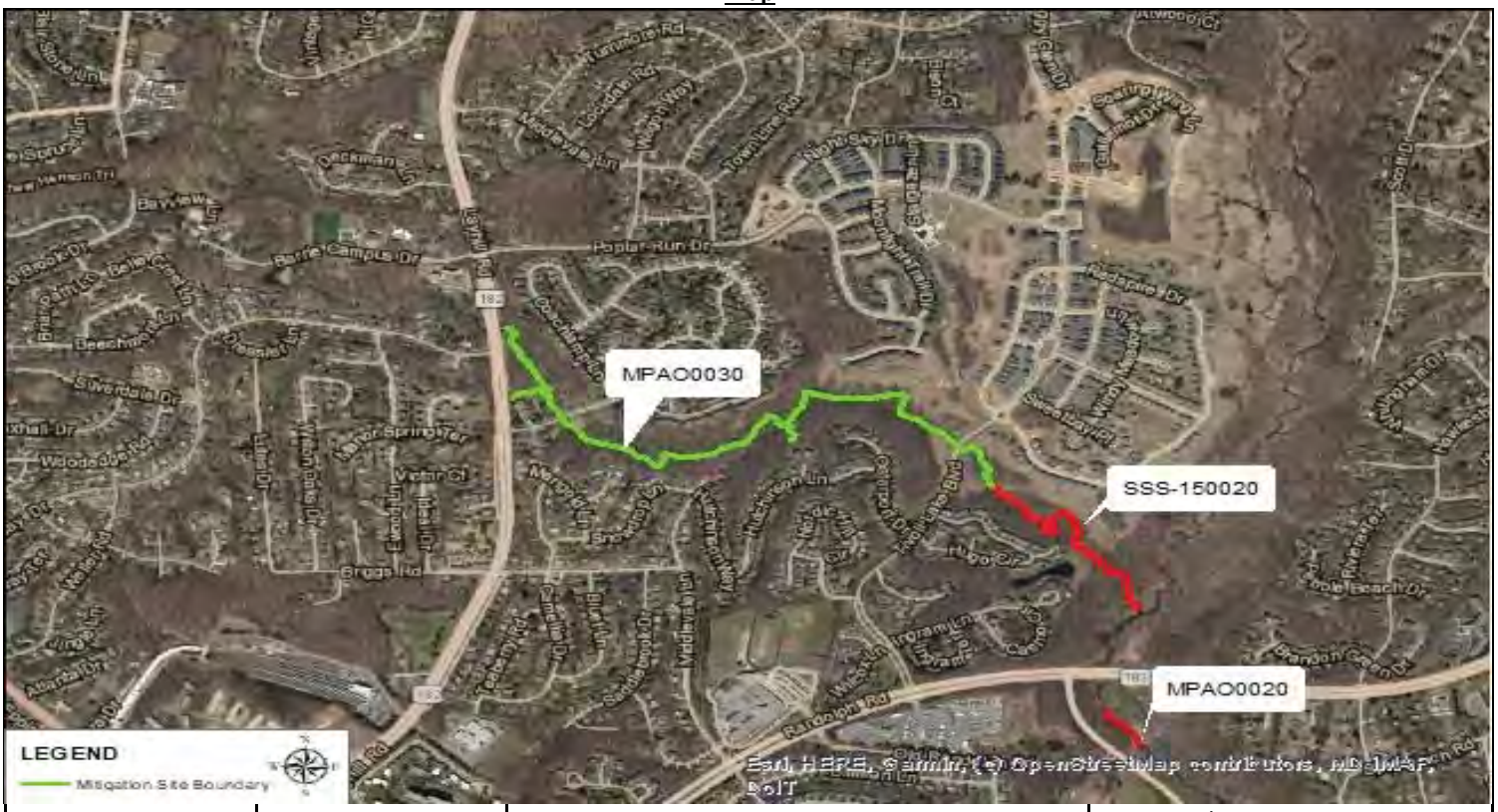
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc.? Explain	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes; Multiple locations have rip-rap lining embankments. Utility crossings are present along with bridges.	Yes; Large MNCPPC floodplain parcel

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Approximately 35% of banks eroded. Bank heights were about 4 feet on outside meanders with a few higher max ~7 feet banks at the top of site		Describe: Site consists of riparian vegetation on both banks and some wetlands in the terrace	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Bank height average is 4 feet. Average increases significantly along the valley wall.		Describe: Young mature forest is within the MNCPPC property.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Some benches on inside meanders flood but terrace log original flood plain gets occasional flooding.		Describe: Bedform diversity; Riparian; Lateral migration; Habitat enhancement; SWM treatment of road in a residential area.	
Opportunity for Floodplain Development	10	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Most locations are 10 times stream width; Some areas have residential land along corridor		Describe: Access for downstream section fairly easy at the new road crossing. Access for the upstream portion is located at Middle Bridge Dr or the MNCPPC Hickory Hill pool.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 4.3 square miles		Describe: Multiple Crossings and utility markers are parallel to stream. No utilities exposed in stream.	
		Total Score out of 100	44

Map



Site No.	MPAO0030		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPAO0031

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/17/2019 **Consultant Firm/Investigator(s):** RK&K; KJH, AJN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Imperial Drive and Woodman Ave

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 0.3 **Lat/Long:** 39.022574 -77.034107

Site Data

Parcel Size (ac): 15.5 **Potential Restoration Reach (LF):** 2,156

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting _X_Habitat Enhancement _X_Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 1.32

Land Use: Forested Parkland **Mapped Soils:** Hatboro silt loam

Property Address: Joseph Park, Woodman Ave.

Property Owner(s): M-NCPPC

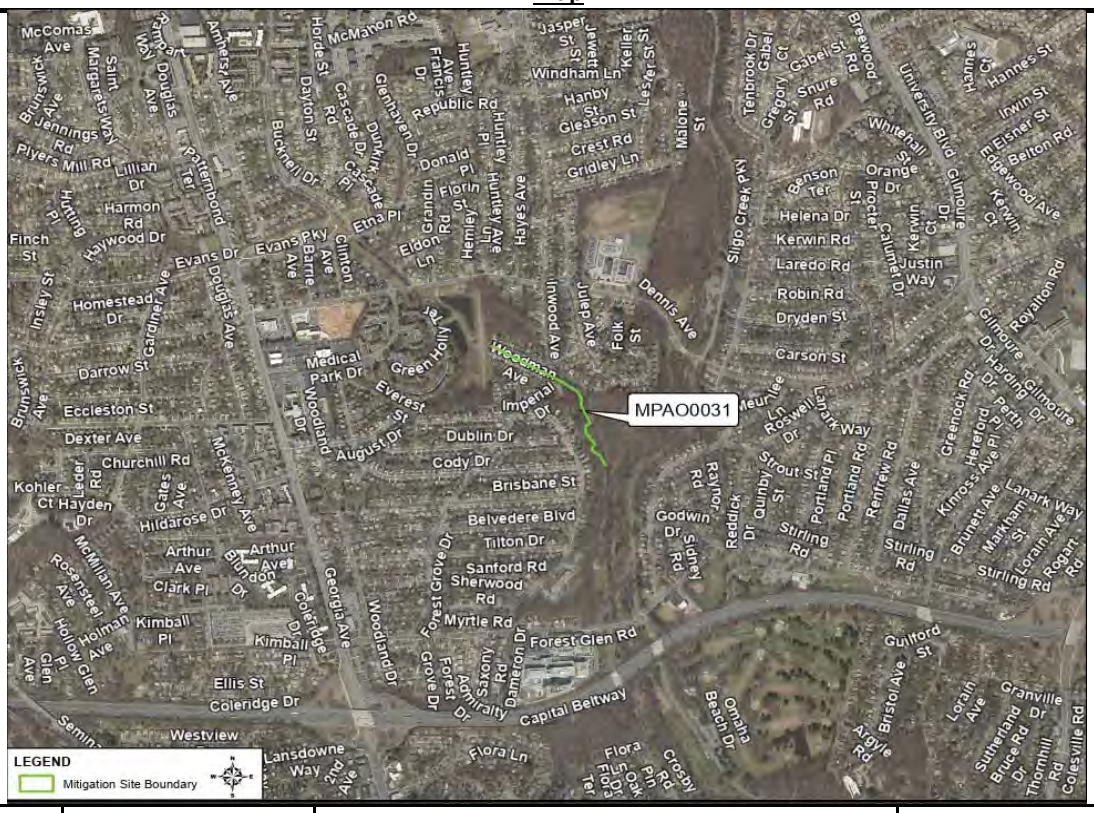
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc.?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes, old restoration; stone toes, log vane, ford crossing.	Wheaton Branch. US end in Montgomery County ROW. MNCPPC recommendation.

Mitigation Site Rating

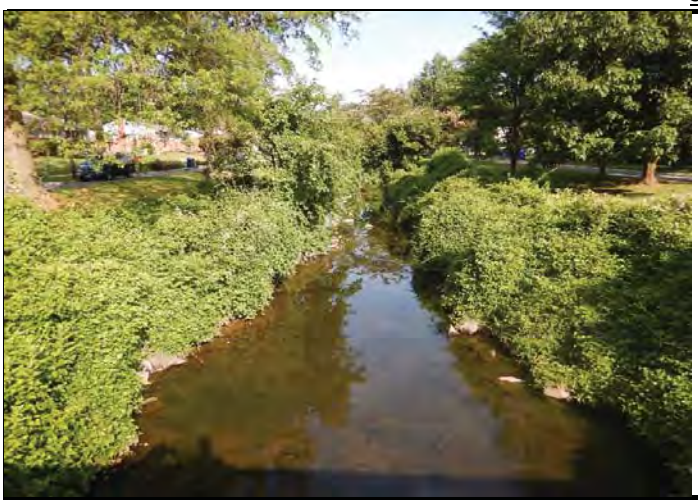
Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Localized moderate to severe erosion, some sections stable		Describe: Mid successional upland forest; Tulip poplar, Red maple, Oaks. Invasives in understory.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 4-8' tall banks		Describe: Forested parkland	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of floodplain access		Describe: Opportunity for sediment reduction, fish passage, riparian buffer improvement. Limited opportunity for floodplain development.	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: No opportunity in western floodplain due to valley hillslope. ~200' potential development in eastern floodplain.		Describe: Old clearing along stream. Some tree clearing would still be required	
Drainage Area Evaluation	5	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 1.32 square miles		Describe: Sewer lines in floodplain	
		Total Score out of 100	43

Map



Site No.	MPAO0031		Scale: 1 in. =	2,000

Site Photos



Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG00002

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 6/14/2019 **Consultant Firm/Investigator(s):** RK&K/KJH, AJN

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Brinkley Road and Cherryfield Road

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140201

Proximity to Impacted Stream (mi.): 1.15 **Lat/Long:** 38.794602 -76.95533

Site Data

Parcel Size (ac): 253.3 **Potential Restoration Reach (LF):** 9,051

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 16.5

Land Use: Forested Parkland **Mapped Soils:** Widewater and Issue soils

Property Address: Henson Valley Way, Fort Washington

Property Owner(s): MNCPPC - PG County

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes. Several sections of large riprap along banks for sewer protection.	No. Large section on private property.

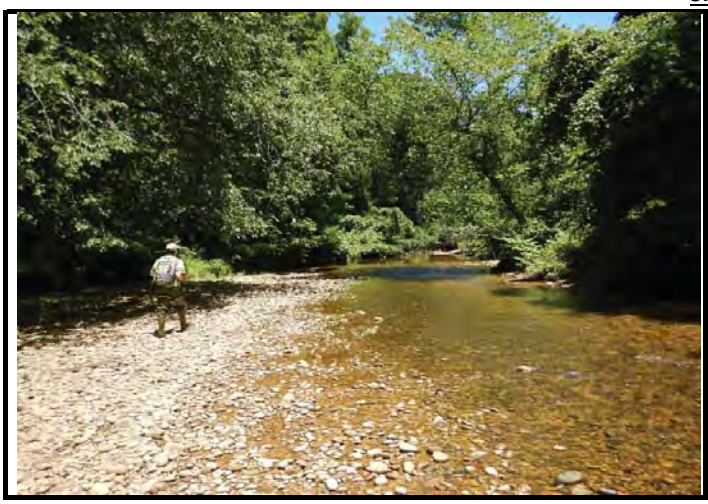
Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Localized moderate to severe erosion. Most banks vertical and stabilized by tree roots or vegetation.		Describe: Mostly midsuccessional forest. Sycamore, elm, swamp white oak, swamp chestnut oak, spicebush, paw paw.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 5-7' tall banks		Describe: Forested parkland	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Some matted down vegetation at top of banks.		Describe: Opportunities for sediment reduction. Very limited otherwise. Decent instream habitat - LWD.	
Opportunity for Floodplain Development	1	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: No. Most of site limited by pedestrian trail, horse track, and adjacent landowners.		Describe: Existing pedestrian trail and grass swale along trail.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 16.5 square mile.		Describe: Sewerline, water, and gas lines present within site.	
		Total Score out of 100	31

Map

Site No.	PG00002		Scale: 1 in. =	2,000

Site Photos



Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG_00016

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 6/12/2019 **Consultant Firm/Investigator(s):** CRI/MD, DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Rte 95 and Rte 212

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 0.37 **Lat/Long:** 39.048994 -76.931214

Site Data

Parcel Size (ac): 12.7, 55.9, ROW **Potential Restoration Reach (LF):** 1,569

Site Opportunities: ___Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting _X__Habitat Enhancement ___Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 7.89

Land Use: ROW, Transportation, Open space **Mapped Soils:** Udorthents, highway; Codorus and Hatboro

Property Address: 11508 Montgomery Rd, Beltsville, MD 20705

Property Owner(s): Maryland National Capital Park & Planning Commission, Potomac Electric

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc? Explain	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Stream is channelized within a concrete trapezoid. Two culverts are present. Evidence of prior bank stabilization (imbricated rock).	Yes, the site is within two parcels and a Right-of-Way.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	10
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Little to no evidence of bank erosion, concrete channel and prior stabilization.		Describe: Mostly herbaceous with small amounts of forest at the downstream extent.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Channelized stream, no access to a floodplain.		Describe: Developed land, ROW between northbound and southbound I-95 and a ROW at powerlines.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Channelized stream, no access to a floodplain.		Describe: Habitat, riparian, vertical stabilization, floodplain access.	
Opportunity for Floodplain Development	5	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: 3-10 times stream width available given the stream is currently overwidened throughout the reach.		Describe: May require shoulder closure on I-95. Access from the MNCPPC park land. Also potential access from utility ROW.	
Drainage Area Evaluation	1	**Utilities Present**	5
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: DA = 7.89		Describe: Old (Inactive) utility crossing, Overhead lines (high hanging) at Potomac Electric ROW.	
		Total Score out of 100	53

Map

Site No.	PG_00016		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG_00077

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 12/14/2018 **Consultant Firm/Investigator(s):** CRI/MD, DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Columbia Park Rd. & 64th Ave.

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 2.58 **Lat/Long:** 38.915426 -76.912602

Site Data

Parcel Size (ac): 8 parcels - 5.8, 0.8, 0.8, 4.0, 1.0, 1.0, 3.1, 0.8 **Potential Restoration Reach (LF):** 1,669

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting _X__Habitat Enhancement ____Fish Passage

Stream Order: 4th **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 4.94

Land Use: Agriculture, Forest **Mapped Soils:** Urban land-Issue complex, Zekiah and Issue soils

Property Address: Middle Parcel - 5540 Columbia Park Road, Landover, MD 20785

Property Owner(s): Washington Metro Area Transportation Authority, Maryland National Capital Park & Planning Commission, Mayor and Town Council of Che

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Yes; Channelization, road fill confines stream. Prior bank stabilization.	Explain: Yes, site completely confined in parcel. Easily accessible from Trent St.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Select areas of sever erosion. Overall, banks protected by gabion.		Describe: Mature deciduous forest with lots of invasive ivy present.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Banks are ~8-9 ft. tall on average, but range from 3-10 ft.		Describe: Residential and transportation uses observed.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of out-of-bank flooding, incised channel.		Describe: Possibility for vertical geomorphic stability and habitat improvement.	
Opportunity for Floodplain Development	5	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Heavy tree impacts, upstream is more confined.		Describe: Clearing needed, staging in residential dead-end possible.	
Drainage Area Evaluation	1	**Utilities Present**	10
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 4.94		Describe: No utilities observed within reach.	
		Total Score out of 100	40

Map

Site No.	PG_00077		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG_00079

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/27/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Birchleaf Ave & Valley Park Rd.

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 2.42 **Lat/Long:** 38.89304891 -76.89516754

Site Data

Parcel Size (ac): Several Parcels - 6.29, 17.71, 0.48 **Potential Restoration Reach (LF):** 1,068

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting __X_Habitat Enhancement ___Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.)

Land Use: Forest **Mapped Soils:** Zekiah and Issue soils

Property Address: Main Parcel - 190 Dateleaf Ave, Capital Heights 20743-0000

Property Owner(s): Maryland National Capital Park & Planning Commission, Seat Pleasant Mayor & Comm Cou

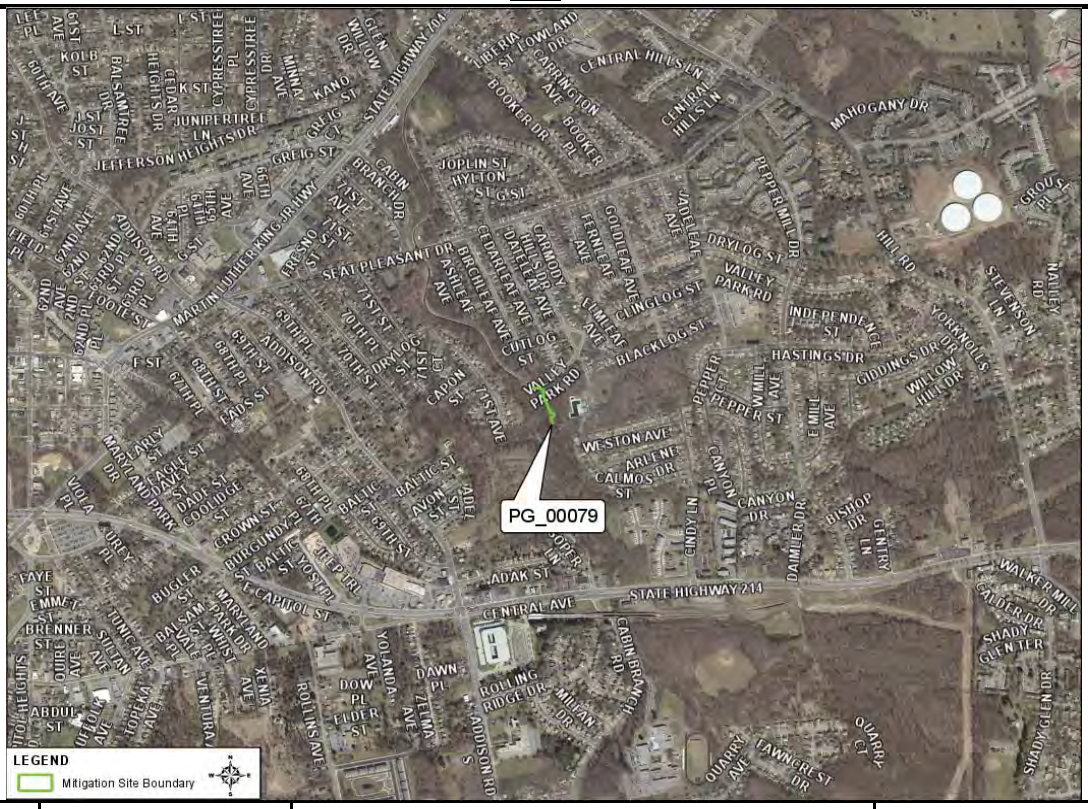
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc.?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
No direct evidence of human disturbance.	Restoration would require access to City and MNCPPC properties.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Severe bank erosion throughout most of site. Numerous fallen trees in channel.		Describe: Mid-successional forest surrounds site.	
Degree of Channel Incision	10	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 6-11 foot tall banks.		Describe: Mid-successional forest on City and M-NCPPC parkland.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of out-of-bank flooding. Deeply incised channel.		Describe: High potential for improving instream habitat and reducing erosion. Some opportunity for floodplain development in downstream segment.	
Opportunity for Floodplain Development	5	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Some opportunity for floodplain development in downstream segment. Floodplain areas in upstream segment limited by steep slopes, narrow valley or adjacent landowners.		Describe: Majority of site surrounded by mid-successional forest, however some of the site is accessible from a sewer line route that was recently planted with small trees.	
Drainage Area Evaluation	5	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 2.18 square miles.		Describe: Sewer line runs parallel stream in eastern floodplain.	
		Total Score out of 100	54

Map



Site No.	PG_00079		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG00097

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 6/14/2019 **Consultant Firm/Investigator(s):** RK&K/KJH, AJN

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Oxon Hill Road and Livingston Road

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02131103

Proximity to Impacted Stream (mi.): 4.85 **Lat/Long:** 38.756622 -77.000749

Site Data

Parcel Size (ac): 56 **Potential Restoration Reach (LF):** 1,568

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting __X_Habitat Enhancement ___Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 24.5

Land Use: Forested Parkland **Mapped Soils:** Widewater and Issue soils

Property Address: Henson Creek Stream Valley Park, Oxon Hill Road, Fort Washington

Property Owner(s): MNCPPC - PG County

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: No evidence. Downstream 500 LF are within critical area. Located in a Historic District.	Explain: No. Small sections on PG county and church properties.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Localized moderate to severe erosion		Describe: Mid successional forest. Sycamore, pawpaw, sweetgum, spicebush, boxelder. Dense understory.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 5-6' tall banks		Describe: Forested parkland	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of out of bank flooding		Describe: Opportunities for sediment reduction, floodplain connectivity, fish and benthic improvements, water quality.	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Large existing floodplain. Some limitations on eastern side near church.		Describe: Old sewer access and abandoned road will require small tree impacts.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 24.5 square miles		Describe: Sewerlines within site. Upstream end has overhad powerlines.	
		Total Score out of 100	44

Map

Site No.	PG00097		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG_00111

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/19/2018 **Consultant Firm/Investigator(s):** CRI/MD, CN

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Rt. 295 & Beaver Dam Rd.

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 1.1 **Lat/Long:** 38.915426 -76.912602

Site Data

Parcel Size (ac): 2 parcels - 24.2, 759.5 **Potential Restoration Reach (LF):** 3,154

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting __X__Habitat Enhancement ____Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 1.84

Land Use: Forest **Mapped Soils:** Zekiah and Issue soils

Property Address: Main Parcel - Edmonstron Road, Greenbelt, MD 20770

Property Owner(s): Beltsville Agricultural Research Center, City of Greenbelt

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Yes; Sewer crossing observed, riffle upstream of sewer crossing.	Explain: Yes; Well within BARC property.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Approximately 50% of banks eroded, specifically in the upstream section where the channel becomes severely incised, 4-9 ft. banks.		Describe: Mature forest and wetlands present at downstream end in the floodplain.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Bank heights up to 9 ft. tall. Upstream section deeply incised, downstream section with 3-4 ft. banks.		Describe: Stream is surrounded by forest.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Downstream end accesses floodplain often. Upstream end (2/3) does not access floodplain.		Describe: Forested buffer present on both banks, stabilize banks and bed, habitat creation, wetland creation, if channel is raised, expand the floodplain.	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Plenty of space, but upstream section is down cut too much to reconnect to the floodplain. Development would require significant tree impacts.		Describe: Could use utilities ROW for access, but would need some clearing for haul roads.	
Drainage Area Evaluation	5	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 1.84 square miles.		Describe: One crossing noted. No utilities observed on most of the site.	
		Total Score out of 100	48

Map

Site No.	PG_00111		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG_00112

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/19/2018 **Consultant Firm/Investigator(s):** CRI/MD, CN

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Rt. 295 & Beaver Dam Rd.

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 1.68 **Lat/Long:** 39.023302 -76.85279

Site Data

Parcel Size (ac): 3 parcels - 629.1, 246.4, 798.3 **Potential Restoration Reach (LF):** 4,147

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting _X__Habitat Enhancement ____Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 6.58

Land Use: Forest, Transportation **Mapped Soils:** Zekiah and Issue soils, Longmarsh and Indiantown soils, Udorthents

Property Address: Beaver Dam Road, Laurel, MD 20708

Property Owner(s): Beltsville Agricultural Research Center

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes; Culverts at Beaverdam Rd. and Soil Conservation Rd.	Yes; Well within BARC property.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Mostly low banks, some minor erosion at the outside meanders.		Describe: Forested and possible wetlands present surrounding stream.	
Degree of Channel Incision	1	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Average bank height ~2 ft tall. Some sections greater than 3 ft. tall, but infrequent.		Describe: Site is forested and surrounded by old fields.	
Existing Floodplain Access	1	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: More than 70% of stream channel gets out-of-bank flows regularly.		Describe: Good floodplain access, could create braided channel within floodplain, increase habitat, provide additional floodplain access.	
Opportunity for Floodplain Development	10	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Forested floodplain present, but could create braided channel and minimize forest impacts.		Describe: It may be possible to use USDA access or utility ROW.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 6.58 square miles.		Describe: One overhead powerline crossing present.	
		Total Score out of 100	27

Map

Site No.	PG_00112		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG-00114

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 12/14/2018 **Consultant Firm/Investigator(s):** CRI/DS, MD

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Cherrywood Ln. & I-495

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 0.04 **Lat/Long:** 39.008461 -76.904091

Site Data

Parcel Size (ac): 4 parcels - 15.3, 1.1, 7.7, 72.5 **Potential Restoration Reach (LF):** 1,235

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 1.47

Land Use: High Density Residential, Forest **Mapped Soils:** Zekiah and Issue soils, Udorthents

Property Address: Cherrywood Lane, Greenbelt, MD 20770

Property Owner(s): City of Greenbelt, Empirian Village of MD LLC, State of MD, Board of Education

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes; Culvert located under bridge. Possible channel relocation present. Rip rap present along banks and stream bed.	No; No access to most of site with the exception of the downstream reach at Cherrywood Lane where possible previous restoration occurred.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Most banks are armored in the parcel where there was access. Approximately 15% of bank erosion present.		Describe: Mature deciduous trees are present with meadow adjacent to stream.	
Degree of Channel Incision	1	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Average bank height is <3 ft tall, ranging from 1.5' to 3.5 ft.		Describe: Area consists of developed residential uses in addition to the Greenbelt Metro station.	
Existing Floodplain Access	1	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Banks are relatively low, evidence of frequent out-of-bank flow is present.		Describe: Possibility for geomorphic stability at confluence with Indian Creek, otherwise low opportunity exists.	
Opportunity for Floodplain Development	10	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Fairly open areas are present immediately adjacent to stream with low tree impact.		Describe: Access road with clearing is needed. Possible traffic pattern change on Cherrywood Lane.	
Drainage Area Evaluation	5	**Utilities Present**	5
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 1.47 square miles.		Describe: Overhead power lines are present at upstream end of stream near bridge, which may restrict access.	
		Total Score out of 100	31

Map

Site No.	PG-00114		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG-00118

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/20/2018 **Consultant Firm/Investigator(s):** CRI/DS, CN

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Greenbelt Park; Greenbelt Park Access Rd

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 1.24 **Lat/Long:** 38.97658 -76.905648

Site Data

Parcel Size (ac): 1 parcel - 726.5 **Potential Restoration Reach (LF):** 5,067

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting _X__Habitat Enhancement __X__Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.49

Land Use: Forest **Mapped Soils:** Zekiah and Issue soils, Udorthents, Russett-Christiana complex, Downer-Hammonton complex, Christiana-Downer complex

Property Address: Good Luck Road, Greenbelt, MD 20770

Property Owner(s): USA Greenbelt Park

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes; Culvert crossings present, likely impacted by construction of I-295.	Yes, the site is competely within the parcel

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Severe erosion and headcutting present in the upstream portion of the stream.		Describe: Site located within a national park. Mature forest with dense trees present.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Top 2/3 of stream reach with ~6-10 ft banks. Bottom 1/3 of stream reach with ~3-6 ft banks.		Describe: Site located within a national park with mature forest.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No rack lines or sediment noted outside of banks. Appears to be forming inset "C" channel within eroded gully.		Describe: Possibility for habitat creation and stabilization of bed and banks.	
Opportunity for Floodplain Development	10	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Steep, narrow valley. Stream is located within a densely forested, incised "B" channel. Floodplain reconnection would require immense tree impacts.		Describe: Site is located within a densely forested national park. Foot trails present.	
Drainage Area Evaluation	10	**Utilities Present**	5
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area = 0.49 square mile.		Describe: Sewer utility present at downstream end of reach.	
		Total Score out of 100	58

Map

Site No.	PG-00118		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG-00120a

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/20/2018 **Consultant Firm/Investigator(s):** CRI/DS, CN

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Edmonston Rd & Sunnyside Ave

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 0.4 **Lat/Long:** 39.019955 -76.892741

Site Data

Parcel Size (ac): 2 parcels - 759.6, 495.3 **Potential Restoration Reach (LF):** 5,371

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting _X__Habitat Enhancement ____Fish Passage

Stream Order: 4th **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 14.1

Land Use: Forest **Mapped Soils:** Zekiah and Issue soils, Longmarsh and Indiantown soils

Property Address: Edmonston Road, Greenbelt, MD 20770

Property Owner(s): Beltsville Agricultural Research Center

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Yes; Some old, dilapidated infrastructure present within stream including concrete and metal. Geotextile and outfalls present along banks.	Explain: Yes, the stream is completely within the parcel

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Approximately 4 ft. vertical banks are present on both sides of the stream for the majority of the reach.		Describe: Mature forest and wetlands within floodplain present on both sides of the stream for extent of the reach.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Approximately 4 ft. vertical banks are present on both sides of the stream. However, stream still accesses the floodplain.		Describe: Mature forest present surrounding site.	
Existing Floodplain Access	1	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Rack lines and fine sediment deposition on both banks/within the floodplain are present for the extent of the reach.		Describe: Some potential in reducing bank erosion, increasing geomorphic stability, habitat creation, and wetland enhancement.	
Opportunity for Floodplain Development	10	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Wide, flat valley is present within a mature forest, but sparse trees may allow for minimal tree disturbance.		Describe: Multiple access points from downstream to upstream end of reach with minimal tree removal required.	
Drainage Area Evaluation	1	**Utilities Present**	5
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 14.1 square miles.		Describe: Powerline ROW crosses stream.	
		Total Score out of 100	49

Map

Site No.	PG-00120a		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG-00120b

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/20/2018 **Consultant Firm/Investigator(s):** CRI/DS, CN

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Research Rd & Beaver Dam Rd

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 1.23 **Lat/Long:** 39.023356 -76.879996

Site Data

Parcel Size (ac): 2 parcels - 759.6, 495.3 **Potential Restoration Reach (LF):** 1,420

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting _X__Habitat Enhancement ____Fish Passage

Stream Order: 4th **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 13.1

Land Use: Forest **Mapped Soils:** Zekiah and Issue soils, Longmarsh and Indiantown soils

Property Address: Research Road, Greenbelt, MD 20770

Property Owner(s): Beltsville Agricultural Research Center

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Yes, possibly former agriculture or livestock field	Explain: Yes, the site is completely within the parcel

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Vertical, unstable banks approximately 4-5 ft. tall present for entire reach with very little root mass.		Describe: Site consists mostly of palustrine emergent wetland. No trees or shrubs were present.	
Degree of Channel Incision	5	**Land Use**	10
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Vertical, incised banks approximately 4-5 ft. tall present for entire reach. However, access to floodplain is present.		Describe: Land use consists of open grass fields which may have been used for agriculture in the past, but are now overgrown with grass.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Evidence of floodplain access is present at the downstream end of the stream reach, but not upstream.		Describe: Some potential in reducing bank erosion, increasing geomorphic stability, habitat creation, floodplain access, and developing stream buffer.	
Opportunity for Floodplain Development	10	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Wide open flat valley with no trees present.		Describe: Site is in close proximity to roads and powerline ROW.	
Drainage Area Evaluation	1	**Utilities Present**	10
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 13.1 square miles.		Describe: No utilities observed.	
		Total Score out of 100	67

Map

Site No.	PG-00120b		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: 495/270 **Mitigation Site Number:** PG-00122

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 8/21/2019 **Consultant Firm/Investigator(s):** CRI- MD/DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Kepner Ct and Nashville Rd

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 214025

Proximity to Impacted Stream (mi.): 0.01 **Lat/Long:** 38.985788 -76.888418

Site Data

Parcel Size (ac): 265.6 **Potential Restoration Reach (LF):** 3,548

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.21

Land Use: Greenbelt Park **Mapped Soils**: Christiana-Downer, Zekiah, and Udorthents

Property Address: 6565 Greenbelt Rd, Greenbelt, MD 20770

Property Owner(s): National Park Service

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc.?	**Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain**
Explain:	Explain:
Yes, utilities exposed throughout the site	Yes, all NPS property but will need SHA ROW access

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Erosion from downcutting impacting ~80% of stream bank		Describe: Forested	
Degree of Channel Incision	10	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Between 3-10 feet for most downstream, greater than 10 upstream		Describe: Forested	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No floodplain access outside incised channel		Describe: Lateral/Vertical stability, bedform diversity	
Opportunity for Floodplain Development	5	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Space for 10 times width with massive tree loss or raising of channel bed		Describe: No access existing, clearing needed with SHA ROW	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 0.21 square miles		Describe: Utilities exposed throughout site within stream	
		Total Score out of 100	54

Map

Site No.	PG-00122		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG_00124

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 6/11/2019 **Consultant Firm/Investigator(s):** CRI - CN, SJ

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Powder Mill Rd and Bond Rd

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 0.01 **Lat/Long:** 39.028914 -76.950838

Site Data

Parcel Size (ac): 4 Parcels: 3.4, 32.3, 19.2, 2.5 **Potential Restoration Reach (LF):** 1,958

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 4th **Stream Hydrology:** Perennial **Stream Use:** III

Drainage Area to Reach (sq. mi.) 15.8

Land Use: Forest **Mapped Soils:** Codorus and Hatboro soils

Property Address: Main Parcel: 3101 Powder Mill Rd, Adelphi, MD. 20783

Property Owner(s): Maryland National Capital Park & Planning Commission

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes, culverts at US and DS ends of site, sewer armament along LB.	Yes, can be done within parcel.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Small patches of erosion, closer to 10%.		Describe: Mature forest	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: ~5' banks, FP access on DS end of reach.		Describe: Mature forest	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Some signs of FP access, sand on FP at DS end of site, may be due to backwater from debris jam at culvert.		Describe: In good condition, only real uplift is FP reconnection, would require extensive impact to mature forest.	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Valley wall on RB, road on LB, mature forest on existing FP.		Describe: Old access road to sewer on RB, young tree planting along road.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 15.8 sq. mi		Describe: Sewer line running along LB.	
		Total Score out of 100	30

Map

Site No.	PG_00124		Scale: 1 in. = 2,000 ft

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG_00132

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/20/2018 **Consultant Firm/Investigator(s):** CRI/DS, CN

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Edmonston Rd & Sunnyside Ave

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 0.35 **Lat/Long:** 39.016993 -76.898683

Site Data

Parcel Size (ac): 1 parcel - 116.7 **Potential Restoration Reach (LF):** 954

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting _X__Habitat Enhancement ____Fish Passage

Stream Order: 4th **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 9.77

Land Use: Forest **Mapped Soils:** Zekiah and Issue soils

Property Address: Edmonston Road, Greenbelt, MD 20770

Property Owner(s): Beltsville Agricultural Research Center

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
No, there is no sign of human disturbance.	Yes, the stream is completely within the parcel.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Upper 2/3 of stream reach with ~1-2 ft. eroded banks on outer meanders of stream. Floodplain access, good root density. Lower 1/3 of stream reach with ~2-4 ft. eroded banks on both sides, no floodplain access.		Mature forest buffer present on both sides. A minimum 50 ft. forested buffer is present on the left bank of stream between stream and Edmonston Road.	
Degree of Channel Incision	1	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
Bank heights range from ~1-2 ft. in the upper 2/3 of the stream and between ~2-4 ft. in the lower 1/3 of the stream.		Site consists of mature forest.	
Existing Floodplain Access	1	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
Rack lines on both banks and active overflow channels are present. Sediment deposition present on bars to top of banks and fine sediment deposition present within floodplain.		Good habitat and flow diversity is present, in addition to lots of large woody debris. Other potential exists in reducing bank erosion, floodplain connectivity, and habitat creation.	
Opportunity for Floodplain Development	10	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
Mature forest with many trees present within a flat, wide valley.		Edmonston Road in close proximity to site.	
Drainage Area Evaluation	1	**Utilities Present**	10
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
Drainage area - 9.77 square miles.		No utilities observed.	
		Total Score out of 100	40

Map

Site No.	PG_00132		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG_00138

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/27/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Central Ave & Cabin Branch Rd.

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 2.02 **Lat/Long:** 38.88651986 -76.88835557

Site Data

Parcel Size (ac): Several Parcels - 16.72, 4.41, 4.65 **Potential Restoration Reach (LF):** 1,940

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting __X_Habitat Enhancement ___Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.26

Land Use: Forest **Mapped Soils:** Adelphia-Holmdel-Urban Complex & Widewater and Issue soils

Property Address: Main Parcel - 100 Cabin Branch Dr., Capital Heights 20743-0000

Property Owner(s): Board of education, Washington Metro Area Transit Authority, PG. County ROW

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Trash dumping in and adjacent to channel.	Explain: Restoration would require access to Board of Education, WMATA & PG. County ROW.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Moderate bank erosion throughout majority of site. Some localized severe bank erosion.		Describe: Site surrounded by mid-successional forest. Dense understory. Several mature trees growing along channel. One small PFO wetland.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 5-10 foot tall banks.		Describe: Mid-successional forest on Board of Education & WMATA properties.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of out-of-bank flooding. Small channel that is deeply incised.		Describe: Opportunities for improving instream habitat and reducing erosion. Some opportunities for floodplain development in southern floodplain.	
Opportunity for Floodplain Development	5	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Some opportunities for floodplain development in southern floodplain, however northern floodplain development is limited by metro embankment.		Describe: Majority of site is surrounded by mid-successional forest, however there is an old sewer line access route along the site that consists of open areas with scattered smaller trees.	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 0.26 square miles		Describe: Sewer line runs parallel to stream in southern floodplain.	
		Total Score out of 100	49

Map

Site No.	PG_00138		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-150020

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/16/2018 **Consultant Firm/Investigator(s):** CRI/MD, SJ

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Randolph Rd & Kemp Mill Rd

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 3.5 **Lat/Long:** 39.068978 -77.028791

Site Data

Parcel Size (ac): 3 parcels - 14.5, 83.5, 57.2 **Potential Restoration Reach (LF):** 2,583

Site Opportunities: _X_ Channel Restoration ___ Livestock Exclusion _____ Riparian Buffer Planting _X_ Habitat Enhancement ___ Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (sq. mi.) 4.5

Land Use: Forest **Mapped Soils:** Hatboro silt loam

Property Address: Randolph Road, Silver Spring, MD 20906

Property Owner(s): M-NCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes, rip rap armored sewer crossing observed	Yes, best access will be from Tivoli which is pretty far from the study site.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Outside meander, banks range from ~4-5 ft. tall, approximately 30% of total length of reach.		Describe: Mature forest is present on floodplain. Possible floodplain wetlands present at toe-of-slope.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Banks are incised and range from ~4-5 ft. tall. It may be difficult to raise the channel at confluence with Northwest Branch Anacostia River.		Describe: Mature forest is present on floodplain.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of rack lines or sediment deposition on floodplain.		Describe: Potential for habitat enhancement, increasing geomorphic stability.	
Opportunity for Floodplain Development	1	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: It may be difficult to raise the channel at confluence with Northwest Branch Anacostia River. Floodplain consists of mature forest.		Describe: The best access to site is through neighborhood west of site or via Trivoli Lake Blvd.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 4.5 square miles.		Describe: Sewer crossing observed at upstream end, but may be possible to avoid. Sewer within floodplain.	
		Total Score out of 100	31

Map

Site No.	SSS-150020		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-150021

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/12/2018 **Consultant Firm/Investigator(s):** CRI/MD, SN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Wick Ln & Keats Ter

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140206

Proximity to Impacted Stream (mi.): 2.5 **Lat/Long:** 39.127546 -77.139088

Site Data

Parcel Size (ac): 3 parcels - 30.4, 80.4, 0.9 **Potential Restoration Reach (LF):** 1,781

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement __X__Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (sq. mi.) 0.32

Land Use: Forest **Mapped Soils:** Hatboro silt loam, Codorus silt loam, Glenelg silt loam

Property Address: Main Parcel - Needwood Road, Rockville, MD 20855

Property Owner(s): M-NCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes; Culvert present at head, placed rip rap at upstream end, downstream of culvert.	Yes; Stream site completely within M-NCPPC property.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Approximately 70% of banks are eroded, ranging from ~4-9 ft. tall, alternating at meanders. Several areas of severe erosion.		Describe: Vegetation is mostly forested, with many vines and invasive species noted.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Bank heights range between ~3-10 ft. tall for most of the stream length. Approximately 40% of banks are over 5 ft. tall.		Describe: Land use consists of forest.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Few indicators of out-of-bank flow in parts of the reach. Bent over vegetation and rack lines present.		Describe: Potential for bank height and encroachment ration improvement, floodplain reconnectivity, stabilizing severely eroded banks, and improving vegetative cover with plantings.	
Opportunity for Floodplain Development	10	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Wide valley present, but stream is incised so the channel would have to be raised to floodplain.		Describe: There appears to be good access from Wick Lane with little maintenance of traffic needed and minor tree trimming.	
Drainage Area Evaluation	10	**Utilities Present**	5
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 0.32 square mile.		Describe: Sewer manhole present at upstream end and approximately 150 feet from channel at edge of valley.	
		Total Score out of 100	62

Map

Site No.	SSS-150021		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-150023

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/14/2018 **Consultant Firm/Investigator(s):** CRI/MD, DS

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Glenallan Ave & Kemp Mill Rd

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 2.9 **Lat/Long:** 39.061106 -77.028795

Site Data

Parcel Size (ac): 4 parcels - 97.0, 4.0, 5.3, 49.6 **Potential Restoration Reach (LF):** 3,069

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting _X__Habitat Enhancement ____Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (sq. mi.) 1.18

Land Use: Forest **Mapped Soils:** Hatboro silt loam, Glenelg silt loam

Property Address: Main Parcel - Kemp Mill Road, Silver Spring 20902

Property Owner(s): M-NCPPC, Montgomery County

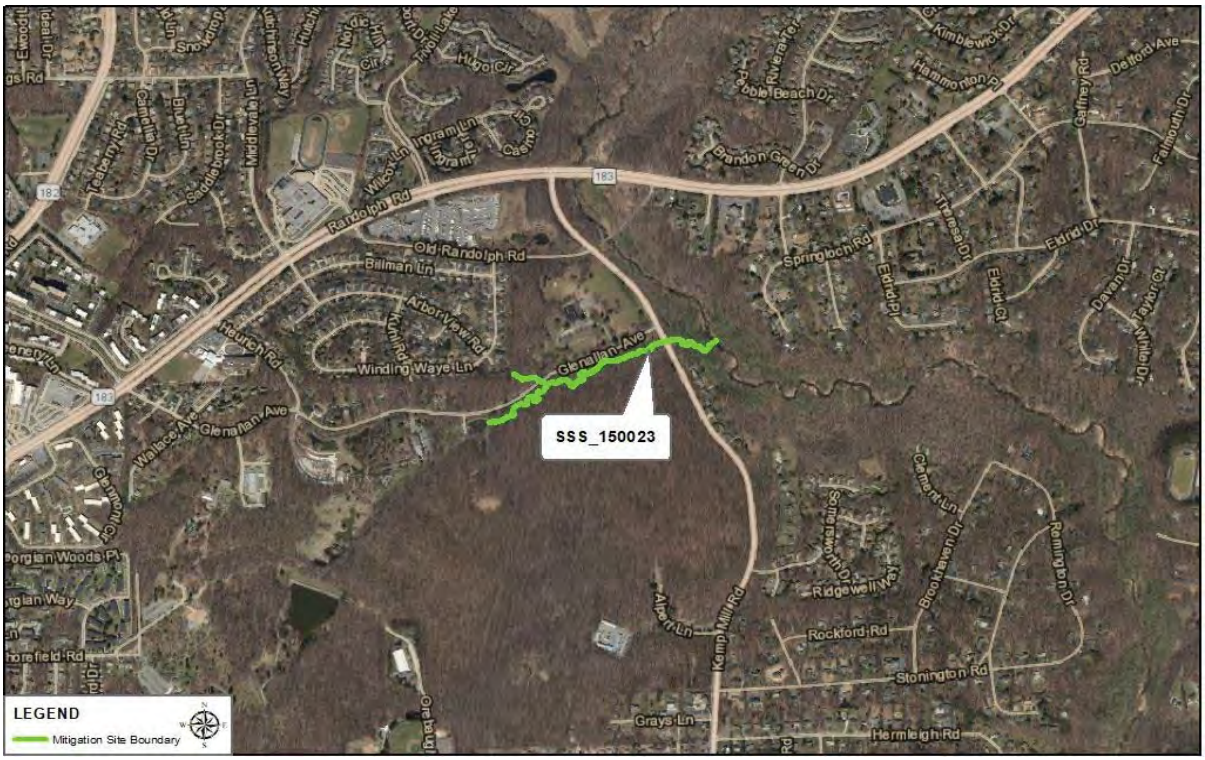
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes; Road culvert present at Kemp Mill Road. Pedestrian bridge and horse trail bridge also present.	Yes; Possible to extend upstream into adjacent parcels for additional length.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: A few spots of minor-to-moderate bank erosion are present with sparse areas of high bank erosion. Banks are highly erodible.		Describe: Vegetation consists mostly of a forested riparian buffer. The left bank upstream of Kemp Mill Road contains a ~20-50 ft. forested buffer and the right bank contains greater than 200 feet of mature forest buffer.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Bank heights are approximately 4 ft. on average.		Describe: Land use consists of forested park land.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Few areas get out-of-bank flow during storm events. Evidence of fine sediment deposits present.		Describe: Potential for geomorphic uplift, increase floodplain access, provide sediment deposition, enhance habitat.	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Floodplain development would require moderate tree impacts. Potential exists specifically on left stream bank.		Describe: Potential access off of Glenallan Ave and Kemp Mill Rd. Minor clearing may be required.	
Drainage Area Evaluation	5	**Utilities Present**	10
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 1.18 square miles.		Describe: No utilities observed.	
		Total Score out of 100	52

Map



Site No.	SSS-150023		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-150040

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/12/2018 **Consultant Firm/Investigator(s):** CRI/MD, SN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Olney Laytonsville Rd & Stanbrook Ln

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140206

Proximity to Impacted Stream (mi.): 5.4 **Lat/Long:** 39.183457 -77.120731

Site Data

Parcel Size (ac): 2 parcels - 62.7, 31.8 **Potential Restoration Reach (LF):** 1,477

Site Opportunities: ___Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 1st **Stream Hydrology:** Intermittent **Stream Use:** III

Drainage Area to Reach (sq. mi.) N/A

Land Use: Forest, Agriculture **Mapped Soils:** Baile silt loam

Property Address: East Parcel - 19820 Muncaster Road, Rockville, MD 20855

Property Owner(s): Montgomery County

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
No, no evidence of human action	Yes; Stream is well within Montgomery County property. Access from roadway within property present.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Minor erosion present. Stream slightly incised downstream of minor headcuts, characteristic of stable "E"channel.		Describe: Wetland meadow present with adjacent tree plantings. Section of palustrine scrub-shrub wetland present. Some multiflora rose observed.	
Degree of Channel Incision	1	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Incision characteristic of stable "E" channel (~1.5 ft. tall banks).		Describe: Wet meadow and tree plantings present. Riparian buffer will develop into forest.	
Existing Floodplain Access	1	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Low banks present throughout reach. Flatland grasses present. Standing water noted within floodplain.		Describe: Potential exists for lift as stable channel is present with existing wetlands and tree plantings to enhance riparian buffer.	
Opportunity for Floodplain Development	5	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Floodplain is already 3-10 times the stream width for most of the reach.		Describe: Existing park entrance is present, in addition to a maintained path parallel to the stream.	
Drainage Area Evaluation	10	**Utilities Present**	10
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area is less than 1 square mile.		Describe: No utilities observed.	
		Total Score out of 100	45

Map

Site No.	SSS-150040		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-150041

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/12/2018 **Consultant Firm/Investigator(s):** CRI/MD, SN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Olney Laytonsville Rd & Wickham Rd

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140206

Proximity to Impacted Stream (mi.): 5.8 **Lat/Long:** 39.17486 -77.100179

Site Data

Parcel Size (ac): 1 parcel - 19.4 **Potential Restoration Reach (LF):** 925

Site Opportunities: ___Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting _X__Habitat Enhancement ____Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** III

Drainage Area to Reach (sq. mi.) 0.13

Land Use: Forest, Agriculture **Mapped Soils:** Baile silt loam

Property Address: Olney Laytonsville Road, Olney, MD 20832

Property Owner(s): M-NCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes; Signs of historic straightening. Culvert present at road crossing seems too low.	No; May need use of County ROW along Olney Laytonsville Road or access from community at Wickham Road.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
No bank erosion observed.		Wetland meadow present throughout site.	
Degree of Channel Incision	1	**Land Use**	5
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
Bank height is less than 1 foot tall throughout site.		Possible fallow agricultural field, currently wetland meadow.	
Existing Floodplain Access	1	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
Stream banks are low. Standing water and saturated soils are present within the floodplain. Vegetation bent over.		Potential to improve riparian buffer and enhance habitat. Stream is stable but has been historically straightened.	
Opportunity for Floodplain Development	10	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
Stream situated in a large, wet meadow within an open field. Banks are already low, so floodplain development would not require a lot of grading.		No direct vehicular access. Path may be needed through wetlands. Maintenance of traffic required along road.	
Drainage Area Evaluation	10	**Utilities Present**	10
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
Drainage area - 0.13 square mile.		No utilities observed.	
		Total Score out of 100	49

Map

Site No.	SSS-150041		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-160039

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 6/14/2019 **Consultant Firm/Investigator(s):** CRI - SN/DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Hamilton St and 38th Avenue

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 4.5 **Lat/Long:** 38.950194 -76.951858

Site Data

Parcel Size (ac): 2.5, 17.4, 6< 1ac **Potential Restoration Reach (LF):** 1,123

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement _X__Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.46

Land Use: Forest, open space **Mapped Soils:** Codorus-Hatboro-Urban land complex and Codorus-Hatboro

Property Address: 3901 Hamilton St Hyattsville, MD 20781

Property Owner(s): M-NCPPC, WSSC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes, bridges and parkland directly adjacent, lots of trash in stream, footbridge over stream, perhaps historically straightened.	Yes, all within M-NCPPS property. Could extend downstream to one additional private property owner to extend approx. 1000 lf.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Erosion looks to be old, stream most likely previously downcut and now stream banks look more stable.		Mature to old deciduous forest along left bank, some forest and parking lot along right bank.	
Degree of Channel Incision	5	**Land Use**	5
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
Approximately 5' tall eroded banks, entrenched stream channel and over widened.		Adjacent land use is forest and developed/ park and open space.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
Mostly 5' banks but some inside banks and other locations have small vegetated benches.		Poor water quality is limiting, increase floodplain, provide lateral stability, increase habitat.	
Opportunity for Floodplain Development	10	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
Stream is over widened		Adjacent to public park with ample parking.	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
DA = 0.46 ac		Sewer manhole potentially near site, crossing at footbridge, gas line crossing.	
		Total Score out of 100	52

Map

Site No.	SSS-160039		Scale: 1 in. = 2,000 ft

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: 495/270 **Mitigation Site Number:** SSS-160041

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 8/21/2019 **Consultant Firm/Investigator(s):** CRI- MD/DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Nashville Rd/Newburg Dr

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 214025

Proximity to Impacted Stream (mi.): 0 **Lat/Long:** 38.983586 -76.884114

Site Data

Parcel Size (ac): 265.6 **Potential Restoration Reach (LF):** 2,408

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.97

Land Use: Greenbelt Park/Residential **Mapped Soils**: Christiana-Downer-Urban, Zekiah, and Russett-Christiana-Urban

Property Address: 6565 Greenbelt Rd, Greenbelt, MD 20770

Property Owner(s): National Parks Service/Private residence (access only)

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc.?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Channelization from road and culvert	Yes, NPS parcel but may need additional access at upstream neighborhood

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Greater than 50% of banks experiencing erosion, ~80%		Describe: Forested	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Average bank height ~6 feet		Describe: Forested	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Very little if any out of bank flow evident		Describe: Vertical/lateral stability , bedform diversity, floodplain reconnection	
Opportunity for Floodplain Development	10	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Existing space for ten times stream width with tree loss, or channel bed being raised		Describe: No access existing, clearing needed. Potential access from Kepner rd	
Drainage Area Evaluation	10	**Utilities Present**	10
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 0.97		Describe: No utilities within NPS parcel	
		Total Score out of 100	63

Map

Site No.	0		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-160042

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/20/2018 **Consultant Firm/Investigator(s):** CRI/CN, DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** I-295 & Greenbelt Park

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 0.48 **Lat/Long:** 38.994218 -76.899435

Site Data

Parcel Size (ac): 1 parcel - 726.5 **Potential Restoration Reach (LF):** 1,091

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting _X__Habitat Enhancement ____Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.03

Land Use: Forest **Mapped Soils:** Zekiah and Issue soils

Property Address: Greenbelt Road, Greenbelt, MD 20770

Property Owner(s): USA Greenbelt National Park

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes; Upstream end of reach begins at outfall. Rip rap dumped as headcut stabilization, flows through pipe under Greenbelt Park access road.	Yes, the stream is completely within the parcel

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Both banks eroded through entire reach. Bank height ranges from ~5-15 ft. tall.		Site is located within a forested national park.	
Degree of Channel Incision	10	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
Banks are severely incised due to difference in culvert elevations between upstream and downstream end.		Land use is forested national park.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
Banks are severely incised, no evidence of out-of-bank flooding.		Stream situated within very steep valley. Culvert invert elevations prevent significant changes. Headcut/grade control only realistic option for lift.	
Opportunity for Floodplain Development	1	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
Flows down valley wall of mainstem, no real floodplain present.		Roads at upstream and downstream end, but dense forest present throughout reach.	
Drainage Area Evaluation	10	**Utilities Present**	10
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
Drainage area - 0.03 square mile.		No utilities observed.	
		Total Score out of 100	55

Map

Site No.	SSS-160042		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-160053

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 6/11/2019 **Consultant Firm/Investigator(s):** CRI- CN, SJ

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** University Blvd E/W Park Dr

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 1.8 **Lat/Long:** 38.987488 -76.964188

Site Data

Parcel Size (ac): 4 Parcels: 1.3, 21.7, 18.5, 8.5 **Potential Restoration Reach (LF):** 2378

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 4th **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (33.7

Land Use: Forest **Mapped Soils:** Codorus and Hatboro soils

Property Address: Main Parcel: 8000 W Park Dr, Adelphi, MD, 20783

Property Owner(s): Maryland National Capital Park & Planning Commission

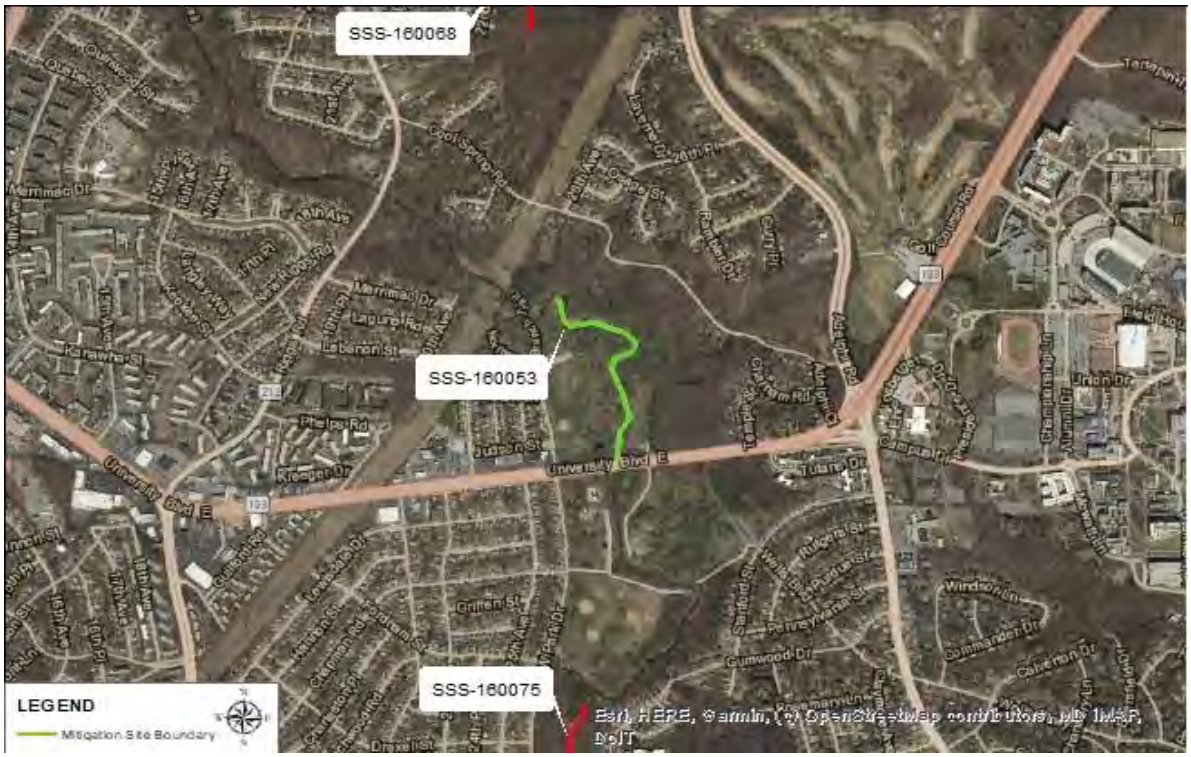
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes, bank armoring in multiple places, bridges US and DS of reach	Yes, can be done within parcel

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Closer to 10%, some patches of hig - very high erosion on outer meand		Describe: Mature forest	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 5-8' banks but good bars and FP benches		Describe: Mature forest	
Existing Floodplain Access	1	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Sand deposition and racklines on FP		Describe: Not much needed other than some minor bank rehab/stabilization	
Opportunity for Floodplain Development	10	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Flat, wide floodplain area		Describe: Could access without extensive forest impacts	
Drainage Area Evaluation	1	**Utilities Present**	5
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 33.7 sq mi		Describe: Sewer present but not close to stream	
		Total Score out of 100	35

Map



Site No.	SSS-160053		Scale: 1 in. = 2,000 ft

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-160058

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 6/11/2019 **Consultant Firm/Investigator(s):** RK&K/KJH, CAS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Seat Pleasant Drive and Hill Road

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 2.1 miles **Lat/Long:** 38.901499 -76.891591

Site Data

Parcel Size (ac): 9.6 **Potential Restoration Reach (LF):** 1,361

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting __X_Habitat Enhancement ___Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.18

Land Use: Forested Parkland **Mapped Soils:** Christiana-Downer-Urban land complex

Property Address: Highland Park

Property Owner(s): MNCPPC - PG County

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Extensive trash dumping	Explain: Yes

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Localized areas of moderate to severe erosion. Some sections are stable.		Describe: Mid-successional forest - upland. Beech, tulip poplar, mixed oaks, spicebush, musslewood.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 5-10' tall banks		Describe: Forested parkland	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence, deeply incised channel		Describe: Opportunities for sediment reduction, instream habitat. Limited to a few aspects.	
Opportunity for Floodplain Development	1	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Limited by adjacent houses and recreational fields		Describe: No existing access. Old WSSC path with small tree impacts.	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 0.18 square miles		Describe: Sewerline runs along northern side of channel.	
		Total Score out of 100	44

Map

Site No.	SSS-160058		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-160059

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 6/14/2019 **Consultant Firm/Investigator(s):** CRI-SN/DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Hillside Ave and Oak Forest Ct

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 1.7 **Lat/Long:** 38.929105 -76.902346

Site Data

Parcel Size (ac): 4 parcels (0.84, 1.57, 0.66, 4.82) **Potential Restoration Reach (LF):** 1347

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting __X_Habitat Enhancement ___Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.17

Land Use: Forest, Residential **Mapped Soils:** Christiana-Downer-Urban land complex; Russett-Christiana-Urban land complex

Property Address: Oak St, Cheverly, MD 20785

Property Owner(s): Cheverly Mayor & Town Council, M-NCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?

Explain:
Yes, remnant restoration (bed/bank stabilization), culvert at RTE 50

Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain

Explain:
Yes- within M-NCPPC property

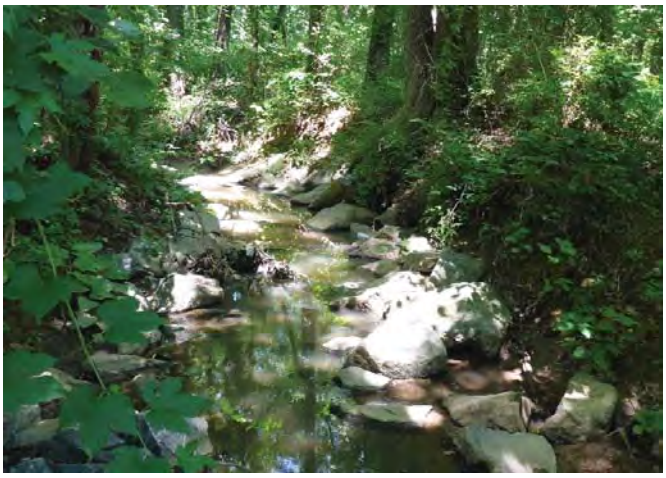
Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: DS section has previous restoration but was still eroding, overall stream appears to be downcutting, multiple man made grade control structures with localized success		Describe: Stream corridor is mostly forested young/mature deciduous	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Average eroded bank height is approximately 4-5'		Describe: Forested adjacent to stream and residential housing encroaching in a few areas	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Rarely accesses FP and only in specific areas		Describe: Lateral migration, vertical instability, habitat enhancement	
Opportunity for Floodplain Development	5	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Lower end of stream may be over 10 times, but majority of the stream only has an opportunity for 3-10 times the stream width		Describe: Stream ins entirely within forested buffer	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: DA=0.17 sq mi		Describe: Overhead lines and possible sewer crossing observed	
		Total Score out of 100	39

Map

Site No.	SSS-160059		Scale: 1 in. = 2,000 ft

Site Photos



Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-160060

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/27/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Seat Pleasant Dr. & Ashleaf Ave.

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 2.53 **Lat/Long:** 38.89717533 -76.8994935

Site Data

Parcel Size (ac): Several parcels - 2.39, 17.71, 1.39, 4.89 **Potential Restoration Reach (LF):** 4,478

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion ___X___Riparian Buffer Planting _X__Habitat Enhancement ___Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 3.08

Land Use: Forest **Mapped Soils:** Zekiah and Issue soils

Property Address: Martin Luther King Jr. Hwy, Capitol Heights 20743-0000

Property Owner(s): State of MD, Seat Pleasant Mayor & Comm Cou, Acuna Hugo R, Maryland National Capital Park & Planning Commissior

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Entire site consists of concrete lined channel.	Restoration and access would be required on numerous property owner parcels.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Very minor erosion. Entire site consists of concrete lined channel.		Describe: Majority of site is surrounded by forest. Downstream reach is a mix of scrub-shrub, mowed lawn, and forest.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 6' foot tall concrete lined banks.		Describe: Majority of site is surrounded by forest located on a mix of county parkland, city parcels, and private properties.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of out-of-bank flows. Stream appears to stay within the concrete lined channel.		Describe: Limited potential for improving instream habitat. No potential for floodplain development, improving water quality, or reducing erosion.	
Opportunity for Floodplain Development	1	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Very limited space for floodplain development due to adjacent communities, recreational parks, roads or steep slopes.		Describe: Clear access in some segments from past sewer repairs. Other segments would require tree clearing.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 3.08 square miles.		Describe: Sewer line runs parallel to stream.	
		Total Score out of 100	27

Map

Site No.	SSS-160060		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: 495/270 **Mitigation Site Number:** SSS-160062a

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 8/21/2019 **Consultant Firm/Investigator(s):** CRI- MD/DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Nashville Rd

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 214025

Proximity to Impacted Stream (mi.): 0.41 **Lat/Long:** 38.981681 -76.889402

Site Data

Parcel Size (ac): 265.6 **Potential Restoration Reach (LF):** 3341

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 1.85

Land Use: Greenbelt Park **Mapped Soils**: Zekiah and Issue soils

Property Address: 6565 Greenbelt Rd, Greenbelt, MD 20770

Property Owner(s): National Park Service

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Channelization at upstream extent, multiple 295 culverts	Explain: Yes, NPS property. Addressing concrete apron at upstream extent may require additional access

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: ~40% of banks eroded		Describe: Forested	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Average bank height 4 feet		Describe: Forested	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Infrequent access, some section with access and some with none		Describe: Lateral/Vertical stability, bedform, floodplain reconnection, Habitat enhancement, riparian buffer planting	
Opportunity for Floodplain Development	10	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Greater than 10 times stream width, clearing needed		Describe: No existing access, may be able to access at upstream extent	
Drainage Area Evaluation	5	**Utilities Present**	5
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 1.85		Describe: Sewer crossing	
		Total Score out of 100	48

Map

Unmapped stream, extend potential restoration upstream. Aggradation occurring upstream of 295 road crossings.

Site No.	SSS-160062a		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: 495/270 **Mitigation Site Number:** SSS-160062b

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 8/21/2019 **Consultant Firm/Investigator(s):** CRI- MD/DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Park Central Rd/Good Luck Rd

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 214025

Proximity to Impacted Stream (mi.): 0.1 **Lat/Long:** 38.988876 -76.895401

Site Data

Parcel Size (ac): 726.5 **Potential Restoration Reach (LF):** 6,669

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.59

Land Use: Greenbelt Park **Mapped Soils**: Zekiah and Issue soils

Property Address: 6565 Greenbelt Rd, Greenbelt MD 20770

Property Owner(s): National Park Service

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc.?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Multiple culverts and road crossings, areas of rip rap armoring	Explain: Yes within NPS property. Overall highly incised stream, many overland flow head cut, extend stream restoration up to you SHA right of way, erodible soil, split 160062A to be at confluence of 10062C

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Greater than 50% for most of the reach. Site was experiencing erosion for around 80% of banks		Describe: Forested	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Average bank height around 6 feet with some areas exceeding 10 feet		Describe: Forested	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Infrequent access		Describe: Vertical/Lateral stability, bedform diversity, habitat enhancement, floodplain access	
Opportunity for Floodplain Development	10	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Greater than 10 times stream width exists with tree clearing		Describe: Some areas of direct access via road and trail, clearing needed in most areas	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 0.59		Describe: Sewer utility throughout site parallels stream	
		Total Score out of 100	58

Map

Site No.	SSS-160062b		Scale: 1 in. = 2,000 ft

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: 495/270 **Mitigation Site Number:** SSS-160062c

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 8/22/2019 **Consultant Firm/Investigator(s):** CRI- MD/DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Kenilworth Ave/Knoxville Dr

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 214025

Proximity to Impacted Stream (mi.): 0.71 **Lat/Long:** 38.982327 -76.906283

Site Data

Parcel Size (ac): 736.5 **Potential Restoration Reach (LF):** 8894

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 3.23

Land Use: Greenbelt Park **Mapped Soils**: Issue-Urban land complex, and Zekiah and Issue soils

Property Address: 6565 Greenbelt Rd, Greenbelt, MD 20770

Property Owner(s): National Park Service

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc.?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Multiple sewer crossings, bank armoring, culverts	Explain: Yes within NPS property. Will need SHA ROW in downstream section that parallels MD 201

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: About 40% of site experiencing erosion		Describe: Forested	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Average bank height of 6 feet with some areas exceeding 15’		Describe: Forested	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of floodplain access		Describe: Vertical/lateral stability, bedform diversity, habitat enhancement, floodplain access	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: 3-10 times stream width exists with tree impact		Describe: Access in some areas existing for Sewer ROW and park road/ trails but clearing needed for most of site	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: DA=3.23		Describe: Multiple sewer crossings instream and line parallels stream	
		Total Score out of 100	44

Map

Site No.	SSS-160062c		Scale: 1 in. = 2000 ft

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: 495/270 **Mitigation Site Number:** SSS-160062D
Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 8/22/2019 **Consultant Firm/Investigator(s):** CRI- MD/DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Westchester Park Dr
Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 214025
Proximity to Impacted Stream (mi.): 0.89 **Lat/Long:** 38.98628 -76.903171

Site Data

Parcel Size (ac): 726.5 **Potential Restoration Reach (LF):** 2423
Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage
Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I
Drainage Area to Reach (sq. mi.) 0.14
Land Use: Greenbelt Park **Mapped Soils**: Sassafras and Croom, and Zekiah and Issue soils
Property Address: 6565 Greenbelt Rd, Greenbelt, MD 20770
Property Owner(s): National Park Service

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Multiple stormwater inputs and culvert at stream head. Approx. 30' of bank armoring	Explain: Will need to extend upstream into Friends Community School property in order to tie in at stormwater facilities, Extend up to Winchester Park Dr to stabilize downstream of stormwater pipes

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: About 85% eroded due to downcutting		Describe: Forested	
Degree of Channel Incision	10	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Average bank height around 12', some lower banks near confluence		Describe: Forested	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of floodplain access		Describe: Vertical/lateral stability, bedform diversity, floodplain access at downstream extent	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Existing space for about 3-10 times width		Describe: Roadway at top of site with potential access, otherwise clearing needed	
Drainage Area Evaluation	10	**Utilities Present**	10
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: DA=0.14 sq. mi.		Describe: No utility	
		Total Score out of 100	67

Map

Site No.	SSS-160062D		Scale: 1 in. = 2,000 ft

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-160063

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 12/13/2018 **Consultant Firm/Investigator(s):** CRI/MD, DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Baltimore Ave & Campus Dr

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 1.7 **Lat/Long:** 38.986491 -76.930313

Site Data

Parcel Size (ac): 11 parcels - 20.0, 10 parcels <0.5 **Potential Restoration Reach (LF):** 3,069

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting _X__Habitat Enhancement ____Fish Passage

Stream Order: 4th **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 30.9

Land Use: Forest **Mapped Soils:** Fallsington-Urban land complex, Codorus and Hatboro soils

Property Address: East Parcel - 5051 Pierce Avenu, College Park, MD 20740

Property Owner(s): M-NCPPC, WSSC

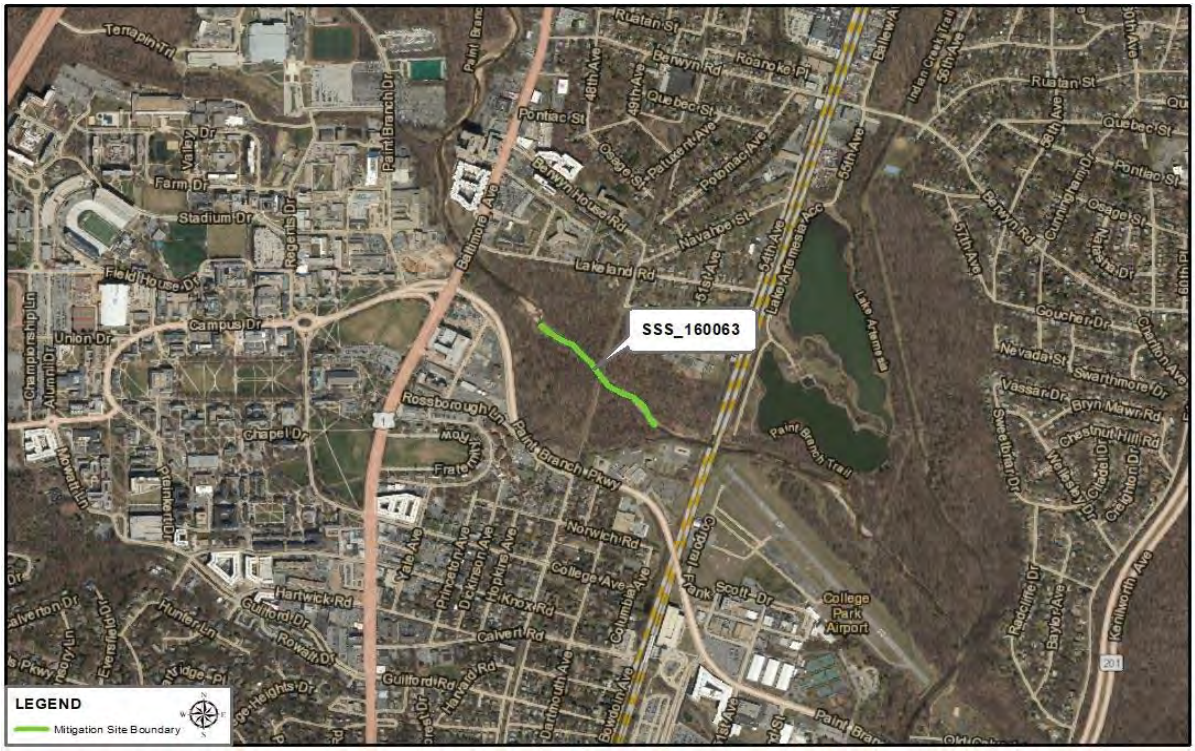
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	**Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain**
Explain:	Explain:
Yes; Rip rap armoring in several locations. Sewer crossing, pedestrian bridges, and railroad crossing present at downstream end of reach.	No; Sections of stream parcel were not given access permission, but would be required if a restoration was done.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Approximately 20% of banks are eroded. Bank heights were consistently high, ranging from ~4-8 ft. tall.		Vegetation consists of mature deciduous trees within park land.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
Banks range from ~4-8 ft. tall.		Site consists of high impervious developed watershed and park land immediately adjacent to the stream reach.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
Limited low benches and some evidence of deposition at extremely high flows on top of eroded banks.		Potential for channel stabilization, floodplain reconnection, habitat improvement, connection to restoration projects upstream and downstream of reach.	
Opportunity for Floodplain Development	10	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
Park land on left bank for most of site, although many mature trees present.		Access present parallel to site with trails, but clearing is likely needed.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
Drainage area - 30.9 square miles.		Sewer utility crossing and exposed pipe present downstream of pedestrian bridge on right bank. Overhead powerline present at pedestrian bridge.	
		Total Score out of 100	40

Map



Site No.	SSS-160063		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-160065

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 6/14/2019 **Consultant Firm/Investigator(s):** CRI-SN/DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** 2nd Ave andTanglewood Dr

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 2.6 **Lat/Long:** 38.929105 -76.902346

Site Data

Parcel Size (ac): 4 parcels (38.3, 0.97, 40.0, 0.72) **Potential Restoration Reach (LF):** 1,904

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion ____X__Riparian Buffer Planting __X_Habitat Enhancement _X__Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.54

Land Use: Forest, Open space **Mapped Soils:** Issue-Urban land complex; Codorus-Hatboro-Urban land complex, frequently flooded

Property Address: 5671 Tanglewood Dr, Riverdale, MD 20737

Property Owner(s): M-NCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes, evidence of straightening around park, 2 crossings, site is very open, trash in stream	Yes- within M-NCPPC property

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	5
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Previoiusly downcut channel with minor to moderate erosion throughout		Mowed grass to top of stream bank, slopes and small buffer of herbaceous vegetation and invasives, few large trees scattered in the floodplain	
Degree of Channel Incision	5	**Land Use**	5
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
Bank height averages approximately 4'		Upstream section is mostly ope park with a few trees, downstream section is forested to the confluence with Northeast Branch	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
Channel does not have access to the floodplain		Vertical stability, latral stability, habitat enhancement, riparian buffer enhancement	
Opportunity for Floodplain Development	10	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
Space exists fo expansive floodplaindownstream of the footbridge		Parking lot access for much of the potential site	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
Less than 1 sqmi		Sewer crossing (fishblockage) at downstream section	
		Total Score out of 100	66

Map

Site No.	SSS-160065		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-160066

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 6/14/2019 **Consultant Firm/Investigator(s):** CRI-SN/DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** 2nd Ave andTanglewood Dr

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 2.6 **Lat/Long:** 38.955864 -76.926032

Site Data

Parcel Size (ac): 38.3 **Potential Restoration Reach (LF):** 1,552

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.08

Land Use: Forest, Open space **Mapped Soils:** Issue-Urban land complex, occasionally flooded

Property Address: 5671 Tanglewood Dr, Riverdale, MD 20737

Property Owner(s): M-NCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Yes, looks to be straightened/ditched, originates at an outfall	Explain: Yes- within M-NCPPC property

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	5
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: 20% actively eroding, historical downcutting and ditching		Describe: Mostly mowed grass with ocassional trees, limited herbaceous and shrub buffer	
Degree of Channel Incision	5	**Land Use**	5
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Approximately 5-6' in the upper section and 3-4' in the lower section		Describe: Mostly open park with a few trees	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No existing floodplain access		Describe: Vertical stability, lateral stability, floodplain access, habitat enhancement	
Opportunity for Floodplain Development	10	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Sape exists for ten times the stream width		Describe: Access form the park parking lot or adjacent roadway	
Drainage Area Evaluation	10	**Utilities Present**	10
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Less than 1 sqmi		Describe: No utilities visible	
		Total Score out of 100	75

Map

Site No.	SSS-160066		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-160068

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 6/11/2019 **Consultant Firm/Investigator(s):** CRI-CN, SJ

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Rolander St/22nd Place

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 1.3 **Lat/Long:** 38.997809 -76.967345

Site Data

Parcel Size (ac): 43.2 **Potential Restoration Reach (LF):** 663

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting _X__Habitat Enhancement ___Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (sq. mi.) 0.25

Land Use: Forest, Medium Density Residential **Mapped Soils:** Manor loam

Property Address: Main Parcel: 2405 Tecumseh St, Adelphi, MD 20783

Property Owner(s): Maryland National Capital Park & Planning Commission

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Yes, riprap dumped in stream, pipe outfall into stream	Explain: Yes, can be done within parcel

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Severe erosion on outer meanderbends throughout reach, stream very sinuous		Describe: Mature forest w/ thick understory	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 6-7' eroded banks		Describe: Mature forest	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Stream very incised, no evidence of FP access		Describe: FP connection, lateral stability, habitat availability, flow diversity	
Opportunity for Floodplain Development	10	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Plenty of room but would require forest impacts		Describe: Forested, no existing access	
Drainage Area Evaluation	10	**Utilities Present**	5
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 0.25 sq mi		Describe: Sewer present on LB	
		Total Score out of 100	63

Map

Site No.	SSS-160068		Scale: 1 in. = 2,000 ft

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-160070

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 12/13/2018 **Consultant Firm/Investigator(s):** CRI/MD, DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Carrollton Pky & Lamont Dr

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 0.1 **Lat/Long:** 38.969981 -76.878142

Site Data

Parcel Size (ac): N/A, completely within ROW **Potential Restoration Reach (LF):** 4,332

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting ____Habitat Enhancement ____Fish Passage

Stream Order: 4th **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 10.5

Land Use: Medium Density Residential, Institutional **Mapped Soils:** Issue-Urban land complex

Property Address: Carrollton Parkway, Hyattsville, MD 20784

Property Owner(s): SHA (Completely within ROW)

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Yes; Site is confined by roads on both sides. Stream has been historically straightened.	Explain: Yes; Site is within the confines of top roads.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	10
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Approximately 65% of banks are eroded. Banks are highly incised in several areas with heights ranging from ~2-6 ft. tall.		Describe: Vegetation consists of mostly mowed grass with some trees along banks (specifically downstream end).	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Average bank height is ~4 ft. tall.		Describe: Land use is developed, stream is located between two residential roads.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Some fine sediment deposits and rack lines observed in a few areas along benches.		Describe: Potential to increase geomorphic stability, treat stormwater inputs to slow release.	
Opportunity for Floodplain Development	5	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Floodplain is limited by two roadways, thus highly confined. Possible to develop floodplain ~3-5 times stream width.		Describe: Roadways are present parallel to site, areas marked for possible stockpiles.	
Drainage Area Evaluation	5	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 1.05 square miles.		Describe: Few overhead line crossings present, possible sewer crossings.	
		Total Score out of 100	57

Map

Site No.	SSS-160070		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-160075

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 6/11/2019 **Consultant Firm/Investigator(s):** CRI - CN, SJ

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** East-West Hwy/W Park Dr/Highview Terrace

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 2.5 **Lat/Long:** 38.972272 -76.964481

Site Data

Parcel Size (ac): 2 Parcels: 60, 8.1 **Potential Restoration Reach (LF):** 4,806

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion ___X___Riparian Buffer Planting __X_Habitat Enhancement ___Fish Passage

Stream Order: 4th **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (sq. mi.) 35.1

Land Use: Forest **Mapped Soils:** Codorus and Hatboro soils

Property Address: Main Parcel: 7601 W Park Dr, Adelphi, MD 20783

Property Owner(s): Maryland National Capital Park & Planning Commission

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Yes, bank armoring in some places, bridge at DS end	Explain: Yes, but might be close at development along Highview Terrace

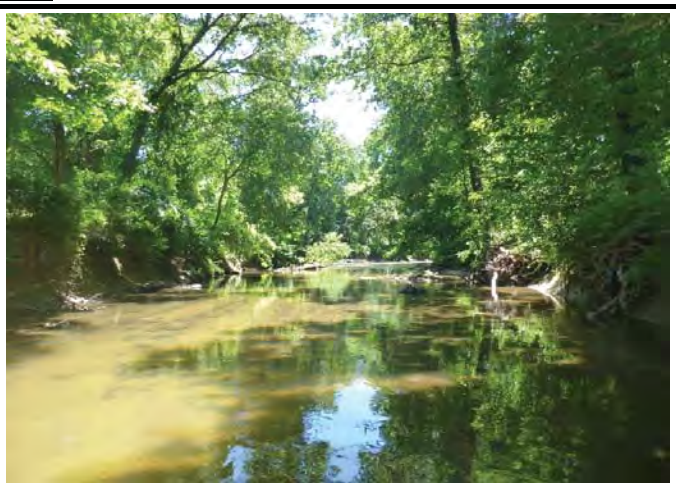
Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Mostly stable, some stretches of high-very high erosion and vertical banks		Describe: Mostly mature forest, some areas lacking buffer (along Highview Terrace)	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: US half of site more incised and overwidened. Some benches. Few signs of FP access. DS half of site has lower FP, more signs of FP access, better benches and bars		Describe: Mostly forested, some development adjacent to stream	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: More frequent FP access at DS end of site than US end		Describe: Bank stabilization, habitat, FP access, flow diversity, geomorph	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Changes throughout reach depending on development/valley walls, but some space to reconnect to FP		Describe: Access from park without extensive forest impacts	
Drainage Area Evaluation	1	**Utilities Present**	5
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 35.1 sq mi		Describe: Sewer along RB, 1 utility crossing at approximate mid point of reach	
		Total Score out of 100	38

Map

Site No.	SSS-160075		Scale: 1 in. = 2,000 ft

Site Photos



Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-160081

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 12/14/2018 **Consultant Firm/Investigator(s):** CRI/MD, DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Metzerott Rd & Riggs Rd

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02140205

Proximity to Impacted Stream (mi.): 0.85 **Lat/Long:** 39.002885 -76.975103

Site Data

Parcel Size (ac): 2 parcels - 21.1, 5.7 **Potential Restoration Reach (LF):** 973

Site Opportunities: _X_ Channel Restoration ___ Livestock Exclusion _____ Riparian Buffer Planting _X_ Habitat Enhancement ____ Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (sq. mi.) 0.92

Land Use: Institutional, Forest **Mapped Soils:** Codorus and Hatboro soils

Property Address: Main Parcel - 8910 Riggs Road, Hyattsville, MD 20783

Property Owner(s): Board of Education, 1811 Metzerott Rd LLC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes; Lots of discarded concrete located downstream of road and bridge apron. Remnants of old dam in reach.	Yes; Access permitted.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Approximately 15% of banks are eroded, primarily near the upstream end of site.		Describe: Mature deciduous trees present adjacent to stream.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Bank heights range from ~3-10 ft. tall with an average of ~5 ft. tall.		Describe: Land use is developed/residential.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of out of bank flooding, despite downstream bank height being lower.		Describe: Potential exists for habitat enhancement and increasing geomorphic stability.	
Opportunity for Floodplain Development	5	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Confined stream valley is present, especially upstream, but potential to develop floodplain exists.		Describe: No access road present. Lots of clearing would be required or possible lane closure needed as site is a steep valley.	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 0.92 square mile.		Describe: Sewer crossing stream (exposed) with sewer parallel to stream for much of reach.	
		Total Score out of 100	44

Map

SSS_160081
LEGEND
Mitigation Site Boundary
Metzerott Rd
New Hampshire Ave
Piney Branch Rd
Hampshire Dr
Northampton Dr
Southampton Dr
Edwards Way
Apache St
Tecumseh St
Saratoga Dr
Red Oak Dr
Dana Dr
Sarahaci St
Roanan St
Rolander St
Quebec St
Quebec Ter
Tahoma Dr
Merrimac Dr
Cool Spring Rd
Ridge Rd
Buck Lodge Rd
Higbee Rd
Fox St
Erie St
Cherokee St
Willow Ln
Loyola Dr
Loyola Ln
Maryland Ave
Maryland Ln
Maryland Ct
Maryland St
Maryland Dr
Maryland Pl
Maryland Cir
Maryland Way
Maryland Terr
Maryland Trail
Maryland Blvd
Maryland Loop
Maryland Path
Maryland Alley
Maryland Square
Maryland Crescent
Maryland Parkway
Maryland Highway
Maryland Freeway
Maryland Expressway
Maryland Turnpike
Maryland Interstate
Maryland Beltway
Maryland Bypass
Maryland Connector
Maryland Spur
Maryland Loop
Maryland Ring
Maryland Circle

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MO_00013A

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/20/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Woodfield Rd. & Watkins Rd.

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 02140208

Proximity to Impacted Stream (mi.): 6.4 **Lat/Long:** 39.23201509 -77.18753066

Site Data

Parcel Size (ac): 2 parcels - 42.01, 24.44 **Potential Restoration Reach (LF):** 2,934

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion ___X___Riparian Buffer Planting __X_Habitat Enhancement __X_Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 3.48

Land Use: Agriculture **Mapped Soils:** Hatboro silt loam

Property Address: 0-000 Woodfield Rd.

Property Owner(s): Maryland National Capital Park & Planning Commission

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc? Explain	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Culvert at upstream end of site creating fish blockage - 1 foot drop.	Explain: Restoration and access is feasible within 2 M-NCPPC parcels.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	10
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Moderate to severe erosion on outside banks. Reed canary grass stabilizing some areas. Freeze thaw evident. Torturous meanders.		Describe: Site dominated by reed canary grass with scattered black walnut trees.	
Degree of Channel Incision	5	**Land Use**	5
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 3-4 foot tall banks		Describe: Located in Lower Magruder Branch Park. Site dominated by reed canary grass with scattered black walnut trees. Provides limited habitat.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Some evidence of out-of-bank flows in floodplain near channel-matted down veg.		Describe: High potential for reducing erosion, improving instream habitat, floodplain connection, wetland creation/enhancement & improving water quality.	
Opportunity for Floodplain Development	10	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Broad, flat floodplain greater than 10 times stream width.		Describe: No existing access into site from Watkins Road. Majority of site is open field dominated by reed canary grass.	
Drainage Area Evaluation	1	**Utilities Present**	5
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 3.48 square miles.		Describe: Powerlines along Watkins Rd. just north of site.	
		Total Score out of 100	61

Map

Site No.	MO_00013A		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MO_00013B

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/20/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Woodfield Rd. & Watkins Rd.

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 02140208

Proximity to Impacted Stream (mi.): 6.4 **Lat/Long:** 39.23579123 -77.18752835

Site Data

Parcel Size (ac): 2 Parcels - 24.7, 16.3 **Potential Restoration Reach (LF):** 1,053

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting __X_Habitat Enhancement __X_Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 3.35

Land Use: Forest & Agriculture **Mapped Soils:** Hatboro silt loam

Property Address: 0-0000 Watkins Rd.

Property Owner(s): Maryland National Capital Park & Planning Commission

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Culvert at downstream end of site is creating fish blockage - 1 foot drop.	Restoration and access is feasible within 2 M-NCPPC parcels.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	10
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Moderate bank erosion throughout most of site. Reed canary grass stabilizing some areas.		Describe: Site dominated by reed canary grass with scattered red maple & black willow trees.	
Degree of Channel Incision	5	**Land Use**	5
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 2-4 foot tall banks		Describe: Located in Lower Magruder Branch Park. Site dominated by reed canary grass with scattered red maple & black willow trees. Provides limited habitat.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Some evidence of out-of-bank flows in floodplain near channel-matted down veg.		Describe: High potential for reducing erosion, improving instream habitat, floodplain connection, wetland creation/enhancement & improving water quality.	
Opportunity for Floodplain Development	10	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Broad, flat floodplain greater than 10 times stream width.		Describe: No existing access into site from Watkins Road. Majority of site is open field dominated by reed canary grass.	
Drainage Area Evaluation	1	**Utilities Present**	10
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 3.35 square miles.		Describe: No utilities observed within or adjacent to site.	
		Total Score out of 100	66

Map

Site No.	MO_00013B		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MO_00018

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/8/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, DB

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Falls Road & Falls Bridge Lane

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 2140202

Proximity to Impacted Stream (mi.): 3.0 **Lat/Long:** 39.01127779 -77.21091459

Site Data

Parcel Size (ac): 4 parcels - 6.4, 6.4, 3.4, 5.6 **Potential Restoration Reach (LF):** 3,723

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion ___X___Riparian Buffer Planting __X_Habitat Enhancement _X__Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 1.13

Land Use: Forest **Mapped Soils:** Hatboro silt loam, 0 to 3 percent slopes

Property Address: Falls Bridge Lane 0-0000

Property Owner(s): Maryland National Capital Park & Planning Commission

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Sewer crossing and old bridge foundation within stream at northern end of site. Bank just upstream of Logan Dr. has been stabilized with boulders.	Restoration is feasible within 4 M-NCPPC parcels.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Minor to moderate bank erosion. Low bank erosion at downstream end of site. Bank erosion increases at upstream end.		Describe: Entire site consists of mid-successional tulip poplar forest. Several PFO wetlands east of stream.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Banks are ~1-5 ft. tall.		Describe: Site consists of mid-successional tulip poplar forest located on park land.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Floodplain is broad and flat. Some segments appear to be connected to floodplain with minor evidence of out of bank flows.		Describe: Potential in reducing bank erosion, improving floodplain connection, providing fish passage, and improving fish/benthic habitat.	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Floodplain is broad and flat. Floodplain development is limited in some segments by adjacent landowners and valley slopes.		Describe: Potential access through old sewer line clearing east of stream. Some tree clearing would likely be required to access stream.	
Drainage Area Evaluation	5	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area is 1.13 sq. mi.		Describe: Sewer line runs parallel to stream in eastern floodplain.	
		Total Score out of 100	43

Map

Site No.	MO_00018		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MO-00037

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/19/2018 **Consultant Firm/Investigator(s):** CRI/MD, CN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Helmsdale Rd. & Selkirk Dr.

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 2140207

Proximity to Impacted Stream (mi.): 0 **Lat/Long:** 38.985373 -77.151998

Site Data

Parcel Size (ac): 6 parcels - 4.8, 6.0, 5.8, 4.7, 2.1, 0.4 **Potential Restoration Reach (LF):** 4,032

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting __X_Habitat Enhancement ___Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 4.3

Land Use: Low Density Residential, Institutional, Transportation **Mapped Soils:** Baile silt loam, Codorus silt loam

Property Address: Middle Parcel - Royal Dominion Court, Bethesda, MD 20817

Property Owner(s): Maryland National Capital Park & Planning Commission

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes; Culverts present at upstream and downstream ends, previous restoration throughout reach.	Yes; Well within M-NCPPC property.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Approximately 25% of banks eroded, ranging from 3-9 ft. (6 ft. average).		Describe: Mostly forested on both sides of stream.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Banks are ~3-8 ft. tall. Average bank height is ~5 ft.		Describe: Forested land use in immediate vicinity, residential land use adjacent to property.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Inset floodplain in some areas of the incised channel, evidence of flows on top of low benches.		Describe: Increase bank stability, provide low benches for storm relief, increase available habitat, increase vegetative cover in areas	
Opportunity for Floodplain Development	5	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Area exists to narrow flows and provide inset floodplain benches.		Describe: Access paths from previous restoration can be used, off of Cabin John Parkway and off of Helmsdale Road.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 4.3 square miles.		Describe: Exposed manholes along streambank; One observed crossing exposed.	
		Total Score out of 100	44

Map

Site No.	MO-00037		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MO_00047A

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/8/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, DB

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Clopper Rd. & Allspice Dr.

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 02140208

Proximity to Impacted Stream (mi.): 2.36 **Lat/Long:** 39.15853055 -77.26036442

Site Data

Parcel Size (ac): 2 Parcels - 9.8, 28.8 **Potential Restoration Reach (LF):** 3,131

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion ___X___Riparian Buffer Planting __X_Habitat Enhancement __X_Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 2.92

Land Use: Forest & Institutional **Mapped Soils:** Hatboro silt loam

Property Address: Main Parcel - 0-000 Clopper Rd.

Property Owner(s): Maryland National Capital Park & Planning Commission

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	**Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain**
Explain:	Explain:
Old riprap bank stabilization near foot bridge. Railroad crossing/culvert at upstream end of site.	Restoration is feasible within 2 M-NCPPC parcels.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Moderate bank erosion throughout most of site.		Majority of site is surrounded by mid-successional forest or PEM/PSS wetlands.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
Banks are ~3 -5 foot tall.		Stream is surrounded by mid-successional forest or PEM/PSS wetlands located on park land.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
Some evidence of matted down vegetation near top of bank.		Some opportunity for sediment reduction, wetland creation/enhancement, riparian plantings, aquatic habitat improvements, and fish passage.	
Opportunity for Floodplain Development	5	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
Floodplain development limited in certain areas due to adjacent park recreation areas and parking lots.		Existing access route from sewer line repairs.	
Drainage Area Evaluation	5	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
Drainage Area - 2.92 square miles.		Sewer line runs parallel to stream in western floodplain.	
		Total Score out of 100	43

Map

Site No.	MO_00047A		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name:	I-495/I-270 Managed Lanes Study	**Mitigation Site Number:**	MO_00047B
Projects Estimated Stream Mitigation Needs (LF):	TBD		
Date of Field Assessment:	11/16/2018	**Consultant Firm/Investigator(s):**	RK&K/KJH, DB

Site Location Details-taken from desktop review

County:	Montgomery	**Cross Roads:**	Clopper Rd. & Allspice Dr.		
Basin (HUC 8):	Middle Potomac-Catoctin		**MDE Watershed (8 digit):**	02140208	
Proximity to Impacted Stream (mi.):	2.36		**Lat/Long:**	39.15113494	-77.26403347

Site Data

Parcel Size (ac):	1,411.39	**Potential Restoration Reach (LF):**	5,232		
Site Opportunities:	__X__Channel Restoration	____Livestock Exclusion	___X___Riparian Buffer Planting	_X_Habitat Enhancement	__X_Fish Passage
Stream Order:	2nd	**Stream Hydrology:**	Perennial	**Stream Use:**	I
Drainage Area to Reach (sq. mi.)	4.35				
Land Use:	Forest	**Mapped Soils:**	Hatboro silt loam		
Property Address:	11900 Clopper Rd.				
Property Owner(s):	Maryland Department of Natural Resources				

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc? Explain	**Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain**
Explain:	Explain:
Sewer encroaches into stream in several locations. Bank stabilization (riprap) is evident in one area to protect the sewer line.	Restoration is feasible within DNR parcel - Strider Wildlife Management Area.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Some bank sections are stabilized with vegetation, while others have moderate erosion.		Majority of site is surrounded by mid-successional floodplain forest. Upstream end of site has extensive PEM/PSS wetlands.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
3-5' tall vertical banks.		Majority of site is surrounded by mid-successional floodplain forest located on parkland. Upstream end of site has extensive PEM/PSS wetlands.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
Some wrack lines observed in floodplain near top of bank.		Some potential for reducing erosion and improving aquatic habitat and floodplain connection.	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
Floodplain development in center and downstream sections of site are limited by adjacent neighborhoods and valley slopes. Some floodplain development potential at upstream end of site.		Existing sewer line access for northern section of site. Center and downstream sections would require tree clearing.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
Drainage area - 4.35 square miles		Sewer line runs parallel to stream in western floodplain.	
		Total Score out of 100	34

Map

Site No.	MO_00047B		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MO_00048

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/20/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Game Preserve Rd. & I-270

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 02140208

Proximity to Impacted Stream (mi.): 1.89 **Lat/Long:** 39.15680585 -77.23925466

Site Data

Parcel Size (ac): 213.52 **Potential Restoration Reach (LF):** 1,489

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.0002

Land Use: Forest **Mapped Soils:** Hatboro silt loam

Property Address: 11131 Game Preserve Rd, Gaithersburg 20878-0000

Property Owner(s): Maryland Department of Natural Resources

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Rip-rap slope/bank stabilization next to roadway.	Restoration access is feasible within MDNR property. Upstream segment on private properties has been removed from site.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Majority of site has minor erosion. Localized areas with moderate to severe erosion.		Site is surrounded by high quality, mid-successional forest.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
3-8 foot tall banks that are mostly stable.		Site consists of high quality, mid-successional forest in Seneca Creek State Park.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
Incised channel. Some out-of-bank flows is evident at top of bank.		Limited potential for improving instream habitat , reducing erosion and floodplain development. Existing instream habitat is good. Most of site has minor erosion and floodplain is restricted by steep/narrow valley.	
Opportunity for Floodplain Development	1	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
Steep/narrow forested valley and adjacent roadway limit potential for floodplain development. Bedrock outcrops observed in floodplain.		Forest clearing would be required for the majority of the site.	
Drainage Area Evaluation	10	**Utilities Present**	5
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
Drainage area - 0.0002 square miles.		Gas line and overhead powerlines just south of site.	
		Total Score out of 100	31

Map

Site No.	MO_00048		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MO_00050

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/8/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, DB

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** River Rd. & Lake Potomac Dr.

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 02140202

Proximity to Impacted Stream (mi.): 6.06 **Lat/Long:** 39.04313403 -77.25399448

Site Data

Parcel Size (ac): 3 Parcels - 1.14, 3.84, 6.26 **Potential Restoration Reach (LF):** 923

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion ___X___Riparian Buffer Planting _X_Habitat Enhancement ___Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 16.6

Land Use: Forest **Mapped Soils:** Codorus silt loam & Hatboro silt loam

Property Address: Main Parcel - 0-0000 Lake Potomac Dr.

Property Owner(s): Maryland National Capital Park & Planning Commission & Montgomery County

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	**Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain**
Explain:	Explain:
Bank armoring is evident just downstream of powerlines.	Restoration is feasible within two M-NCPPC parcels and one Montgomery County parcel.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Majority of banks are stabilized with vegetation & bedrock. Section downstream of powerlines has been stabilized with rip-rap.		Majority of site is surrounded by mid-successional forest. Large PEM wetland & recent tree plantings just west of Lake Potomac Dr.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
Banks are 6-8 ft. tall, but appear mostly stable.		Majority of site is surrounded by mid-successional forest on Park land. Open field under powerlines & PEM wetland just west of Lake Potomac Dr.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
Some evidence of matted down vegetation at top of banks.		Majority of banks appear stable. Large stream with existing aquatic habitat. Limited opportunity for floodplain development due to utilities and valley slope. Short segment on public property.	
Opportunity for Floodplain Development	1	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
Floodplain development limited due to utilities and valley slope.		Existing access off Lake Potomac Dr. from recent sewer repairs. Access passes through PEM wetland.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
Drainage area - 16.6 square miles.		Overhead powerlines and underground gas lines at downstream end of site. Likely sewer line along stream, however no manholes were observed.	
		Total Score out of 100	27

Map

Site No.	MO_00050		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MO-00051

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/16/2018 **Consultant Firm/Investigator(s):** CRI/MD, SJ

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Fairfax Rd. & Little Falls Pkwy.

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 2140202

Proximity to Impacted Stream (mi.): 2.3 **Lat/Long:** 38.974004 -77.102571

Site Data

Parcel Size (ac): 8 parcels - 32.1, 39.4, 0.3, 0.3, 0.3, 0.3, 0.4, 0.5 **Potential Restoration Reach (LF):** 2,160

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion __X____Riparian Buffer Planting ____Habitat Enhancement ___Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.48

Land Use: Forest **Mapped Soils:** Glenelg-Urban land complex, Gaila silt loam

Property Address: Main Parcel - Little Falls Parkway, Bethesda, MD 20814

Property Owner(s): Maryland National Capital Park & Planning Commission & Mo. County RO

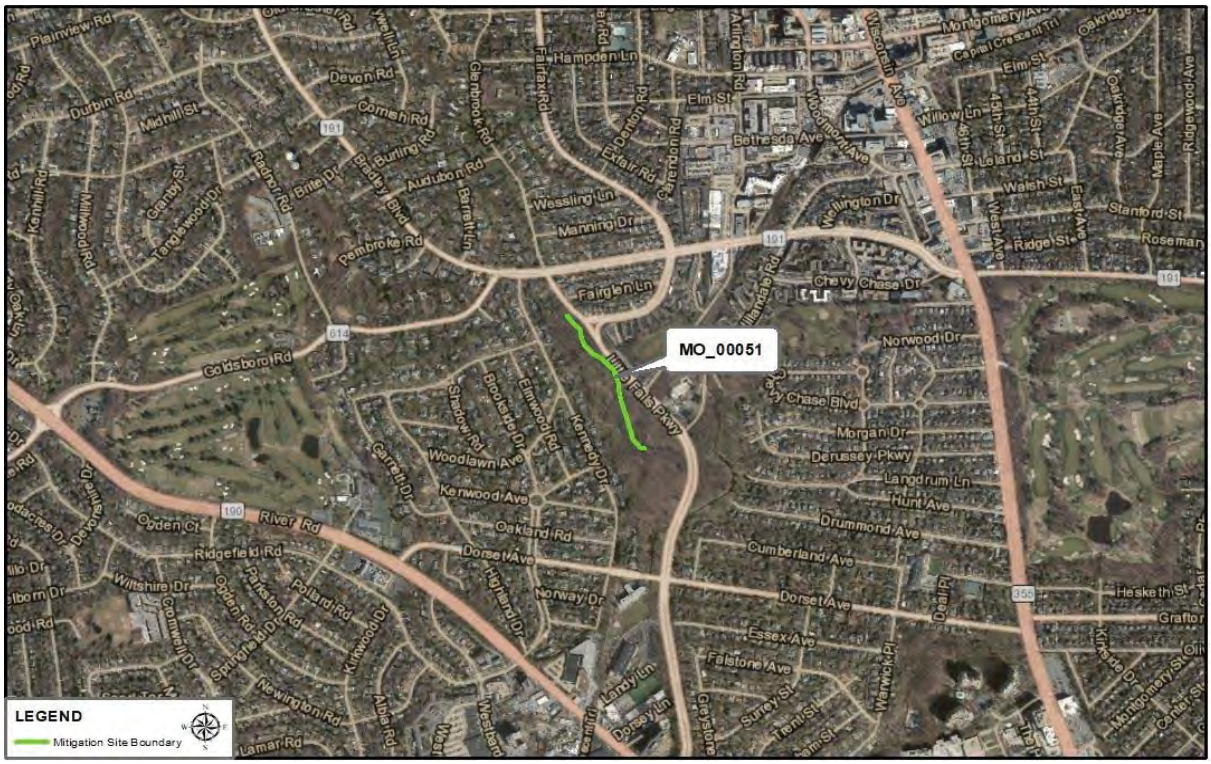
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes, rip-rap placed downstream of culvert at the top of the study reach. Riffle grade control and other grade control structures observed near trail crossing at downstream end	Site located on M-NCPPC parkland & Mo. County ROW. Can access directly from Little Falls Parkway.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Approximately 30% of banks are eroded.		Mowed lawn present on left bank for 2/3 of reach; inadequate buffer.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
Banks are ~3-5 ft. tall.		Forest greater than 100 ft. on right bank, left bank is developed/residential.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
Areas of low bank storm relief.		Upstream section is highly developed, constrained on left bank by road, channel elevation controlled upstream/downstream by culverts, possible floodplain reconnection.	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
2/3 of stream can be accessed with tree impacts. Top 1/3 constrained by valley and road. Potential exists to make low benches.		Mapped out potential access from previous work from Little Falls Pkwy.	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
Drainage area - 0.48 square mile.		Runs parallel to stream. Possible crossings.	
		Total Score out of 100	43

Map



Site No.	MO-00051		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MO_00060

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 2/25/2019 **Consultant Firm/Investigator(s):** CRI/DS, JG, LE

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Victory Farm Dr. & Belle Grove Rd.

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 02140208

Proximity to Impacted Stream (mi.): 1.57 **Lat/Long:** 39.149794 -77.184313

Site Data

Parcel Size (ac): 2 parcels - 5.3, 27.9 **Potential Restoration Reach (LF):** 1,934

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting _X__Habitat Enhancement __X__Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.78

Land Use: Medium Density Residential, Forest **Mapped Soils:** Hatboro silt loam

Property Address: Main Parcel - Victory Farms Drive, Gaithersburg MD 20877

Property Owner(s): City of Gaithersburg

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes; Culverts, stream crossing present.	Yes; Can be done within parcel, City of Gaithersburg land/park.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	5
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Approximately 40-50% of banks are eroded, more frequent further downstream in reach.		Describe: Left bank consists of sparse planted trees with wetland and constructed wetland ponds. Right bank small riparian forest, one wetland with mostly shrub cover.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Banks are ~4-5 ft. tall on average, but range from 2-6 ft.		Describe: Small riparian forest development within site. Open trail (paved) lined with shrubs.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Infrequent out-of-bank flow in areas where channel is less incised.		Describe: Hydraulics, hydrology, geomorphic lift can be achieved and sustained.	
Opportunity for Floodplain Development	5	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Most existing space along right bank, limited by sewer utility and wetland on left bank.		Describe: Clearing needed in some areas, existing paved path parallels stream for entire reach.	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 0.78 square mile.		Describe: Sewer parallel to site, potential crossing.	
		Total Score out of 100	52

Map

Site No.	MO_00060		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MO_00063

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/16/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, DB

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Morning Light Ter. & Morning Light Ct.

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 02140208

Proximity to Impacted Stream (mi.): 2.64 **Lat/Long:** 39.13487705 -77.26027051

Site Data

Parcel Size (ac): 1,411.30 **Potential Restoration Reach (LF):** 2,240

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting __X_Habitat Enhancement __X_Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.16

Land Use: Forest **Mapped Soils:** Brinklow blocktown channery silt loam

Property Address: 11900 Clopper Rd.

Property Owner(s): Maryland Department of Natural Resources

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
No direct evidence of human impacts to stream, however the site originates at a wet stormwater pond.	Restoration and access is feasible within MDNR parcel.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Moderate to severe erosion throughout most of site. Torturous meanders & meander breakthroughs.		Entire site surrounded by mid-successional good quality forest. Potential specimen tree impacts along channel. No wetlands observed.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
Banks are 3-10 feet tall.		Entire site surrounded by mid-successional good quality forest in Seneca Creek State Park. Potential specimen tree impacts along channel.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
Some evidence of out-of-bank flow in localized areas.		Good potential for reducing erosion, improving instream habitat, and providing fish passage.	
Opportunity for Floodplain Development	5	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
Some opportunity for floodplain development, however sections of the site are limited by the narrow/steep valley and sewer line constraints.		Existing sewer line access for majority of site. Northern section may require some scrub/shrub clearing.	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
Drainage Area - 0.78 square miles		Sewer line runs parallel to stream along northern hillslope.	
		Total Score out of 100	58

Map

Site No.	MO_00063		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MO_00064

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/16/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, DB

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Bradbury Dr. & Suffolk Terrace

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 02140208

Proximity to Impacted Stream (mi.): 2.64 **Lat/Long:** 39.13030063 -77.25646132

Site Data

Parcel Size (ac): 3 parcels - 1,411.3, 16.3 & 9.3 **Potential Restoration Reach (LF):** 6,945

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting __X_Habitat Enhancement ___Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 1.05

Land Use: Forest **Mapped Soils:** Codorus silt loam & Baile silt loam

Property Address: Main Parcel - 11900 Clopper Rd.

Property Owner(s): Maryland Department of Natural Resources & Maryland National Capital Park & Planning Commission

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Several sewer crossings. Instream stormwater structure just upstream along trib that flows into site mainstem. Footbridge crossing at northern end of site.	Restoration is feasible within one MDNR parcel and two M-MCPC parcels.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe:		Describe:	
Moderate to severe bank erosion throughout site. Torturous meanders.		Site is dominated by mid-successional tulip poplar forest. Couple of scattered PFO wetlands in northern floodplain.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe:		Describe:	
Banks are 3-6 feet tall.		Majority of site is dominated by mid-successional tulip poplar forest located in Seneca Creek State Park & Quince Orchard Valley Park.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe:		Describe:	
Minor evidence of out-of-bank flows near top of bank.		Good potential for reducing erosion, instream habitat improvements, and improving downstream floodplain access.	
Opportunity for Floodplain Development	5	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe:		Describe:	
Upstream section limited by narrow/steep valley. Potential for floodplain access improvements in downstream section where floodplain is wider and valley is less steep.		Existing sewer line access throughout most of site. May require clearing some smaller trees and stream crossings.	
Drainage Area Evaluation	5	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe:		Describe:	
Drainage area - 1.05 square miles.		Sewer line runs parallel to stream and crosses the stream in a couple locations. Manhole observed in center of channel.	
		Total Score out of 100	53

Map

Site No.	MO_00064		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPOC0003

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 4/23/2019 **Consultant Firm/Investigator(s):** RK&K/KJH, DB

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Game Preserve Road and Frederick Road

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 02070008

Proximity to Impacted Stream (mi.): 2.03 **Lat/Long:** 39.163101 -77.229916

Site Data

Parcel Size (ac): 83 **Potential Restoration Reach (LF):** 207

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting ____Habitat Enhancement ____Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) <1

Land Use: Parkland (Forested) **Mapped Soils:** 16D, 17C, 54A

Property Address: Game Preserve Road, Gaithersburg, MD

Property Owner(s): State of MD DNR

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain:	Explain:
Yes, perched culvert with rip-rap revetment	Yes - all DNR parkland.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Entire reach degraded		Describe: Scattered trees connected to forest	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 8-10' tall banks		Describe: Parkland - forested floodplain.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Incised short channel		Describe: Limited opportunity. Mostly mitigate for erosion. Small tributary, no habitat potential.	
Opportunity for Floodplain Development	1	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Tributary to larger system. Steep reach		Describe: Adjacent to an old cleared road. May involve some tree removal.	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: <1 sq. mi.		Describe: Sewer in downstream section runs parallel to Seneca Creek.	
		Total Score out of 100	45

Map

Site No.	MPOC0003		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPOC0004

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 4/23/2019 **Consultant Firm/Investigator(s):** RK&K/KJH, DB

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Game Preserve Road and Frederick Road

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 02070008

Proximity to Impacted Stream (mi.): 1.98 **Lat/Long:** 39.163436 -77.230249

Site Data

Parcel Size (ac): 83 **Potential Restoration Reach (LF):** 2,503

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting ____Habitat Enhancement ____Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** IV

Drainage Area to Reach (sq. mi.) 41

Land Use: Parkland (Forested) **Mapped Soils:** 54A

Property Address: Game Preserve Road, Gaithersburg, MD

Property Owner(s): State of MD DNR

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Yes, bridge spans upstream side	Explain: Yes - all DNR parkland.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Severe erosion throughout reach.		Describe: Forested riparian floodplain	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 3-4' tall banks		Describe: Parkland - forested.	
Existing Floodplain Access	1	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Evidence of sediment deposition in floodplain.		Describe: Potential for reducing bank erosion. Limited potential for habitat improvement and floodplain access.	
Opportunity for Floodplain Development	1	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Large stream - already connected to floodplain		Describe: Forested floodplain. No existing access.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 41 square miles		Describe: Utilities present in floodplain - sanitary sewer.	
		Total Score out of 100	23

Map

Site No.	MPOC0004		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPOC0005

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 4/23/2019 **Consultant Firm/Investigator(s):** RK&K/KJH, DB

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Riffle Ford Road and Woodsboro Drive

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 02070008

Proximity to Impacted Stream (mi.): 3.05 **Lat/Long:** 39.133133 -77.267205

Site Data

Parcel Size (ac): 229 **Potential Restoration Reach (LF):** 448

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting ____Habitat Enhancement ____Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 44

Land Use: Parkland (Forested) **Mapped Soils:** 54A

Property Address: Riffle Ford Road, Seneca Creek State Park

Property Owner(s): State of MD DNR

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Yes, imbricated stone wall at upstream end. Bridge crossing downstream	Explain: Yes - all DNR parkland.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: 3-4' vertical and raw banks. Severe bank erosion		Describe: Mostly forested riparian area. Some open meadow	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Most banks 5-6' tall		Describe: Parkland - forested.	
Existing Floodplain Access	1	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Large system. Evidence of sediment deposition in floodplain		Describe: Potential for reducing bank erosion. No potential for habitat improvement. Floodplain is already set and accessed	
Opportunity for Floodplain Development	1	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Floodplain access limited by adjacent road and trail.		Describe: Good trail adjacent to site with some forest impacts from the trail.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 44 square miles		Describe: Mostly sanitary sewer and overhead powerlines.	
		Total Score out of 100	27

Map

Site No.	MPOC0005		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: i495/270 Managed Lane Study **Mitigation Site Number:** MPOC0006

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/30/2019 **Consultant Firm/Investigator(s):** CRI - DS/SN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Hillendale Drive and Little Falls Parkway

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 2140202

Proximity to Impacted Stream (mi.): 2.2 **Lat/Long:** 38.975032 -77.099841

Site Data

Parcel Size (ac): 2 parcels (1.79, 32.1) **Potential Restoration Reach (LF):** 673

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion ___X___Riparian Buffer Planting ___Habitat Enhancement _X_Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.53

Land Use: Parkland **Mapped Soils:** Brinklow-Blockton channery silt loams,

Property Address: 6300 Hillandale Rd, Bethesda, MD 20815 Glenelg-Urban land Complex

Property Owner(s): MNCPPC & Mo. County ROW

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Yes; culverts upstream and downstream; utility crossing on bank protection.	Explain: Site located on M-NCPPC parkland and Mo. County ROW. Restoration could be combined with MPOC0010/MPOC0011

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Approximately 30%-40%; But some had protection		Describe: Forest	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Approximately 6-8 feet		Describe: Forested	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Lower banks on inside of meanders provide floodplain access.		Describe: Bank stability; habitat; fish blockage; lateral and vertical stability	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Limited by trail, road, and valley; lower end 3-4 times of the stream width		Describe: Road/trail on upstream end; steep slopes downstream old access from restoration	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 0.53 square miles		Describe: Utility Crossing present	
		Total Score out of 100	43

Map

Site No.	MPOC0006		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPOC0008 (combined with MPOC0007)

Projects Estimated Stream Mitigation Needs (LF):

Date of Field Assessment: 7/17/2019 **Consultant Firm/Investigator(s):** RK&K; KJH, AJN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Glen Road and Travilah Road

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 02140202

Proximity to Impacted Stream (mi.): 4.67 **Lat/Long:** 39.069438 -77.258469

Site Data

Parcel Size (ac): 15.8 **Potential Restoration Reach (LF):** 2,419

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting __Habitat Enhancement _X_Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.25

Land Use: Forested **Mapped Soils:** Baile silt loam

Property Address: Glen Road

Property Owner(s): M-NCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc? Explain	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: No evidence. Bedrock throughout majority of streambed. Combine with MPOC0007	Explain: Two small segments on private property. MNCPPC recommendation

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Moderate bank erosion throughout		Describe: Forested parkland. Mid-successional; red maple, sycamore, persimmon.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 3-6' tall banks		Describe: Forested parkland	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Matted down vegetation at top of bank		Describe: Opportunity for sediment reduction throughout. In-stream habitat limited by bedrock. Riparian invasive treatment needed.	
Opportunity for Floodplain Development	1	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Limited by steep valley slopes and adjacent private properties		Describe: Clearing of trees would need to occur.	
Drainage Area Evaluation	10	**Utilities Present**	10
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 0.25 square miles		Describe: None observed	
		Total Score out of 100	44

Map

Site No.	MPOC0008 (combined		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPOC-0009

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/25/2019 **Consultant Firm/Investigator(s):** RKK KJH&AJN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Goshen Road and Rock Elm Way

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 02140208

Proximity to Impacted Stream (mi.): 2.13 **Lat/Long:** 39.171692 -77.186706

Site Data

Parcel Size (ac): 25.8 **Potential Restoration Reach (LF):** 3,457

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting _X__Habitat Enhancement ___Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 2.91

Land Use: Park floodplain **Mapped Soils:** Hatboro silt loam

Property Address: Goshen Road

Property Owner(s): MNCPPC and Montgomery County ROW

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Yes, rip-rap at sewer crossings and bridge at downstream end.	Explain: MNCPPC property and Montgomery Co. ROW. MNCPPC recommendation

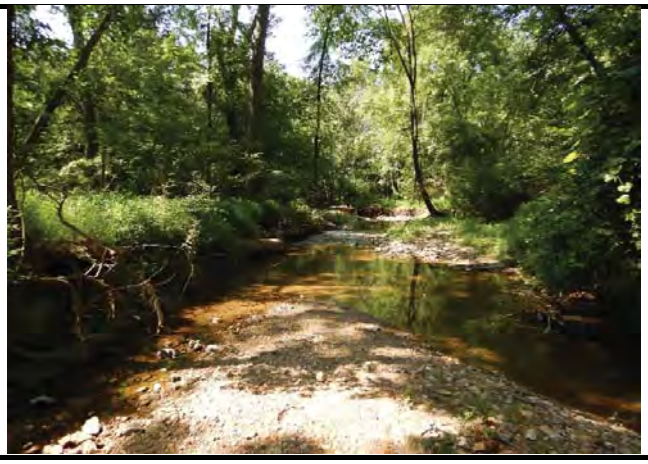
Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Severe erosion throughout reach. Deeply incised channel.		Describe: Mid successional forest; Black Walnut, Sycamore. Downstream section is open meadow.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Bank Height 3-6'		Describe: Forested parkland upstream and old field downstream	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of out of bank flooding		Describe: Opportunities for sediment reduction, floodplain connectivity, aquatic habitat, wetland creation, water quality, an riparian buffer planting.	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Some restrictions due to valley slopes and residential housing		Describe: DS - open meadow and existing path. US - forested.	
Drainage Area Evaluation	5	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 2.91 square miles		Describe: Sewer line runs parallel to stream.	
		Total Score out of 100	53

Map

Site No.	MPOC-0009		Scale: 1 in. =	2,000

Site Photos



Stream Mitigation Field Site Assessment Form

Project Details

Project Name: 1-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPOC0010

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/30/2019 **Consultant Firm/Investigator(s):** CRI - DS/SN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Hillandale and Little Falls Parkway

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 2140202

Proximity to Impacted Stream (mi.): 2.4 **Lat/Long:** 38.97123 -77.098712

Site Data

Parcel Size (ac): 19.5 **Potential Restoration Reach (LF):** 1,203

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _X_Riparian Buffer Planting __X_Habitat Enhancement __X_Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.)

Land Use: Park/Open Space **Mapped Soils:** Glenelg-Urban land complex

Property Address: 6300 Hillandale Dr, Bethesda, MD 20815

Property Owner(s): MNCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc? Explain	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Concrete channel	Explain: Only feasible if it extends to natural channel at downstream end, extend upstrea

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	5
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Concrete channel		Describe: Some forest but mostly vines	
Degree of Channel Incision	5	**Land Use**	10
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Concrete 2:1; Approximately 4 feet		Describe: Mostly mowed parkland	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of grass		Describe: Habitat enhancement; floodplain reconnection; bedform diversity	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Closer to 3, but concrete channel is significantly over widened		Describe: Recent utility access from upstream road crossing	
Drainage Area Evaluation	5	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 1.259 miles		Describe: Sewer along stream bank and could cross	
		Total Score out of 100	57

Map

Site No.	MPOC0010		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: 1-495/I-270 Managed Lane Study **Mitigation Site Number:** MPOC0011

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 7/30/2019 **Consultant Firm/Investigator(s):** CRI - DS/SN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Hillendale Rd and Little Falls Parkway

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 2140202

Proximity to Impacted Stream (mi.): 2.4 **Lat/Long:** 38.97293 -77.09917

Site Data

Parcel Size (ac): 19.5 **Potential Restoration Reach (LF):** 709

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion ___X___Riparian Buffer Planting _X_Habitat Enhancement _X_Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.56 sq mi

Land Use: Parkland **Mapped Soils:** Glenelg-Urban land complex

Property Address: 6300 Hillendale Drive, Bethesda, MD 20815

Property Owner(s): MNCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc? Explain	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Yes; culverts, trail adjacent; Downstream channel becomes concrete channel	Explain: Combine with MPOC0010 and MPOC0006

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: 40%-50% of eroded banks; Approximately 4-6		Describe: Forest with some clearing near road	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Approximately 4-6 feet		Describe: Forested parkland	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No obvious evidence of flooding.		Describe: Bank stability; floodplain reconnection; habitat	
Opportunity for Floodplain Development	5	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: More forest but plenty of space		Describe: MNCPPC trail along stream but clearing needed	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 0.56 square miles		Describe: Multiple utility crossings	
		Total Score out of 100	48

Map

Site No.	MPOC0011		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MPOC0012

Projects Estimated Stream Mitigation Needs (LF):

Date of Field Assessment: 7/17/2019 **Consultant Firm/Investigator(s):** RK&K; KJH, AJN

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Democracy Blvd. and Seven Locks Rd.

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 02140207

Proximity to Impacted Stream (mi.): 0.77 **Lat/Long:** 39.024472 -77.158008

Site Data

Parcel Size (ac): 34 **Potential Restoration Reach (LF):** 939

Site Opportunities: ___Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting __Habitat Enhancement _X_Fish Passage

Stream Order: 1st **Stream Hydrology:** Ephemeral **Stream Use:**

Drainage Area to Reach (sq. mi.) 0.06

Land Use: Forested parkland **Mapped Soils:** Blocktown channery silt loam

Property Address: Democracy Blvd.

Property Owner(s): M-NCPPC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: No.	Explain: Ephemeral channel draining to a wetland, that drains back into the ephemeral channel. All on MNCPPC property. MNCPPC recommendation.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Minor to moderate erosion throughout		Describe: Mid successional forest. Middle portion of site is an open meadow/potential wetland	
Degree of Channel Incision	1	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 0.5 - 3' tall banks		Describe: Forested parkland	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of flooding		Describe: No opportunites - ephemeral channel.	
Opportunity for Floodplain Development	1	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: No opportunity - steep valley that drains to an open meadow		Describe: Existing 15' wide path. Would require tree clearing to get to channel	
Drainage Area Evaluation	10	**Utilities Present**	10
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 0.06 square miles		Describe: None observed within site	
		Total Score out of 100	50

Map

Site No.	MPOC0012		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-150006

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/20/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Woodfield Rd. & Watkins Rd.

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 02140208

Proximity to Impacted Stream (mi.): 6.4 **Lat/Long:** 39.23314874 -77.18283808

Site Data

Parcel Size (ac): 48.28 **Potential Restoration Reach (LF):** 3,529

Site Opportunities: ___Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 9.01

Land Use: Forest - Existing Wetland Mitigation Site **Mapped Soils:** Hatboro silt loam & Codorus silt loam

Property Address: Woodfield Rd., Gaithersburg 20882

Property Owner(s): State Highway Administration

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: The site consists of an existing ICC wetland mitigation site (SC-19). Site surrounded by wetland creation/tree planting areas. Some rock toe protection structures along channel.	Explain: NA - Existing mitigation site. SHA EPD stated in a meeting on 1/28/19 that this site should not be pursued for stream mitigation.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Localized sections with minor to moderate bank erosion. Sections have been stabilized with rock toe protection.		Describe: Recent tree plantings throughout site. Majority of site is wetland creation area.	
Degree of Channel Incision	1	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 1-3 foot tall banks		Describe: Reforestation plantings in old field & wetland creation areas.	
Existing Floodplain Access	1	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Evidence of out-of-bank flooding in several areas throughout site - woody debris piles, sediment deposition & matted down veg.		Describe: Existing restoration site with little potential for erosion reduction and habitat improvements.	
Opportunity for Floodplain Development	1	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Plenty of space for floodplain, however stream is already connected to the adjacent floodplain. Low banks, evidence of out-of-bank flows, and existing floodplain wetlands.		Describe: Existing access from previous restoration at northern end of site, however access to the stream would require removal of recent tree plantings.	
Drainage Area Evaluation	1	**Utilities Present**	5
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 9.01 square miles.		Describe: Overhead powerlines along road just outside site.	
		Total Score out of 100	22

Map

Site No.	SSS-150006		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-150017

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/8/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, DB

Site Location Details-taken from desktop review

County: Montgomery **Cross Roads:** Carderock Springs Dr. & Fenway Rd.

Basin (HUC 8): Middle Potomac-Catoctin **MDE Watershed (8 digit):** 2140207

Proximity to Impacted Stream (mi.): 0.6 **Lat/Long:** 38.99502015 -77.17030611

Site Data

Parcel Size (ac): 3 parcels - 1.7, 5.8 & 6.5 **Potential Restoration Reach (LF):** 1,084

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion ___X___Riparian Buffer Planting ___Habitat Enhancement _X__Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.78

Land Use: Medium density residential **Mapped Soils:** Blocktown channery silt loam

Property Address: Main Parcel - Steamboat Rd, Bethesda 20817

Property Owner(s): Maryland National Capital Park & Planning Commission

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Boulder armoring is evident along the banks in the lower section of the site. Possible past floodplain fill for adjacent roadway.	Explain: Restoration is feasible within 3 M-NCPPC parcels, however may require access through a private property at the northern end of the site.

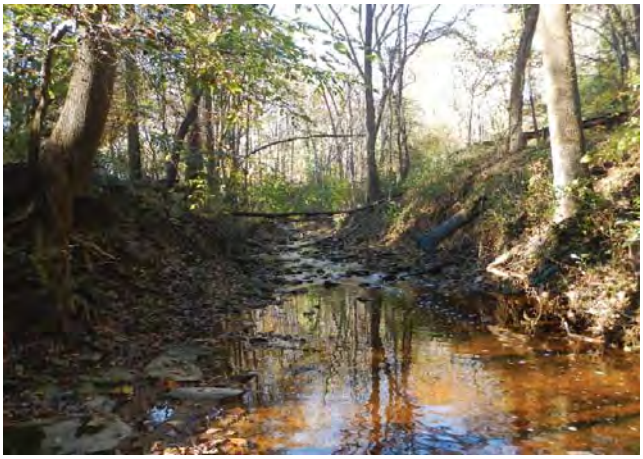
Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Moderate bank erosion throughout most of site. A few localized areas of severe bank erosion. Some bank sections are stabilized with vegetation.		Describe: Stream is surrounded by mid-successional upland forest. Small potential PFO wetland at upstream end of site.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Banks are ~4-8 ft. tall.		Describe: Located in Cabin John Creek Park. Stream valley park consisting of mid-successional forest.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Deeply incised channel. No evidence of out of bank flooding.		Describe: Some potential in reducing bank erosion, however fish/benthic habitat and water quality improvements are limited due to existing good habitat and constricted floodplain.	
Opportunity for Floodplain Development	1	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Floodplain is narrow and constricted by a roadway to the north and steep valley slopes to the south.		Describe: Potential access through cleared area in center of site and private property at upstream end of site that appears to have been cleared in the past for sewer repairs.	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 0.78 square miles.		Describe: Sewer line runs parallel to stream.	
		Total Score out of 100	44

Map

Site No.	SSS-150017		Scale: 1 in. = 2,000

Site Photos



Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG_00008

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/27/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Harry S Truman Dr. N. & Shoppers Way

Basin (HUC 8): Patuxent **MDE Watershed (8 digit):** 02131103

Proximity to Impacted Stream (mi.): 0.09 **Lat/Long:** 38.90121886 -76.84465743

Site Data

Parcel Size (ac): 2 Parcels - 16.28, 49.39 **Potential Restoration Reach (LF):** 1,682

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting __X_Habitat Enhancement ___Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.2

Land Use: Commercial **Mapped Soils:** Urban land-Collington-Wist complex

Property Address: 801 Capital Centre Blvd, Upper Marlboro 20774-0000

Property Owner(s): Washington Metro Area Transit Authority, RPAI Capital Centre II LLC

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Active construction just north of site in commercial development. Rip-rap in portions of the stream. Turbid water.	Explain: Site restoration would require access from WMATA & commercial development.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Minor to moderate bank erosion throughout site.		Describe: Narrow strip of forest surrounds site.	
Degree of Channel Incision	1	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 1-3 foot tall banks.		Describe: Narrow forested strip on WMATA and commercial properties.	
Existing Floodplain Access	1	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Evidence of wrack lines, matted down veg, and trash in narrow floodplain.		Describe: Some potential for improving instream habitat and reducing erosion. No potential for floodplain development or improving water quality.	
Opportunity for Floodplain Development	1	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: No potential for floodplain improvements due to the site being surrounded by development.		Describe: Site surrounded by narrow strip of forest.	
Drainage Area Evaluation	10	**Utilities Present**	5
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage Area - 0.2 square miles		Describe: Storm drains located just outside site.	
		Total Score out of 100	31

Map

Site No.	PG_00008		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG00017

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 6/11/2019 **Consultant Firm/Investigator(s):** RK&K/KJH, CAS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Croom Road and Grandhaven Ave.

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 02060006

Proximity to Impacted Stream (mi.): 6.25 miles **Lat/Long:** 38.778987 -76.774976

Site Data

Parcel Size (ac): 15.2 **Potential Restoration Reach (LF):** 2,935

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting ___Habitat Enhancement ___Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 13

Land Use: Forested Parkland **Mapped Soils:** Widewater and Issue soils

Property Address: Croom Road, Upper Marlboro

Property Owner(s): MNCPPC - PG County

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Old bridge foundation near confluence.	Explain: May require access/work on private property. 1,800 LF potential on MNCPPC property.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Old severe erosion stabilized by vegetation. Mostly localized active severe erosion.		Describe: Mid-successional forest. Dense understory of spicebush. River birch, box elder, tulip poplar, sycamore. One PFO wetland.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 8-10' tall banks		Describe: Forested parkland	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of flooding		Describe: Opportunities for sediment reduction, floodplain connectivity, water quality. Existing good instream woody habitat.	
Opportunity for Floodplain Development	5	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: ~ 200' on both sides for floodplain development.		Describe: Mid-successional forest with dense understory - no existing access.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 13 square miles		Describe: Sewerline along smaller tributary. Overhead powerline along tributary.	
		Total Score out of 100	40

Map

Site No.	PG00017		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG_00049A

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 12/12/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Stephanie Roper Hwy & Pennsylvania Ave

Basin (HUC 8): Patuxent **MDE Watershed (8 digit):** 02131103

Proximity to Impacted Stream (mi.): 6.38 **Lat/Long:** 38.80716792 -76.74881669

Site Data

Parcel Size (ac): 147.7, 23.8, 3.3, 3.6, 11.7 **Potential Restoration Reach (LF):** 4,231

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion ___X___Riparian Buffer Planting __X_Habitat Enhancement ___Fish Passage

Stream Order: 4th **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 91.2

Land Use: Commercial & Forest **Mapped Soils:** Widewater and Issue Soils

Property Address: PG County Address - 14900 Pennsylvania Ave, Upper Marlboro 20772-0000

Property Owner(s): Prince George's County & 4 Private Property Owners

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Bridge & rip-rap bank stabilization at upstream end of site. Large pond that runs parallel to the stream may be man-made.	Explain: Stream restoration at the site would require access to four private properties along the west and south sides of the channel.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	5
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Moderate to severe erosion throughout majority of site. Vertical, sandy banks.		Describe: Riparian zone north of the channel consists mostly of maintained grass areas with scattered trees. Riparian zone south of the channel consists of mid-successional forest with extensive PFO wetlands.	
Degree of Channel Incision	10	**Land Use**	5
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 6 - 12 foot tall banks. Banks in majority of site are 10 feet tall.		Describe: Park land used for events & equestrian services. Northern riparian zone is open grass. Southern riparian zone is mid-successional forest.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Some evidence of sand deposition at top of stream banks.		Describe: Opportunity for reducing bank erosion. Limited potential for improvements to instream habitat and floodplain development.	
Opportunity for Floodplain Development	1	**Ease of Access**	5
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Floodplain development limited by valley wall south of site and park amenities north of site.		Describe: Open access north of site. Access and work south of site may require tree clearing.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 91.2 square miles		Describe: Sewer and gas lines within site.	
		Total Score out of 100	48

Map

Site No.	PG_00049A		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG_00049B

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 12/12/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Marlboro Pike & Marlboro Race Track Rd.

Basin (HUC 8): Patuxent **MDE Watershed (8 digit):** 02131103

Proximity to Impacted Stream (mi.): 6.38 **Lat/Long:** 38.81456046 -76.74699715

Site Data

Parcel Size (ac): 147.7, 5.2, 5.7, 6.3, 0.4, 2.9, 1.3, 1.6, 0.1, 7.6 **Potential Restoration Reach (LF):** 4,260

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting __X_Habitat Enhancement ___Fish Passage

Stream Order: 4th **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 90.6

Land Use: Forest **Mapped Soils:** Widewater and Issue Soils

Property Address: 14900 Pennsylvania Ave, Upper Marlboro MD, 20772

Property Owner(s): Prince George's County, Town of Upper Marlboro, Marlboro Volunteer Fire Dept., and 1 Private Property

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Rock toe bank protection at upstream end of site. Timber mats from construction washed down and scattered throughout site.	Explain: Majority of site on PG County property, however portions of site extend onto Town of Marlboro, Fire Dept, and one private property.

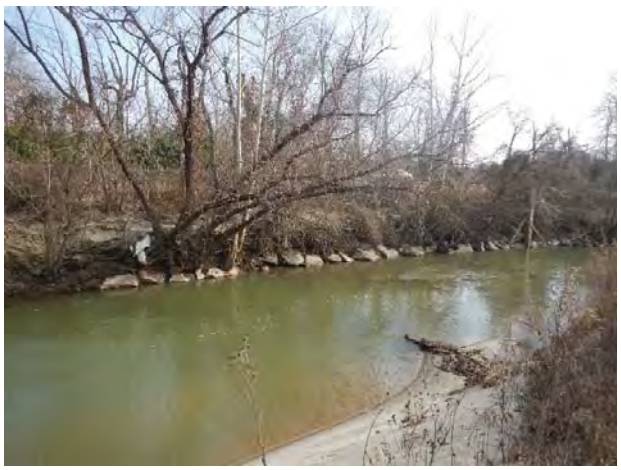
Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Moderate to severe erosion throughout most of site. Vertical, sand banks. Some bank sections are vertical, yet appear stable.		Describe: Majority of site is mid-successional forest. Section DS of Water St. is open grass. Several large floodplain wetlands throughout site.	
Degree of Channel Incision	10	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 8 - 11 foot tall banks.		Describe: Majority of site is mid-successional forest on park land. Section DS of Water St. is open grass. Several large floodplain wetlands throughout site.	
Existing Floodplain Access	1	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Extensive sand deposition throughout majority of floodplain. Timber mats from upstream construction scattered throughout floodplain.		Describe: Opportunity for reducing bank erosion. Limited potential for improvements to instream habitat and floodplain development.	
Opportunity for Floodplain Development	1	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Narrow floodplain confined by steep valley slopes. Stream already appears to be connected to majority of floodplain.		Describe: Majority of site is forested and surrounded by steep valley slopes. Several large floodplain wetlands throughout site. Section DS of Water St. is open grass.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 90.6 square miles		Describe: Sewer and gas lines within site. Electric lines across Water St. bridge.	
		Total Score out of 100	32

Map

Site No.	PG_00049B		Scale: 1 in. = 2,000

Site Photos



Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG_00149

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 1/2/2019 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Central Ave & Enterprise Rd

Basin (HUC 8): Patuxent **MDE Watershed (8 digit):** 02131103

Proximity to Impacted Stream (mi.): 2.5 **Lat/Long:** 38.89810854 -76.79590878

Site Data

Parcel Size (ac): 3.1 **Potential Restoration Reach (LF):** 1,995

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion _____Riparian Buffer Planting __X_Habitat Enhancement ___Fish Passage

Stream Order: 3rd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 8.56

Land Use: Forest **Mapped Soils:** Widewater and Issue Soils

Property Address: Central Ave, Upper Marlboro 20774-0000

Property Owner(s): Prince George's County

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Stormwater Pond retrofit under construction drains to the site. Majority of site is within wetlands of special state concern.	Explain: Access and restoration is feasible within PG County property.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Moderate to severe erosion throughout most of site. Trees roots stabilizing some portions.		Describe: Mid-successional forest surrounding most of site dominated by red maple, sweet gum, sycamore and American elm. Extensive PFO wetlands throughout floodplain. High quality sphagnum moss wetland within site.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 6 foot tall sandy banks		Describe: Mid-successional forest and PFO wetlands located on County property. Two stormwater facilities within site.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Some evidence of sand deposition and matted down vegetation at top of banks.		Describe: Ecological lift limited to reducing erosion. Limited potential for improvements to fish habitat and floodplain development.	
Opportunity for Floodplain Development	5	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Potential for floodplain development north of channel. Floodplain development south of channel is limited by steep valley slopes, adjacent residential community, and stormwater facility.		Describe: Site surrounded by mid-successional forest, PFO wetlands and steep slopes.	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 8.56 square miles		Describe: Sewer line along north side of channel.	
		Total Score out of 100	30

Map

Site No.	PG_00149		Scale: 1 in. = 2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** PG00160

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 12/12/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Brooke Ln. & Brown Station Rd.

Basin (HUC 8): Patuxent **MDE Watershed (8 digit):** 02131103

Proximity to Impacted Stream (mi.): 3.55 **Lat/Long:** 38.83722883 -76.78668749

Site Data

Parcel Size (ac): 261.7, 56.1, 15.0, 14.8, 54.6, 1.0, 10.2 **Potential Restoration Reach (LF):** 6,742

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion _____Riparian Buffer Planting __X_Habitat Enhancement ___Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 2.67

Land Use: Forest, Landfill, Education **Mapped Soils:** Widewater and Issue soils

Property Address: 3210 Brown Station Rd, Upper Marlboro 20774-0000

Property Owner(s): Prince George's County (4 parcels), Board of Education (1 parcel) & 2 Private Properties

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Evidence of instream dumping & old bridge foundation. Site is located in forested area between high school and landfill.	Explain: Majority of site is located on PG County and board of education property. Two small sections are located on private properties.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	5	**Vegetation**	1
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Moderate to severe erosion along outer banks. Torturous meanders.		Describe: Entire site consists of mid-successional forest dominated by American beech, tulip poplar, white oak, and northern red oak.	
Degree of Channel Incision	5	**Land Use**	1
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 3-5 foot tall banks.		Describe: Site consists of mid-successional forest on board of education, PG county, and two private properties.	
Existing Floodplain Access	10	**Opportunity for Ecological Lift**	10
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: No evidence of out-of-bank flooding.		Describe: Potential for reducing erosion and improving instream habitat, floodplain connection, and water quality.	
Opportunity for Floodplain Development	5	**Ease of Access**	1
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Floodplain development limited in some areas by steep valley slopes.		Describe: Site surrounded by mid-successional forest that would require clearing. Potential access points from adjacent County landfill roads.	
Drainage Area Evaluation	5	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 2.67 square miles.		Describe: Sewer line runs parallel to the stream.	
		Total Score out of 100	44

Map

Site No.	PG00160		Scale: 1 in. =	2,000

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-160023

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 6/14/2019 **Consultant Firm/Investigator(s):** CRI - SN/DS

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Cleary Lane and Bald Hill Terrace

Basin (HUC 8): Patuxent **MDE Watershed (8 digit):** 2131103

Proximity to Impacted Stream (mi.): 0.05 **Lat/Long:** 38.9446 -76.8395

Site Data

Parcel Size (ac): M-NCPPC- 19.25, 6.43 Private-84.22 **Potential Restoration Reach (LF):** 1,513

Site Opportunities: __X__Channel Restoration ____Livestock Exclusion ___X___Riparian Buffer Planting __X_Habitat Enhancement _X__Fish Passage

Stream Order: 2nd **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 4.51

Land Use: Forest, wetland, residential **Mapped Soils:** Zekiah and Issue soils

Property Address: Cleary Lane, Mitchellville, MD 20721

Property Owner(s): M-NCPPC, private owner

General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Small tributary near US sectionwith culvert and fish blocakge. Sewer crossing observed with freshly palced riprap at crossing	Explain: Yes, all within M-NCPPS property. Could extend downstream to one additional private property owner to extend approx 1000 lf

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	10	**Vegetation**	5
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: A lot of fresh erosion alog both banks		Describe: Sewer crossing/ROW may limit plating forest buffer, existing vegetation is scrub-shrub and invasive herbaceous	
Degree of Channel Incision	5	**Land Use**	10
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: Bank heights ranging from 3-7', average at 5'		Describe: M-NCPPC stream parcel, open space near US 50, residential	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	5
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: High banks with established invasive herbaceous, evidence of flow in side channels		Describe: Vertial stability, lateral stability, floodplain access, habitat	
Opportunity for Floodplain Development	10	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: Wide ope valley with room for expansive floodplain access		Describe: Recent utility work in potential restoration, M-NCPPS ROW with low gradient	
Drainage Area Evaluation	1	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: 4.51 ac		Describe: Sewer manhole present in Floodplain, stream croses sewer ROW, sewer appears to run parallel to stream	
		Total Score out of 100	62

Map

Site No.	SSS-160023		Scale: 1 in. = 2,000 ft

Site Photos

Stream Mitigation Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** SSS-160034

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 11/27/2018 **Consultant Firm/Investigator(s):** RK&K/KJH, BDM

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Kipling Pkwy & Mason St.

Basin (HUC 8): Patuxent **MDE Watershed (8 digit):** 02131103

Proximity to Impacted Stream (mi.): 1.3 **Lat/Long:** 38.85702841 -76.88380062

Site Data

Parcel Size (ac): NA **Potential Restoration Reach (LF):** 2,868

Site Opportunities: __X__Channel Restoration ___Livestock Exclusion ___X___Riparian Buffer Planting __X_Habitat Enhancement __X_Fish Passage

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Drainage Area to Reach (sq. mi.) 0.52

Land Use: Medium Density Residential **Mapped Soils:** Croom-urban land complex

Property Address: Kipling Pkwy, District Heights, MD 20747

Property Owner(s): State Highway Administration - Right-of-way

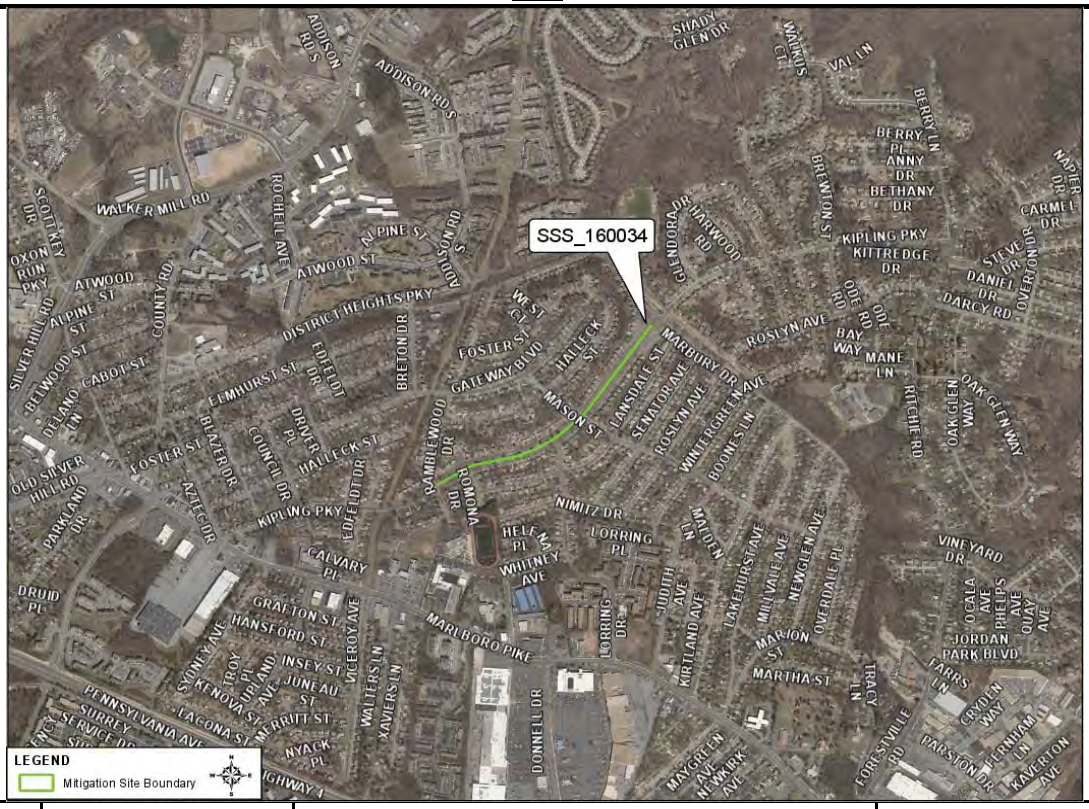
General Field Observations

Is there evidence that the stream has been disturbed by some kind of human action, like grading, dumping, livestock, culvert, etc?	Can the stream restoration be reasonably done within the confines of the parcel or does it require connections beyond the parcel limits? Explain
Explain: Entire site consists of concrete lined channel.	Explain: Restoration and access is feasible within SHA right-of-way.

Mitigation Site Rating

Criteria	Score	Criteria	Score
Estimated Bank erosion within reach	1	**Vegetation**	10
10 - Greater than 50% 5 - 10% to 50% 1 - Less than 10%		10 - Herbaceous cover (non-wetland) 5 - Scrub-shrub cover (non-wetland) 1 - Mostly forested and/or wetland	
Describe: Very minor erosion. Entire site consists of concrete lined channel.		Describe: Site is dominated by grass lawn with scattered mature trees.	
Degree of Channel Incision	1	**Land Use**	10
10 - Bank Height greater than 10 feet 5 - Bank Height between 3 and 10 feet 1 - Bank Height less than 3 feet		10 - Agricultural or Open Space 5 - Marginal Pasture 1 - Old field/ Developed/Forested	
Describe: 1-3 foot tall banks.		Describe: Site is within SHA right-of-way and dominated by grass lawn with scattered mature trees.	
Existing Floodplain Access	5	**Opportunity for Ecological Lift**	1
10 - No evidence of out of bank flooding 5- Yes (Infrequent out of bank flow) 1 - Yes (evidence of frequent flooding)		10 - Conditions exist for several aspects of lift to be achieved and sustained 5 - Lift limited to one or few aspects 1 - Conditions are such that Lift is difficult to achieve and sustain	
Describe: Some evidence of out-of-bank flows at top of concrete lined channel.		Describe: Limited potential for improving instream habitat. No potential for floodplain development, improving water quality, or reducing erosion.	
Opportunity for Floodplain Development	1	**Ease of Access**	10
10 - Existing space for floodplain greater than 10 times stream width 5 - Existing space for floodplain 3 to 10 times stream width 1 - Little to no space for floodplain development		10 - Yes (with existing direct vehicular access to potential site) 5- yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed)	
Describe: No opportunity for floodplain development. Site is surrounded by roads and residential housing.		Describe: Majority of site is open and dominated by grass lawn with scattered trees.	
Drainage Area Evaluation	10	**Utilities Present**	1
10 -D.A. less than 1 sq. mi. 5- D. A. between 1 & 3 sq. mi. 1 - D. A. greater than 3 sq. mi.		10 - No utilities on site 5 - Utilities but not within restoration area 1 - Utilities within potential restoration area	
Describe: Drainage area - 0.52 square miles.		Describe: Overhead powerlines and possible sewer crossings.	
		Total Score out of 100	50

Map



Site No.	SSS-160034		Scale: 1 in. = 2,000

Site Photos

FISH PASSAGE RATING CRITERIA & FIELD SITE ASSESSMENT FORMS

Fish Passage Field Site Assessment Rating Criteria

Functional Upstream Network

The functional upstream network is the length of stream (mi.) between the fish blockage being investigated and the next upstream fish blockage. The functional upstream network consists of the length upstream of the blockage that would be accessible to downstream fish once the blockage has been removed. This value can be referenced from the Chesapeake Fish Passage Prioritization (CFPP) online database (http://maps.freshwaternetwork.org/chesapeake/#) or determined in the field.

Number of Downstream Fish Blockages

Determine the number of downstream fish blockages based on a GIS analysis or the Chesapeake Fish Passage Prioritization (CFPP) online database (http://maps.freshwaternetwork.org/chesapeake/#).

NAACC Diadromous Fish HUC 12 Watershed Score

Reference the North Atlantic Aquatic Connectivity Collaborative (NAACC) diadromous fish score (3-61) based on the HUC12 watershed where the site is located (http://tnc.maps.arcgis.com/apps/webappviewer/index.html?id=f64c9c61e01d4befafdb63afa638511f).

Percentage of Upstream Impervious Surface

Calculate the percentage of impervious surface in the watershed upstream of the fish blockage. This percentage can be calculated from a GIS analysis or referenced from the Chesapeake Fish Passage Prioritization (CFPP) online database (http://maps.freshwaternetwork.org/chesapeake/#).

Fish Habitat Diversity

Describe/list the different fish habitat types upstream and downstream of the blockage based on stream segments that are visible form the road right-of-way. Habitat types include large woody debris, riffles, deep pools, overhanging vegetation, boulders/cobble, undercut banks, thick root mats, submerged aquatic vegetation, isolated/backwater pools.

Fish Blockage Height - Ecological Benefits of Removal

Measure and record the height of the fish blockage (ft.) in the field. This criteria rates the ecological benefits that would be provided from removal of the blockage based on height. Take photographs of the fish blockage (facing upstream) and the culvert/dam inlet upstream of the blockage (facing downstream).

Adjacent Land Use

Describe the land use adjacent to the fish blockage site where construction/access would take place. Describe any challenges (vegetation, wetlands, development) may play in accessing the site for construction. Take a representative photo of the adjacent landuse.

Ease of Construction

Rate how difficult/easy it would be to successfully remove the fish blockage based the blockage type and height in the following table.

Ease of Construction Rating Criteria

Blockage Type	Blockage Height & Ease of Construction Score			
	No Blockage	< 1 foot	1-5 foot	> 5 foot tall
Small Pipe (12-48" diameter)	0	10	5	1
Large Pipe (>48" diameter)	0	5	1	1
Small Box Culvert (12-48" width)	0	10	5	1
Large Box Culvert (>48" width)	0	5	1	1
Small Dam/Weir (< 20' long)	0	10	1	1
Large Dam/Weir (>20' long)	0	5	1	1
Sewer Crossing	0	10	5	1
Natural Blockage	0	10	5	1

Ease of Access

Consider how easy/difficult it may be to access the site for construction and restoration of fish passage. Does considerable clearing or access road construction need to be performed? Are there steep slopes surrounding the site that will make access/construction a challenge or is the surrounding area relatively flat and easy to access?

Utilities Present

Do utilities exist within or nearby the stream and do they present an issue that may effect construction, access, or reforestation efforts. Describe what utilities are seen such as overhead wires vs. underground utilities such as sewer lines, gas lines or cables.

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MD_AN015

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 2/25/2019 **Consultant Firm/Investigator(s)** CRI; JG, DS, LE

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** MD 193 (Greenbelt Rd.), E of Greenbelt Station Pkwy

Basin (HUC 8): Middle Potomac-Anacostia-Occoquan **MDE Watershed (8 digit):** 2140205

Proximity to Impacted Stream (mi.): 0.9 **Lat/Long:** 38.998348 -76.917222

Site Data

Parcel Size (ac): Within SHA ROW **Drainage Area to Reach (sq. mi.** 27.9

Site Opportunities: __Fish Passage ___Channel Restoration ___Habitat Enhancement ____Riparian Buffer Planting

Stream Order: 4th **Stream Hydrology:** Perennial **Stream Use:** I

Culvert/Dam Type: Box Culvert x4 **Culvert/Dam Dimensions:** 15' x 4 **Blockage Type:** __Complete ___ Partial _X_None

USGS Gage Station #: 01649500 **USGS Gage Discharge (fs3/s):** _4.2 *high, but only gage nearby with similar DA__

USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%

Property Address: SHA ROW - MD 193, Berwyn Height MD 20740

Property Owner(s): SHA

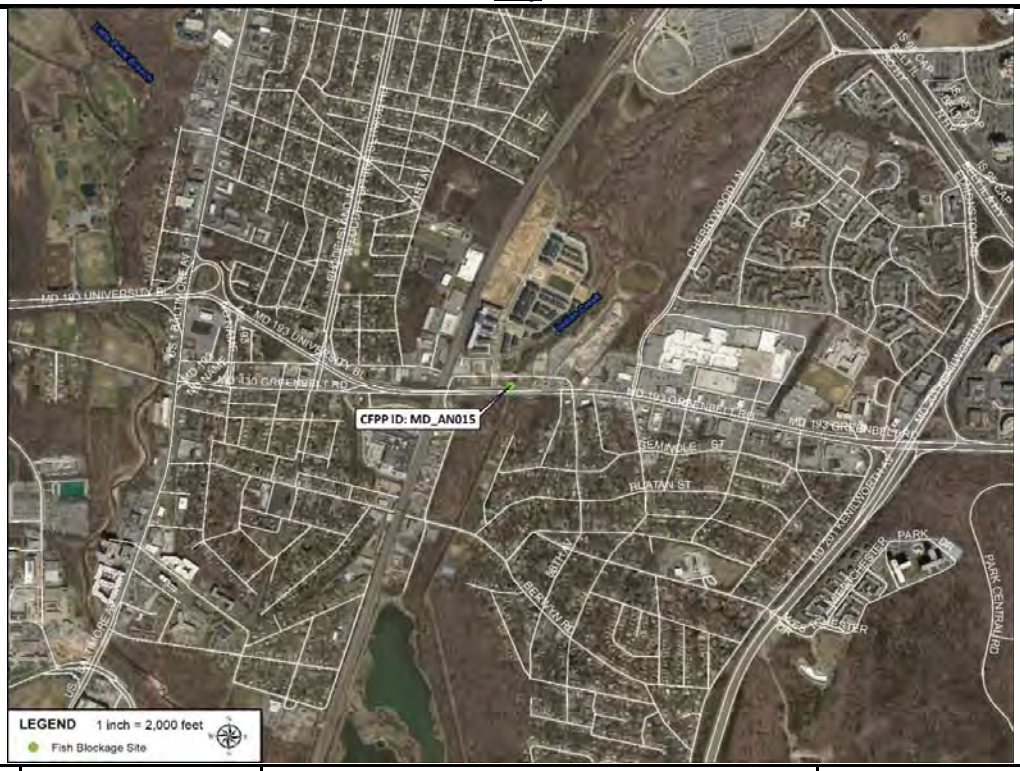
General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies pending.	Explain: No blockage

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	10	**Fish Blockage Height - Ecological Benefits of Removal**	0
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 42		Describe: No blockage	
Number of Downstream Fish Blockages	5	**Adjacent Land Use**	5
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 1 blockage		Describe: US - Forest. DS - Field	
NAACC Diadromous Fish HUC 12 Watershed Score	5	**Ease of Construction**	0
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 23		Describe: No height, large box culvert >48''	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	5
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 15.60%		Describe: DS - forest, no direct access, clearing and grading needed. US - Field, no direct access	
Fish Habitat Diversity	1	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: DS - riffle, deep pool. US - deep pool, woody debris		Describe: Powerlines present in ROW. Water pipeline	
		Total Score out of 100	37

Map



Site No.	MD_AN015		Scale: 1 in. = 2,000 ft.

Site Photos

Looking downstream at culvert from right bank

Channel overview upstream of culvert - facing upstream

Downstream of culvert - facing upstream

Channel overview downstream of culvert - facing downstream

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: MPAO0033
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 8/14/2019
Consultant Firm/Investigator(s): RKK; KJH & AJN

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: I-495 & I-95 Interchange
Basin (HUC 8): Middle Potomac-Anacostia-Occoquan
MDE Watershed (8 digit): 2140205
Proximity to Impacted Stream (mi.): 0
Lat/Long: 39.021035 -76.945654

Site Data

Parcel Size (ac): 366.3
Drainage Area to Reach (sq. mi.): 16.4
Site Opportunities: __X__Fish Passage __X__Channel Restoration ___X___Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 3rd
Stream Hydrology: Perennial
Stream Use: III
Culvert/Dam Type: Quadruple Box Culvert
Culvert/Dam Dimensions: 10' wide. 14' tall
Blockage Type: _X__Complete ___ Partial ___None
USGS Gage Station #: 1649190
USGS Gage Discharge (fs3/s): 4.3
USGS Gage Daily Discharge Percentile: ___0-25% _X__25-50% ___50-75% ___75-100%
Property Address: Lodge Road
Property Owner(s): BARC

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending. American Eel and Sea Lamprey documented by MBSS near the site.	Explain: Site recommended by SHA-EPD. Requires work on BARC South Farm Parcel.

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	10	**Fish Blockage Height - Ecological Benefits of Removal**	5
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: Full re-establishment - 0.64 miles US. Partially restore 26 miles US.		Describe: 3 blockages; 12", 10", and 14"	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	5
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 0 downstream blockages		Describe: Mix of forest and scrub/shrub	
NAACC Diadromous Fish HUC 12 Watershed Score	1	**Ease of Construction**	1
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 52		Describe: Quadruple box culvert - each 10' wide	
Percentage of Upstream Impervious Surface	1	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 31%		Describe: Forest and scrub/shrub clearing required.	
Fish Habitat Diversity	5	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Riffles, deep pools, overhanging vegetation, boulders/cobble.		Describe: Sewerline parallels stream	
		Total Score out of 100	40

Map

Site No.	MPAO0033		Scale: 1 in. =	2000

Site Photos

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: MPAO0034
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 8/14/2019
Consultant Firm/Investigator(s) RKK; KJH & AJN

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: I-495 and Forestville Road
Basin (HUC 8): Middle Potomac-Anacostia-Occoquan
MDE Watershed (8 digit): 2140201
Proximity to Impacted Stream (mi.): 0
Lat/Long: 38.825498 -76.880549

Site Data

Parcel Size (ac): 16.4
Drainage Area to Reach (sq. mi. 0.11
Site Opportunities: __X__Fish Passage __X__Channel Restoration ___X___Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: CMP - Concrete Bottom
Culvert/Dam Dimensions: 9' wide. 6' tall
Blockage Type: _X__Complete ___ Partial ___None
USGS Gage Station #: 1594526
USGS Gage Discharge (fs3 21.5
USGS Gage Daily Discharge Percentile: ___0-25% _X_25-50% ___50-75% ___75-100%
Property Address: 4400 Rena Rd. Suitland, MD 20746
Property Owner(s): Forest Village United LLC

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: Orconectes limosus documented within close proximity.	Explain: Recommended by USACE and MDE

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	1	**Fish Blockage Height - Ecological Benefits of Removal**	10
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 0.51 miles		Describe: 6' tall blockage	
Number of Downstream Fish Blockages	1	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 3 downstream blockages		Describe: Forest - mid successional: Red maple, elm, tulip poplar, bush honeysuckle.	
NAACC Diadromous Fish HUC 12 Watershed Score	5	**Ease of Construction**	1
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 25		Describe: 9' wide CMP	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 25%		Describe: Forested downstream of blockage.	
Fish Habitat Diversity	5	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Riffles, deep pools, overhanging vegetation, thick root mats.		Describe: Sewerline downstream of blockage.	
		Total Score out of 100	31

Map

Site No.	MPAO0034		Scale: 1 in. =	2000

Site Photos

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: MPAO0035
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 6/11/2019
Consultant Firm/Investigator(s) RK&K; KJH/CAS

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: Greenbelt Metro Drive and Cherrywood Lane
Basin (HUC 8): Middle Potomac-Anacostia-Occoquan
MDE Watershed (8 digit): 02070010
Proximity to Impacted Stream (mi.): 14.9
Lat/Long: 39.011219 -76.90374

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.65
Site Opportunities: ___Fish Passage __X__Channel Restoration ___X___Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 4th
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: 4 cll box culvert
Culvert/Dam Dimensions: 17' wide
Blockage Type: ___Complete ___ Partial __X_None
USGS Gage Station #: 01649500
USGS Gage Discharge (fs3 50cfs
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% _X__50-75% __75-100%
Property Address: Greenbelt Metro Drive
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: 3 road crossings/culverts. Recommended by USACE	Explain: Indian Creek. Recommneded by USACE

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	10	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: ~42 square miles		Describe: No blockage observed. Shallow flows in culverts - 4-8" deep.	
Number of Downstream Fish Blockages	5	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 2 downstream dams, however 1 has fish passage notch.		Describe: Mid successional. Mix of forest and scrub shrub. Mostly forest downstream. Pin oak, Ironwood, Red Maple, Blackgum	
NAACC Diadromous Fish HUC 12 Watershed Score	5	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: HCV12 score - 23		Describe: 4 cell box culvert. 17' width for each culvert.	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 17.20%		Describe: Clearing of forest and scrub-shrub required. Access through wetland.	
Fish Habitat Diversity	10	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Deep pools, LWD, overhanging vegetation, root mats, SAV, duckwater pools.		Describe: Overhead power lines over downstream culvert.	
		Total Score out of 100	44

Map

Site No.	MPAO0035		Scale: 1 in. = 2,000

Site Photos

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: MD_12066
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/25/2019
Consultant Firm/Investigator(s) CRI; JG, DS, LE

Site Location Details-taken from desktop review

County: Montgomery
Cross Roads: Montgomery Village Ave., NE of Russell Ave.
Basin (HUC 8): Middle Potomac-Catoctin
MDE Watershed (8 digit): 2140208
Proximity to Impacted Stream (mi.): 1.3
Lat/Long: 39.155574 -77.20806

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.4
Site Opportunities: _X_Fish Passage __X_Channel Restoration __X__Habitat Enhancement __X__Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: RCP
Culvert/Dam Dimensions: 4-5' diameter
Blockage Type: _X_Complete ___ Partial ___None
USGS Gage Station #: 01644372
USGS Gage Discharge (fs3 0.78 cfs
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% ___75-100%
*200% of mean
Property Address: SHA ROW - Montgomery Village Ave., Gaithersburg MD 20879
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies pending.	Explain: Outside of ROW

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	1	**Fish Blockage Height - Ecological Benefits of Removal**	5
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 0.03 miles of US network; Culvert drains two retention ponds US. Little/no benefit of removing blockage.		Describe: Perched RCP, 2-3 feet above water surface. Unable to access outfall due to depth.	
Number of Downstream Fish Blockages	1	**Adjacent Land Use**	5
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 2 DS barriers		Describe: DS - forest on RB, commercial on LB; US - field/scrub shrub/commercial. A score of 5 was given due to direct access to blockage without tree removal.	
NAACC Diadromous Fish HUC 12 Watershed Score	1	**Ease of Construction**	1
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 50		Describe: Large pipe, 1-5 feet in height	
Percentage of Upstream Impervious Surface	1	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 55.70%		Describe: DS - steep, clearing needed. US - no direct road, steep	
Fish Habitat Diversity	5	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: DS - deep pool, riffle, roots; US - pond		Describe: Sewage manhole well downstream of culvert	
		Total Score out of 100	26

Map

Site No.	MD_12066		Scale: 1 in. = 2,000 ft.

Site Photos

Culvert outfall/blockage - facing upstream

Channel overview downstream of blockage - facing downstream

Downstream of blockage - looking at sewer manholes

Upstream of culvert looking at pond

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 38347
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/28/2019
Consultant Firm/Investigator(s) CRI; DS, KS

Site Location Details-taken from desktop review

County: Frederick
Cross Roads: MD 17 (Burkittsville Rd); NE of Quebec School Rd.
Basin (HUC 8): Middle Potomac-Catoctin
MDE Watershed (8 digit): 2140305
Proximity to Impacted Stream (mi.): 27.6
Lat/Long: 39.418362 -77.576515

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.6
Site Opportunities: _X_Fish Passage _X_Channel Restoration __X__Habitat Enhancement _X__Riparian Buffer Planting
Stream Order: 2nd
Stream Hydrology: Perennial
Stream Use: III
Culvert/Dam Type: Box Culvert
Culvert/Dam Dimensions: 12.5'x 8' high, 115 feet long
Blockage Type: _X_Complete ___ Partial ___None
USGS Gage Station #: 01637500
USGS Gage Discharge (fs3 220
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% _X_50-75% ___75-100%
Property Address: SHA ROW - at MD 17 just north east of Quebec School Rd., Middletown MD 21769
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending.	Explain: Blockage is within ROW, but likely need access to parcel downstream of ROW since concrete structure is so extensive.

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	1	**Fish Blockage Height - Ecological Benefits of Removal**	5
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 0.8 miles of US network		Describe: 2 step concrete apron. 1st step: 0.4 feet; 2nd step at box culvert: 1.5 - 1.9 feet	
Number of Downstream Fish Blockages	5	**Adjacent Land Use**	5
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 1 blockage DS		Describe: Split, forest upstream; bare on LB and forest on RB downstream. Given average rank of 5 to respresent land use at downstream blockage.	
NAACC Diadromous Fish HUC 12 Watershed Score	1	**Ease of Construction**	1
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 46		Describe: Large box culvert, 1.9 foot blockage height.	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 1.71%		Describe: Clearing needed, steep slopes, guardrail present	
Fish Habitat Diversity	5	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Riffle, boulder/cobble, woody, roots		Describe: None directly within site; overhead utilities adjacent to site	
		Total Score out of 100	39

Map

Site No.	NAACC 38347		Scale: 1 in. = 2,000 ft.

Site Photos

Culvert outfall - facing downstream

Culvert outfall/complete blockage - facing upstream

Upstream of culvert looking upstream

Left Bank at upstream end looking downstream

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 38385
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/28/2019
Consultant Firm/Investigator(s) CRI; DS, KS

Site Location Details-taken from desktop review

County: Frederick
Cross Roads: MD 77 (Foxville Rd.); just E of Quirauk School Rd.
Basin (HUC 8): Middle Potomac-Catoctin
MDE Watershed (8 digit): 2140305
Proximity to Impacted Stream (mi.): 38.2
Lat/Long: 39.638376 -77.513944

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.4
Site Opportunities: _X_Fish Passage ___Channel Restoration ____Habitat Enhancement ___Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: III
Culvert/Dam Type: Box Culvert
Culvert/Dam Dimensions: 12'x6.7' and 35 feet long
Blockage Type: _X_Complete ___ Partial ___None
USGS Gage Station #: 01637500
USGS Gage Discharge (fs3 220 *no gages nearby with comparable DA
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% _X_50-75% ___75-100%
Property Address: SHA ROW - on MD 77 just east of Quirauk School Rd., Sabillasville MD 21780
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending. No diadromous species recently documented by MBSS.	Explain: Yes, structure at crossing is starting to fail and concrete is actively falling into the stream.

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	1	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: ~0.3 miles of US network		Describe: 0.65 foot drop at concrete apron	
Number of Downstream Fish Blockages	5	**Adjacent Land Use**	5
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 1 blockage DS		Describe: Scrub-shrub in ROW, forest upstream and downstream	
NAACC Diadromous Fish HUC 12 Watershed Score	1	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 55		Describe: 12 foot wide box culvert; 0.65 foot high blockage	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	5
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 0.46%		Describe: ROW is open, no clearing needed on downstream end; no existing access road other than MD-77; Guardrail present	
Fish Habitat Diversity	5	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Riffles, cobble/boulder, roots, overhanging vegetation		Describe: Low hanging power lines at both extents of the crossing	
		Total Score out of 100	39

Map

Site No.	NAACC 38385		Scale: 1 in. = 2, 000 ft.

Site Photos

At downstream end of culvert looking downstream

Culvert outfall/complete blockage - facing upstream

Left bank at downstream end looking at overhead utility

Deteriorating concrete on culvert

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 38455
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/28/2019
Consultant Firm/Investigator(s) CRI; DS, KS

Site Location Details-taken from desktop review

County: Frederick
Cross Roads: MD 17 (Wolfsville Rd.), N of Martin Road
Basin (HUC 8): Middle Potomac-Catoctin
MDE Watershed (8 digit): 2140305
Proximity to Impacted Stream (mi.): 36.5
Lat/Long: 39.591704 -77.558824

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 2
Site Opportunities: __Fish Passage ____Channel Restoration _____Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: III
Culvert/Dam Type: Box Culvert
Culvert/Dam Dimensions: 11.5' x 5.5' to thalweg, 30 feet long
Blockage Type: ___Complete ____ Partial _X_None
USGS Gage Station #: 01637500
USGS Gage Discharge (fs3 220
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% ___75-100%
Property Address: SHA ROW - at MD 17 just north of Martin Rd., Smithsburg MD 21783
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending.	Explain: No blockage

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	0
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 3.1 miles of US network		Describe: No blockage	
Number of Downstream Fish Blockages	1	**Adjacent Land Use**	5
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 2 DS barriers		Describe: Old field dowstream, forest upstream	
NAACC Diadromous Fish HUC 12 Watershed Score	1	**Ease of Construction**	0
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 55		Describe: Large box culvert, no blockage	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	5
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 0.57%		Describe: Old field, fences or guardrail would be compromised	
Fish Habitat Diversity	10	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Riffle, cobble/boulder, root, woody, deep pool, back water pools		Describe: Powerlines in right of way at both extents of crossing	
		Total Score out of 100	38

Map

Site No.	NAACC 38455		Scale: 1 in. = 2,000 ft.

Site Photos

Culvert outfall/no blockage - facing upstream

Channel overview downstream of culvert - facing downstream

Left bank at downstream edge looking at powerlines and guardrail

Upstream looking downstream at culvert

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 38672
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/28/2019
Consultant Firm/Investigator(s) CRI; DS, KS

Site Location Details-taken from desktop review

County: Frederick
Cross Roads: MD 17 (Wolfsville Rd.), N of Black Rock Road
Basin (HUC 8): Middle Potomac-Catoctin
MDE Watershed (8 digit): 2140305
Proximity to Impacted Stream (mi.): 35.6
Lat/Long: 39.578487 -77.556051

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 5.9
Site Opportunities: __Fish Passage ____Channel Restoration _____Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 3rd
Stream Hydrology: Perennial
Stream Use: III
Culvert/Dam Type: Triple CMP w/ concrete
Culvert/Dam Dimensions: 8' diameter, 55 feet long
Blockage Type: ___Complete ____ Partial _X_None
USGS Gage Station #: 01637500
USGS Gage Discharge (fs3 220
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% _X_50-75% ___75-100%
Property Address: SHA ROW - at MD 17 just north of Black Rock Rd., Myersville MD 21773
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending.	Explain: No blockage, potentially fixed prior as new concrete bottom on CMP

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	10	**Fish Blockage Height - Ecological Benefits of Removal**	0
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 5.1 miles of US network		Describe: No blockage	
Number of Downstream Fish Blockages	5	**Adjacent Land Use**	5
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 1 DS barrier		Describe: Field clear at ROW, forest upstream and downstream	
NAACC Diadromous Fish HUC 12 Watershed Score	1	**Ease of Construction**	0
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 55		Describe: Three large CMP with concrete bottom, no blockage height.	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	5
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 0.64%		Describe: Open ROW, no existing access	
Fish Habitat Diversity	5	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Riffle, boulder/cobble, woody, roots, deep pool		Describe: Overhead lines within potential site	
		Total Score out of 100	42

Map

Site No.	NAACC 38672		Scale: 1 in. = 2,000 ft.

Site Photos

Culvert outfall/no blockage - facing upstream

Channel overview downstream of culvert - facing downstream

Left bank at downstream end looking at powerlines and guardrail

Upstream of culvert looking upstream

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: MD LPX15
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 3/6/2019
Consultant Firm/Investigator(s) CRI; JG, DS

Site Location Details-taken from desktop review

County: Howard
Cross Roads: US 29, S of Little Patuxent Pkwy.
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 2131105
Proximity to Impacted Stream (mi.): 13.2
Lat/Long: 39.217813 -76.850299

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.4
Site Opportunities: _X_Fish Passage ___Channel Restoration __X__Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 2nd
Stream Hydrology: Perennial
Stream Use: IV
Culvert/Dam Type: Double RCP
Culvert/Dam Dimensions: 6', 200 feet long
Blockage Type: ___Complete _X__ Partial ___None
USGS Gage Station #: 01593500
USGS Gage Discharge (fs3 71.5
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100% 78%
Property Address: SHA ROW - US 29, Columbia MD 21044
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies pending.	Explain: Yes, blockage is just minor debris jam within ROW on upstream end

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 1.4 miles of US network		Describe: Minor debris jam at inlet - 0.8 foot drop	
Number of Downstream Fish Blockages	1	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 3 DS barriers		Describe: Forest US and DS	
NAACC Diadromous Fish HUC 12 Watershed Score	1	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 48		Describe: 6 foot double RCP, <1 foot height	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 10.30%		Describe: Clearing needed and soundwall at DS end	
Fish Habitat Diversity	5	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Riffle, cobble, backwater pool		Describe: Sewer/manholes US and DS but not within site	
		Total Score out of 100	30

Map

Site No.	MD LPX15		Scale: 1 in. = 2,000 ft.

Site Photos

Upstream looking downstream at culvert

At inlet looking upstream at debris jam/ partial blockage

Channel overview downstream - facing downstream

Downstream of culvert facing sewer line on right bank

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: MD PXM23
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/21/2019
Consultant Firm/Investigator(s) CRI; DS, LE

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: MD 197, N of Route 50 and S of MD 450
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 2131102
Proximity to Impacted Stream (mi.): 11.7
Lat/Long: 38.789336 -76.648663

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.62
Site Opportunities: _X_Fish Passage __X__Channel Restoration __X__Habitat Enhancement __X__Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Box Culvert/Top Flow Spillway
Culvert/Dam Dimensions: W: 9.5' H: 5' (1st blockage)
Blockage Type: _X_Complete ___ Partial __None
USGS Gage Station #: 01649150
USGS Gage Discharge (fs3 2.39
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% ___75-100%
Property Address: SHA ROW - MD 197, Bowie MD 20715
Property Owner(s): SHA

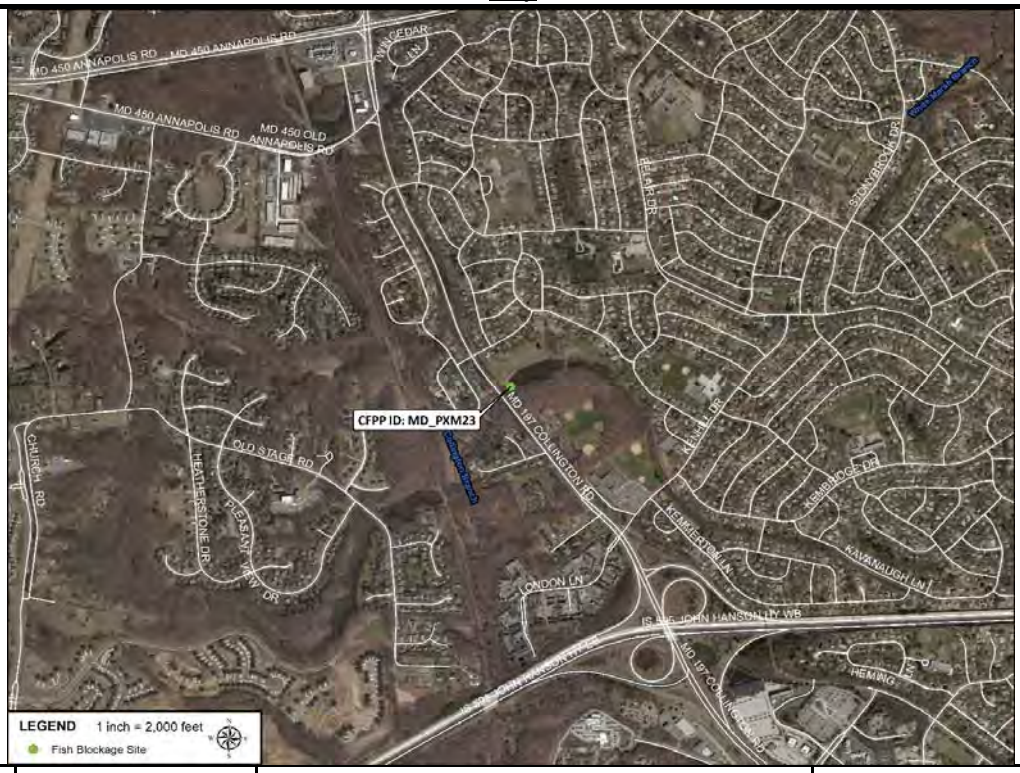
General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies pending.	Explain: No, need access to additional parcels for blockages 2 and 3; 1st blockage is at box culvert

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	5
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 1.2 miles of US network		Describe: 3 blockages. 1st: 0.6 feet; 2nd: 3.4 feet; 3rd: 0.8 feet; Total height: 4.8 feet; *2nd and 3rd blockages are not in ROW and are part of pond dam	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	5
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe:		Describe: Field, recreational park and blockage is DS of pond	
NAACC Diadromous Fish HUC 12 Watershed Score	5	**Ease of Construction**	1
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 39		Describe: Small dam less than 20 feet wide; 1-5 foot blockage height	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	10
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 24.30%		Describe: SHA ROW paved to 1st blockage - additional blockages just US across mowed lawn, but not within ROW	
Fish Habitat Diversity	1	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Trapazoid channel DS. Deep pool DS. Pond US - unknown cover/habitat		Describe: Low overhead powerlines at site	
		Total Score out of 100	48

Map



Site No.	MD PXM23		Scale: 1 in. = 2,000 ft.

Site Photos

Channel overview downstream of 1st blockage in ROW

Upstream at 1st blockage looking upstream at 2nd/3rd blockages

Upstream of 3rd blockage looking upstream at pond

Look upstream at 1st blockage within ROW

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MD-PXM-29

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 3/7/2019 **Consultant Firm/Investigator(s)** RK&K; KJH, DWB

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** Median of MD 4/Ritchie Marlboro Rd

Basin (HUC 8): Patuxent **MDE Watershed (8 digit):** 02131103

Proximity to Impacted Stream (mi.): 5.4 **Lat/Long:** 38.811731 -76.784023

Parcel Size (ac): Within SHA ROW **Drainage Area to Reach (sq. mi.** 1.13

Site Opportunities: ___Fish Passage ___Channel Restoration _____Habitat Enhancement ___Riparian Buffer Planting (Upstream)

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Culvert/Dam Type: CMP **Culvert/Dam Dimensions:** 8 ft wide, 8 ft tall **Blockage Type:** ___Complete ___ Partial _X__None

USGS Gage Station #: 01594526 **USGS Gage Discharge (fs3/s):** ___120_____

USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% __X_50-75% __75-100%

Property Address: unnamed tributary of Federal Spring Branch in median of MD 4, W of Ritchie Marlboro Rd

Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: According to Chesapeake Fish Passage Prioritization, alewife, blueback, American eel, one rare mussel species, and one or more anadromous species occur nearby.	Explain: No blockage

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	1	**Fish Blockage Height - Ecological Benefits of Removal**	0
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 0.03		Describe: No blockage. 6 in water depth at culvert outlet.	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Interior of divided highway	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	0
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 12		Describe: No blockage	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 0.56%		Describe: Steep slopes, forested, within highway median	
Fish Habitat Diversity	1	**Utilities Present**	10
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Root wads, overhanging vegetation; 2 types		Describe: Highway median, none visible	
		Total Score out of 100	44

Map

Site No.	MD-PXM-29		Scale: 1 in. = 2,000

Site Photos

Culvert inlet - facing downstream

Culvert outfall - facing upstream

Slopes adjacent to culvert outfall, facing roadway

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study **Mitigation Site Number:** MD-PXM-30

Projects Estimated Stream Mitigation Needs (LF): TBD

Date of Field Assessment: 3/7/2019 **Consultant Firm/Investigator(s)** RK&K; KJH, DWB

Site Location Details-taken from desktop review

County: Prince George's **Cross Roads:** MD 4/William Beanes Rd

Basin (HUC 8): Patuxent **MDE Watershed (8 digit):** 02131103

Proximity to Impacted Stream (mi.): 5.4 **Lat/Long:** 38.811266 -76.783974

Parcel Size (ac): Within SHA ROW **Drainage Area to Reach (sq. mi.** 1.11

Site Opportunities: __X__Fish Passage __X__Channel Restoration ___X___Habitat Enhancement ____Riparian Buffer Planting (Upstream)

Stream Order: 1st **Stream Hydrology:** Perennial **Stream Use:** I

Culvert/Dam Type: CMP **Culvert/Dam Dimensions:** 36 inches **Blockage Type:** _X__Complete ___ Partial ___None

USGS Gage Station #: 01594526 **USGS Gage Discharge (fs3/s):** ___120_____

USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% __X_50-75% __75-100%

Property Address: unnamed tributary of Federal Spring Branch near MD 4 under William Beanes Rd

Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: According to Chesapeake Fish Passage Prioritization, alewife, blueback, American eel, and one or more anadromous species have historically occured nearby. One rare mussel species was identified in the same HUC12.	Explain: May be on private property

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 2.01		Describe: Depth in culvert = 0.1 ft, thlaweg to top = 1.2 ft, Groundwater? = 6 inches	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	5
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Upstream: residential, Downstream: forested	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	10
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 12		Describe: 36 in CMP and CMP end section. Small blockage, approximately 6 inches	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	5
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 0.56%		Describe: Adjacent driveway	
Fish Habitat Diversity	1	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Root wads, overhanging vegetation; 2 types		Describe: Adjacent overhead power lines	
		Total Score out of 100	62

Map

Site No.	MD-PXM-30		Scale: 1 in. = 2,000

Site Photos

Culvert outfall - facing upstream

Channel overview - facing downstream

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 27544
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/15/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: along W Bay Front Road, E of Fishers Station Rd, W of Crandell Rd
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131102
Proximity to Impacted Stream (mi.): 14.2
Lat/Long: 38.782029 -76.633024

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.59
Site Opportunities: ___Fish Passage __X__Channel Restoration _____Habitat Enhancement __X__Riparian Buffer Planting (Upstream)
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Pipe arch
Culvert/Dam Dimensions: 8 ft wide, 4.5 ft tall
Blockage Type: ___Complete ___ Partial __X_None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): ___120_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% __X_50-75% __75-100%
Property Address: Lyons Creek near Fishers Station Rd along W Bay Front Rd
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: One rare mussel species noted in HUC8 watershed (Freshwater Network, Chesapeake Region).	Explain: No blockage - drop site. Pipe arch with bottomless CMP. Room within ROW. Stream bed flush with culvert bottom.

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 1.49 miles		Describe: No blockage, bottomless culvert	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	10
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Mostly agricultural fields, some trees along downstream channel	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 12		Describe: 8 ft wide CMP with no bottom	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	5
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 1.84%		Describe: Mostly agricultural fields, some trees along downstream channel. Gradual slopes	
Fish Habitat Diversity	10	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: LWD, riffles, overhanging vegetation, cobble, mostly sand, root mats; 6 types		Describe: Overhead powerlines on upstream end and 30 ft upstream	
		Total Score out of 100	71

Map

Site No.	NAACC 27544		Scale: 1 in. = 2,000

Site Photos

Culvert outfall - facing upstream

Channel overview downstream of culvert - facing downstream

Access from road adjacent to culvert

Culvert inlet - facing downstream

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 27548
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/15/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: W Bay Front Road, E of McKendree Rd, W of Dawn Dr
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131102
Proximity to Impacted Stream (mi.): 14.9
Lat/Long: 38.780954 -76.620245

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.65
Site Opportunities: ___Fish Passage __X__Channel Restoration _____Habitat Enhancement ___Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Box culvert
Culvert/Dam Dimensions: 8' wide, 6' tall, embedded bottom 6"
Blockage Type: ___Complete ___ Partial __X_None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): __120_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% _X__50-75% __75-100%
Property Address: Lyons Creek near McKendree Rd along W Bay Front Rd
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: One rare mussel species noted in HUC8 watershed (Freshwater Network, Chesapeake Region).	Explain: No blockage - drop site. Culvert bottom embedded. Exntensive ROW downstream. 4 to 6 inch water depth at end of culvert. Stream bed flush with culvert.

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 3.41 miles		Describe: No blockage	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Mostly forested in ROW	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 12		Describe: NA - no blockage, embedded culvert	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 6.87%		Describe: Surrounded by forest with steep slopes	
Fish Habitat Diversity	5	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: LWD, riffles, overhanging vegetation, undercut banks, root mats; 5 types		Describe: Overhead power lines outside site	
		Total Score out of 100	48

Map

Site No.	NAACC 27548		Scale: 1 in. = 2,000

Site Photos

Channel overview upstream of culvert - facing upstream

Channel overview downstream of sulvert - facing downstream

Culvert outfall - facing upstream

Access from road adjacent to culvert

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 32437
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/21/2019
Consultant Firm/Investigator(s) CRI; DS, LE

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: MD 197 (Laurel Bowie Rd), W of Old Laurel Bowie Road
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 2131104
Proximity to Impacted Stream (mi.): 5.9
Lat/Long: 39.032974 -76.787302

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 2.5
Site Opportunities: _X_Fish Passage ___Channel Restoration __X__Habitat Enhancement __X__Riparian Buffer Planting
Stream Order: 2nd
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Double RCP
Culvert/Dam Dimensions: 5'x5' (both), ~40 feet long
Blockage Type: ___Complete _X_ Partial ___None
USGS Gage Station #: 01593450
USGS Gage Discharge (fs3 4.2
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% ___75-100%
*high, but only gage nearby with similar DA
Property Address: SHA ROW - just northwest of Old Laurel Bowie Rd., Bowie MD 20720
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending. American Eel collected just DS by MBSS.	Explain: Yes, but wetland located just US between blockage and Cash Lake dam

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	1	**Fish Blockage Height - Ecological Benefits of Removal**	5
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: less than 500 feet - Cash Lake dam is just US and upstream habitat consists mainly of wetland area		Describe: Blockage is at rip-rap/boulder - 1 foot drop. Blockage at low flows. Water depth in culvert is 0.6 feet.	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	5
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Brush/field land use	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 17		Describe: Large pipe with about 1 foot drop over riprap downstream	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	5
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 0.60%		Describe: Within ROW with clearing of scrub-shrub area only; overhead utilities and guardrails along both sides of road; would either need to remove guardrail or could access through Cash Lake gravel entrance	
Fish Habitat Diversity	5	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Riffle, overhanging vegetation, undercut banks, woody debris		Describe: High and low overhead powerlines	
		Total Score out of 100	61

Map

Site No.	NAACC 32437		Scale: 1 in. = 2,000 ft.

Site Photos

Culvert inlet - facing downstream

Channel overview downstream of culvert - facing downstream

Culvert outfall/partial blockage - facing upstream

Right bank looking upstream at overhead utilities

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 33809
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/21/2019
Consultant Firm/Investigator(s) CRI; DS, LE

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: MD 32; W of MD 175 (Annapolis Rd.) and E of MD 198 (Laurel Fort Meade Rd)
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 2131105
Proximity to Impacted Stream (mi.):
Lat/Long: 39.08787 -76.738265

Site Data

Parcel Size (ac): No Site Access
Drainage Area to Reach (sq. mi. 4.97
Site Opportunities: ___Fish Passage ____Channel Restoration _____Habitat Enhancement _____Riparian Buffer Planting
Stream Order:
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Double RCP
Culvert/Dam Dimensions:
Blockage Type: ___Complete ___ Partial ___None
USGS Gage Station #:
USGS Gage Discharge (fs3/s): _____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% ___75-100%
Property Address: SHA ROW - W of MD 175 (Annapolis Rd.) and E of MD 198 (Laurel Fort Meade Rd); Fort Meade MD 20755
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: No site Access	Explain: No site access. Site is located on NSA property and could not access due to fence.

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network		**Fish Blockage Height - Ecological Benefits of Removal**	
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: No site Access		Describe: No site Access	
Number of Downstream Fish Blockages		**Adjacent Land Use**	
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Bush, field land use	
NAACC Diadromous Fish HUC 12 Watershed Score		**Ease of Construction**	
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe:		Describe:	
Percentage of Upstream Impervious Surface		**Ease of Access**	
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe:		Describe:	
Fish Habitat Diversity		**Utilities Present**	
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe:		Describe:	
		Total Score out of 100	0

Map

Site No.	NAACC 33809		Scale: 1 in. = 2,000 ft.

Site Photos

NSA fence prohibiting site access

Stream conditions US of road crossing

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 44542
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/21/2019
Consultant Firm/Investigator(s) CRI; JG, DS, SS, LE

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: MD 3 (Crain Hwy), S of Evergreen Rd.
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 2131105
Proximity to Impacted Stream (mi.): 10
Lat/Long: 39.028803 -76.687628

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.8
Site Opportunities: _X_Fish Passage __X__Channel Restoration __X__Habitat Enhancement __X__Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: CMP w/ concrete bottom
Culvert/Dam Dimensions: 8'x8' CMP; 155 feet long
Blockage Type: _X_Complete ___ Partial __None
USGS Gage Station #: 01649150
USGS Gage Discharge (fs3 1.79
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% ___75-100%
*136% of mean
Property Address: SHA ROW - at MD 3 just south of Evergreen Rd., Gambrills MD 21054
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending.	Explain: No, access to parcel downstream will be needed. Downstream area not in ROW, but in need of restoration.

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	5
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 1.5 miles of US network		Describe: Downstream step blockage, drops: 0.45 feet, 1.20 feet, 0.8 feet, 1.50 feet. Upstream drop 0.35 feet; 4.3 feet total. Water depth in culvert is 0.5 feet.	
Number of Downstream Fish Blockages	5	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 1		Describe: Commercial with forest downstream of blockage. Upstream end of culvert also forest. Immediate area at blockage clear with current construction.	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	1
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 14		Describe: Large pipe with 1-5 foot blockage	
Percentage of Upstream Impervious Surface	1	**Ease of Access**	5
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 36.00%		Describe: Roadway drainage rip-rap/gabion wall constructed near site. Clear access, but no existing road	
Fish Habitat Diversity	5	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Downstream 3-5 cover types: riffle, deep pool, woody debris, undercut, cobble/boulder. Upstream 3-5 cover types: riffle, root, cobble.		Describe: Overhead lines cross within site, may not directly inhibit access to restoration	
		Total Score out of 100	43

Map

Site No.	NAACC 44542		Scale: 1 in. = 2,000 ft.

Site Photos

Righ Bank Riprap channel, overhead lines, and existing construction

Channel overview downstream of culvert - facing downstream

Downstream looking upstream at Culvert/complete blockage

Left bank downstream of culvert showing stormwater conveyance

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 44544
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/21/2019
Consultant Firm/Investigator(s) CRI; JG, DS, SS, LE

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: MD 3 (Crain Hwy), S of Johns Hopkins Rd.
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 2131105
Proximity to Impacted Stream (mi.): 10
Lat/Long: 39.028441 -76.686597

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.8
Site Opportunities: ___Fish Passage ____Channel Restoration _____Habitat Enhancement _____Riparian Buffer Planting
Stream Order: 2nd
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: CMP w/ concrete
Culvert/Dam Dimensions: 5' diameter CMP, 90 feet long
Blockage Type: __Complete ____ Partial _X_None
USGS Gage Station #: 01649150
USGS Gage Discharge (fs3 1.79
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% ___75-100%
Property Address: SHA ROW - at MD 3 just south of Johns Hopkins., Gambrills MD 21054
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending.	Explain: No blockage at crossing. There are two changes in gradient within the culvert, but no blockage. There is a pond just US of the culvert.

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	0
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 1.4 miles of US network		Describe: No blockage at time of visit	
Number of Downstream Fish Blockages	1	**Adjacent Land Use**	10
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 2 DS barriers		Describe: US - Commercial, mowed lawn; DS - Forested scrub-shrub corridor with bordering commercial.	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	0
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 14		Describe: No blockage	
Percentage of Upstream Impervious Surface	1	**Ease of Access**	10
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 36.10%		Describe: County pull off area located at sewer facility - direct access to sites through mowed lawn. Would need to coordinate with County for access.	
Fish Habitat Diversity	1	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: US - SAV; DS - riffle, root, cobble		Describe: County sewer adjacent to site, overhead utilities and water main	
		Total Score out of 100	39

Map

Site No.	NAACC 44544		Scale: 1 in. = 2,000 ft.

Site Photos

Right bank and County facility upstream of culvert

Just Upstream of culvert, impoundment and possible blockage

Downstream looking upstream at culvert/no blockage

Downstream of culvert looking downstream

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 50349
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 3/5/2019
Consultant Firm/Investigator(s) CRI; JG, DS

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: MD 564 (Lanham Severn Rd.), E of Springfield Rd.
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 2131104
Proximity to Impacted Stream (mi.): 4.1
Lat/Long: 39.001275 -76.79367

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.6
Site Opportunities: ___Fish Passage ____Channel Restoration _____Habitat Enhancement _____Riparian Buffer Planting
Stream Order: 2nd
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Box culvert
Culvert/Dam Dimensions: 40 feet long
Blockage Type: __Complete ___ Partial _X_None
USGS Gage Station #: 01594440
USGS Gage Discharge (fs3/s): _____10.20_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%
Property Address: SHA ROW - at MD 564 east of Springfield Rd., Bowie MD 20720
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending.	Explain: No blockage, but site access was outside of ROW. Assessment was conducted from roadway due to no access US or DS.

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	0
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 1.1 miles of US network		Describe: No blockage	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe:		Describe: Small riparian forested area	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	0
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 17		Describe: No blockage, riffle grade control present	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 12.51%		Describe: Outside right of way, clearing needed, steep slopes downstream, no vehicular access.	
Fish Habitat Diversity	5	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Roots, deep pool, riffle, cobble/boulder		Describe: Sewer and overhead powerlines upstream	
		Total Score out of 100	42

Map

Site No.	NAACC 50349		Scale: 1 in. = 2,000 ft.

Site Photos

From roadway looking at downstream end of culvert

Downstream of culvert looking downstream

Right bank looking at riparian forest downstream

Left bank looking at sewer and powerlines upstream

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57440
Projects Estimated Stream Mitigation Needs (LF) TBD
Date of Field Assessment: 2/18/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: Southern MD Blvd, SE of Plummer Ln, N of MD 4
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131102
Proximity to Impacted Stream (mi.): 11.3
Lat/Long: 38.79878 -76.680172

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.57
Site Opportunities: ___Fish Passage ___Channel Restoration _____Habitat Enhancement ___Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: RCP - circular
Culvert/Dam Dimensions: 4.5 ft wide, 2.5 ft tall, sand depoisition
Blockage Type: ___Complete ___ Partial _X__None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s) 360
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%
Property Address: Galloway Creek near Southern MD Blvd
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: No blockage, sand deposition throughout culvert. Drop site. Two 4.5 ft RCP culverts, left culvert clogged

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 3.32 miles		Describe: 3 inches of water in culvert. No blockage, deposition throughout	
Number of Downstream Fish Blockages	5	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 1 minor barrier		Describe: Scrub/shrub and forest downstream, forest upstream	
NAACC Diadromous Fish HUC 12 Watershed Scor	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 9		Describe: 4.5 ft wide RCP, no drop	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 3.11%		Describe: Scrub/shrub and forest clearing	
Fish Habitat Diversity	5	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: LWD, riffles, overhanging vegetation, root mats; 4 types		Describe: Overhead power lines above downstream culvert outfall	
		Total Score out of 100	44

Map

Site No.	NAACC 57440		Scale: 1 in. = 2,000

Site Photos

Channel overview downstream of culvert - facing downstream

Culvert outfall - facing upstream

Culvert inlet - facing downstream

Channel overview upstream of culvert - facing upstream

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57441
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/18/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: MD Service Rd, Plummer Ln, MD 4
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131102
Proximity to Impacted Stream (mi.): 10.5
Lat/Long: 38.80448 -76.692119

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 1.29
Site Opportunities: ___Fish Passage ___Channel Restoration _____Habitat Enhancement ___Riparian Buffer Planting
Stream Order: 2nd
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Elliptical
Culvert/Dam Dimensions: 12 ft wide, 5 ft deep, deposition
Blockage Type: ___Complete ___ Partial _X_None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): _360_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%
Property Address: Galloway Creek near Southern MD Blvd/Chesapeake Beach Rail Trail
Property Owner(s): SHA

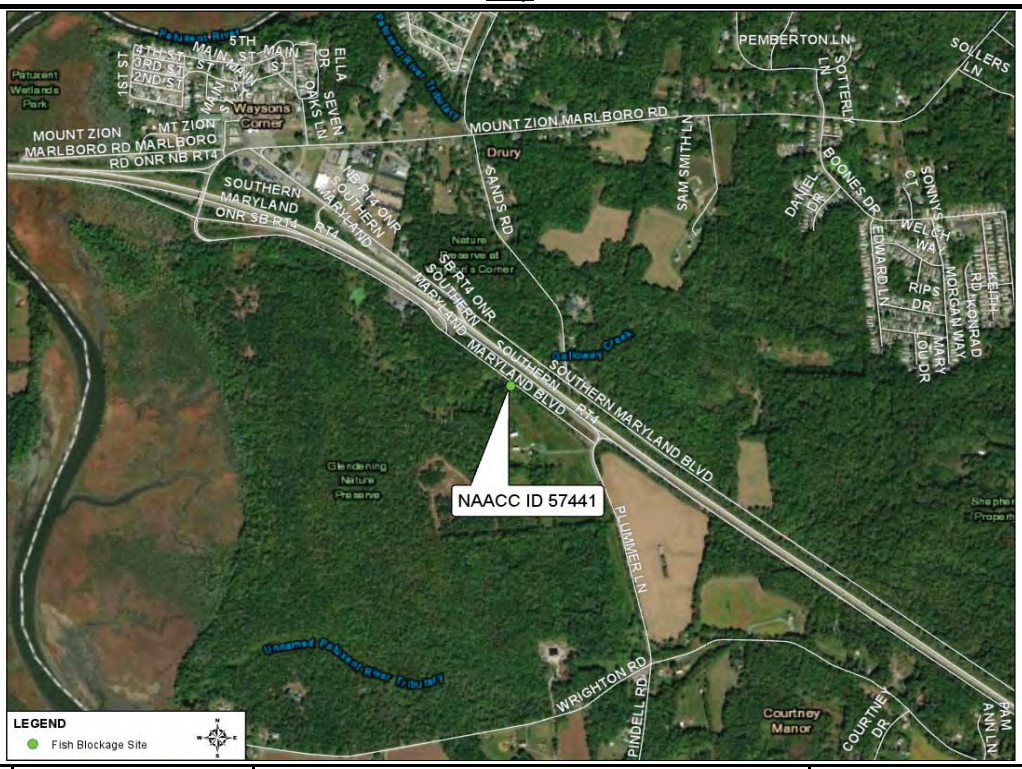
General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: No blockage, backwatered through culvert - 2 ft of standing water. Drop site. Beaver dam - 150 ft downstream of culvert

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 2.90 miles		Describe: No blockage, backwatered through culvert - 2 ft of standing water	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Mid-successional forest, tulip poplar, red maple, white oak, northern red oak	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 9		Describe: 12 ft wide, no blockage	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 12%		Describe: Mid successional forest - steep slopes	
Fish Habitat Diversity	5	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Deep pool, overhanging vegetation. LWD, undercut banks, root mats. 5 cover types		Describe: Fiber optics on upstream end of culvert	
		Total Score out of 100	44

Map



Site No.	NAACC 57441		Scale: 1 in. = 2,000

Site Photos

Culvert outfall - facing upstream

Culvert inlet - facing downstream

Culvert outfall - view of adjacent cover

Channel overview downstream of culvert - facing downstream

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57443
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/18/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: along MD Service Rd, W of Plummer Ln, S of MD 4
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131102
Proximity to Impacted Stream (mi.): 10.5
Lat/Long: 38.804762, -76.691302

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 1.27
Site Opportunities: ___Fish Passage ___Channel Restoration _____Habitat Enhancement ___Riparian Buffer Planting
Stream Order: 2nd
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Box culvert
Culvert/Dam Dimensions: 14 ft wide, 4.5 ft tall, deposition
Blockage Type: ___Complete ___ Partial _X_None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): ___360_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%
Property Address: Galloway Creek near Southern MD Blvd/Chesapeake Beach Rail Trail
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: No blockage - 2 ft deep water through culvert. All in ROW. Drop site.

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 2.90 miles		Describe: No blockage, backwatered through culvert - 2 ft deep through culvert	
Number of Downstream Fish Blockages	5	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 1		Describe: Mid-successional forest, tulip poplar, red maple, sweet gum	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 9		Describe: 14 ft wide box culvert - no blockage	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 11.90%		Describe: Mid successional forest - steep slopes	
Fish Habitat Diversity	5	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Deep pool, overhanging vegetation, LWD, undercut banks, root mats; 5 cover types		Describe: Fiber optics along roadway	
		Total Score out of 100	39

Map

Site No.	NAACC 57443		Scale: 1 in. = 2,000

Site Photos

Culvert inlet - facing downstream

Channle overview downstream of culvert - facing downstream

Culvert outfall - facing upstream

Channel overview downstream of culvert - facing downstream

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57445
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 3/5/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: along US 301, E of Old Crain Hwy, W of Croom Station Rd
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131103
Proximity to Impacted Stream (mi.): 8.3
Lat/Long: 38.793005 -76.769992

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.25
Site Opportunities: __X__Fish Passage __X__Channel Restoration ___X___Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: RCP
Culvert/Dam Dimensions: US 6' W, 5.5' tall DS 5' W, 4.5' tall
Blockage Type: __X_Complete ___ Partial ___None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): ____191_____
US: Complete, DS: Partial
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%
Property Address: unnamed tributary of Charles Branch along US 301 in between Old Crain Hwy and Croom Station Rd
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: Need access onto private property downstream. May be park property? Upstream blockage: log jam in culvert, 2 ft drop in culvert. Downstream blockage: culvert drop over grout bags

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	5
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 1.45 miles		Describe: Rated based on taller blockage. Upstream blockage: 2 ft tall vertical. Downstream blockage: 4 inch DSW - invert, 5 inch DSW - USW (?)	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Mid-successional forest: tulip poplar, beech, hickory, white oak	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	1
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 12		Describe: Downstream: 5 ft wide RCP, 4 inch tall blockage; Upstream: 6 ft wide RCP, 2 ft tall blockage	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 7.28%		Describe: Mid-successional forest, steep slopes along roadway embankment	
Fish Habitat Diversity	5	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: LWD, root mats, overhanging vegetation; 3 types		Describe: Overhead powerlines on upstream side of culvert	
		Total Score out of 100	49

Map

Site No.	NAACC 57445		Scale: 1 in. = 2,000

Site Photos

Channel overview upstream of culvert - facing upstream

Within culvert - facing upstream, log blockage

Culvert outfall - facing upstream

Channel overview downstream of culvert - facing downstream

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57470
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/18/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: Southern MD Blvd, SE of Plummer Ln, S of MD 4
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131102
Proximity to Impacted Stream (mi.): 11.3
Lat/Long: 38.798645 -76.681186

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.055
Site Opportunities: __X__Fish Passage __X__Channel Restoration ___X___Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Grout-lined elliptical pipe
Culvert/Dam Dimensions: 9 ft wide, 6.5 ft tall, 6 inches of grout
Blockage Type: ___Complete __X_ Partial ___None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): ___360_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%
Property Address: Galloway Creek along Southern MD Blvd
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: Yes, downstream parallels road ROW. Opportunities for stream restoration in ROW.

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	1	**Fish Blockage Height - Ecological Benefits of Removal**	5
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 0.55 miles		Describe: 3 to 4 inches of water in culvert. 2 to 2.5 ft frop over grout bags - cascade.	
Number of Downstream Fish Blockages	5	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 1 minor barrier		Describe: Mid-successional forest: sycamore, tulip poplar, red maple	
NAACC Diadromous Fish HUC 12 Watershed Score	1	**Ease of Construction**	1
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 9		Describe: 9 ft wide elliptical pipe, 2 ft drop	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 18.20%		Describe: Requires forest clearing; steep slopes along roadway	
Fish Habitat Diversity	10	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: LWD, riffles, deep pools, overhanging vegetation, unercut banks, root mats, backwater pools; 7 types		Describe: Overhead utilities on upstream side of site	
		Total Score out of 100	31

Map

Site No.	NAACC 57470		Scale: 1 in. = 2,000

Site Photos

Channel overview upstream of culvert - facing upstream

Channel overview downstream of culvert - facing downstream

Culvert inlet - facing downstream

Culvert outfall - facing upstream

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57482
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/15/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: Solomons Island Rd/ MD 258
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131102
Proximity to Impacted Stream (mi.): 16.08
Lat/Long: 38.785015 -76.599821

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 4.06
Site Opportunities: __X__Fish Passage __X__Channel Restoration ___X___Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Double box culvert (9' each)
Culvert/Dam Dimensions: 18 ft wide, 8 ft tall
Blockage Type: ___Complete _X__ Partial ___None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): _120_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% _X__50-75% __75-100%
Property Address: Lyons Creek near Solomons Island Rd along W Bay Front Rd
Property Owner(s): SHA

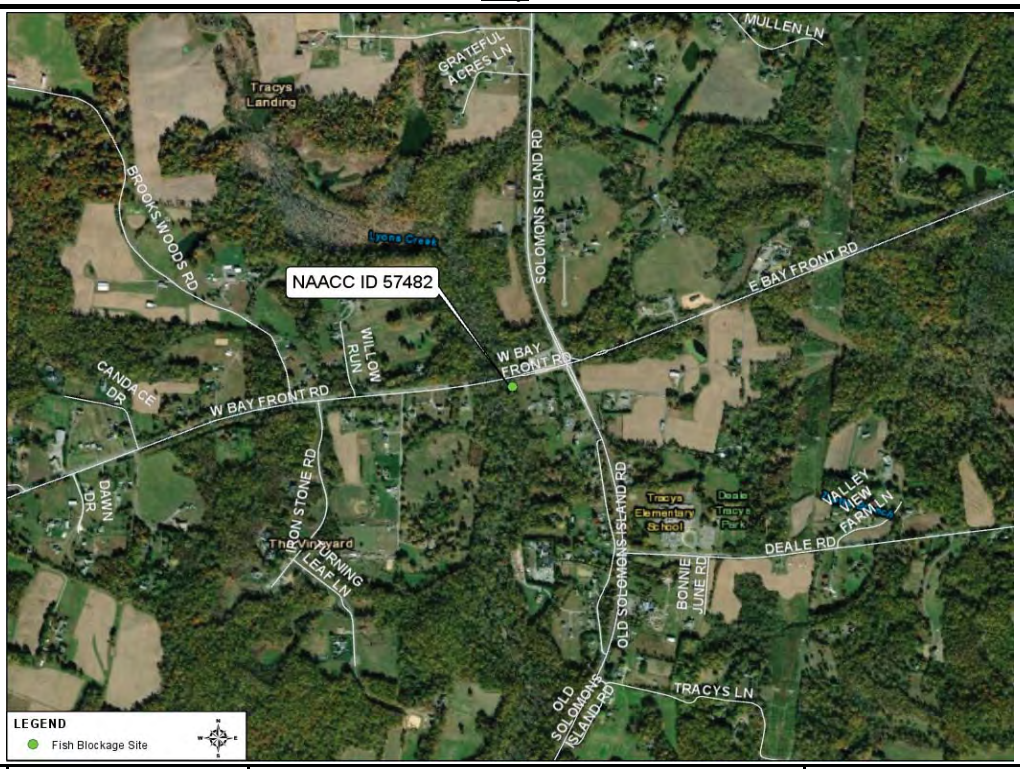
General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: Potential to build site within ROW - depends on design. Wide ROW about 175 ft from outfall

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	10	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 26 miles		Describe: 8 inches tall - BW, 10 inches TW	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Mostly mid-successional forest, open lawn downstream of site	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 12		Describe: 18 ft box culvert, 8 inch blockage	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	5
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 4.00%		Describe: Access through grass lawn downstream of culvert within ROW. Upstream surrounded by forest. Steep slopes	
Fish Habitat Diversity	10	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: LWD, deep pools (2 to 3 ft), overhanging vegetation, undercut banks, riffles downstream; 6 types. Riffles downstream		Describe: Overhead utilities just downstream	
		Total Score out of 100	67

Map



Site No.	NAACC 57482		Scale: 1 in. = 2,000

Site Photos

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57494
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 3/5/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: Sollers Ln/MD 408 (Mt Zion Marlboro Rd)
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131102
Proximity to Impacted Stream (mi.): 11.6
Lat/Long: 38.814191 -76.674711

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 1.68
Site Opportunities: ___Fish Passage __X__Channel Restoration _____Habitat Enhancement ___Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Bridge
Culvert/Dam Dimensions: 15 ft wide, 5 ft, 7 in tall
Blockage Type: ___Complete ___ Partial _X__None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): _____191_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%
Property Address: Wilson Owens Branch near Sollers Ln
Property Owner(s): SHA

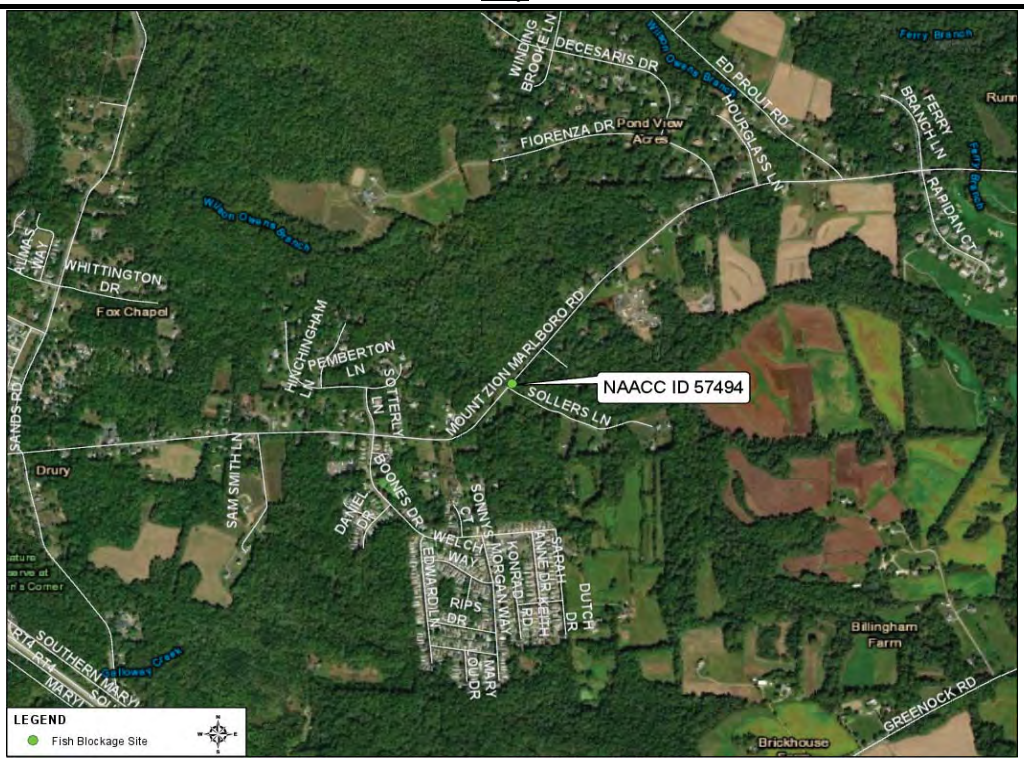
General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: No blockage - drop site. No - narrow ROW, would need access to private property.

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	10	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 8.32 miles		Describe: No blockage, bridge, substrate under bridge - deposition throughout	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Mid-successional forest: white oak, tulip poplar, beech, sycamore	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 9		Describe: Large bridge, 15 ft	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	10
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 4.13%		Describe: Opening in guard rail. Existing clear path adjacent to bridge - 15 ft wide, minimal tree impacts along banks.	
Fish Habitat Diversity	10	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Deep pools, root mats, woody debris, overhanging vegetation, riffles, undercut banks; 6 types		Describe: Overhead powerlines on upstream end of bridge	
		Total Score out of 100	72

Map



Site No.	NAACC 57494		Scale: 1 in. = 2,000

Site Photos

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57496
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/18/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: Southern MD Blvd, N of MD 4, SE of Plummer Ln
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131102
Proximity to Impacted Stream (mi.): 11
Lat/Long: 38.800916 -76.68399

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.77
Site Opportunities: ___Fish Passage ___Channel Restoration _____Habitat Enhancement ___Riparian Buffer Planting
Stream Order: 2nd
Stream Hydrology: Intermittent
Stream Use: I
Culvert/Dam Type: CMP
Culvert/Dam Dimensions: 24 inches
Blockage Type: ___Complete ___ Partial _X_None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): ___360_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%
Property Address: Galloway Creek near Southern MD Blvd
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: Clogged pipe that drains upstream roadway - intermittent channel. No fish habitat upstream or downstream. Drop site.

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	1	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 0.02 miles		Describe: No upstream fish habitat; downstream channel of culvert is mostly dry	
Number of Downstream Fish Blockages	1	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 2 in database		Describe: Mid-successional upland forest: white oak, tulip poplar, American beech	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	10
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 9		Describe: 24 inch CMP, clogged, no blockage, no fish habitat	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 5.04%		Describe: Mid-successional forest	
Fish Habitat Diversity	1	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Intermittent channel; majority of channel is dry		Describe: Overhead utilities on upstream side	
		Total Score out of 100	37

Map

Site No.	NAACC 57496		Scale: 1 in. = 2,000

Site Photos

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57498
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 3/5/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: US 301/MD 382 (Croom Rd)
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131103
Proximity to Impacted Stream (mi.): 9.7
Lat/Long: 38.785678 -76.792231

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.95
Site Opportunities: ___Fish Passage __X__Channel Restoration _____Habitat Enhancement ___Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: CMP
Culvert/Dam Dimensions: 12' wide, 12' tall, 3" grout on bottom
Blockage Type: ___Complete ___ Partial __X_None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): ___191_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%
Property Address: unnamed tributary of Charles Branch along US 301 near MD 382 (Croom Rd)
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: Drop site - no blockage

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	10	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 5.62 miles		Describe: No blockage - deposition and backwatering in culvert. Water depth in culvert is 8 inches	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Mid-successional forest: tulip poplar, beech, sycamore	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 12		Describe: 12 ft CMP, no blockage	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 13.60%		Describe: Mid-successional forest, steep slopes surrounding culvert	
Fish Habitat Diversity	10	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: LWD, riffles, deep pools, overhanging vegetation, undercut banks, root mats; 6 types		Describe: Sewer line upstream and downstream of culvert. Overhead power lines upstream	
		Total Score out of 100	54

Map

Site No.	NAACC 57498		Scale: 1 in. = 2,000

Site Photos

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57501
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 3/5/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: MD 382/Trumps Hill Rd
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131103
Proximity to Impacted Stream (mi.): 10
Lat/Long: 38.783646 -76.790279

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 1.03
Site Opportunities: ___Fish Passage __X__Channel Restoration _____Habitat Enhancement ___Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Bridge
Culvert/Dam Dimensions: 16 ft wide, 6 ft tall
Blockage Type: ___Complete ___ Partial __X_None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): ___191_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%
Property Address: Unnamed tributary of Charles Branch along MD 382 near Trumps Hill Rd
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: Drop site - no blockage. Bridge. Upstream is a forest conservation area designated by signs.

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	1	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 0.36 miles		Describe: No blockage - bridge. Water depth under bridge approximately 8 inches.	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Mid-successional forest: tulip poplar, sycamore, sweet gum	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 12		Describe: 16 ft wide bridge - no blockage	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 13.70%		Describe: Surrounded by forest. Recent clearing on south side	
Fish Habitat Diversity	10	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: LWD, riffles, deep pools, overhanging vegetation, undercut banks, root mats; 6 types		Describe: Sewer and overhead utilities within site	
		Total Score out of 100	45

Map

Site No.	NAACC 57501		Scale: 1 in. = 2,000

Site Photos

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57502
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/18/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: Southern MD Blvd, SE of Plummer Ln, N of MD 4
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131102
Proximity to Impacted Stream (mi.): 11
Lat/Long: 38.800275 -76.683598

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.72
Site Opportunities: _X_ Fish Passage __X__ Channel Restoration __X__ Habitat Enhancement ___ Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Grouted elliptical pipe
Culvert/Dam Dimensions: 9 ft wide, 4.5 ft tall
Blockage Type: ___Complete _X__ Partial ___None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): __360_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%
Property Address: Galloway Creek near Southern MD Blvd
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: No, need access downstream of ROW. Natural blockage just downstream of culvert. Debris jam against standing trees, beaver activity

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	5
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 3.68 miles		Describe: 3-4 inches of water in culvert, 2.5 ft to water surface, 3 ft to top of debris	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: No significant barriers		Describe: Narrow forested strip: early successional w/ scattered larger trees- sweet gum, American beech, tulip poplar, red maple	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	1
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 9		Describe: 9 ft wide pipe, 2.5 ft blockage. Debris jam and recent beaver activity	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 5.06%		Describe: Surrounded by young forest with scattered larger trees	
Fish Habitat Diversity	10	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: LWD, riffles, deep pools, overhanging vegetation, uncercut banks, root mats, backwater pools: 7 types		Describe: Overhead power lines just downstream of blockage	
		Total Score out of 100	54

Map

Site No.	NAACC 57502		Scale: 1 in. = 2,000

Site Photos

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57504
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/18/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: MD 258 (W Bay Front Rd)/MD 4
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131102
Proximity to Impacted Stream (mi.): 12.6
Lat/Long: 38.791381 -76.660114

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.45
Site Opportunities: __X__Fish Passage __X__Channel Restoration _____Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Box culvert
Culvert/Dam Dimensions: 7 ft wide, 7 ft tall
Blockage Type: ___Complete __X_ Partial ___None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): __360_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%
Property Address: Cabin Branch along MD 258, just E of MD 4
Property Owner(s): SHA

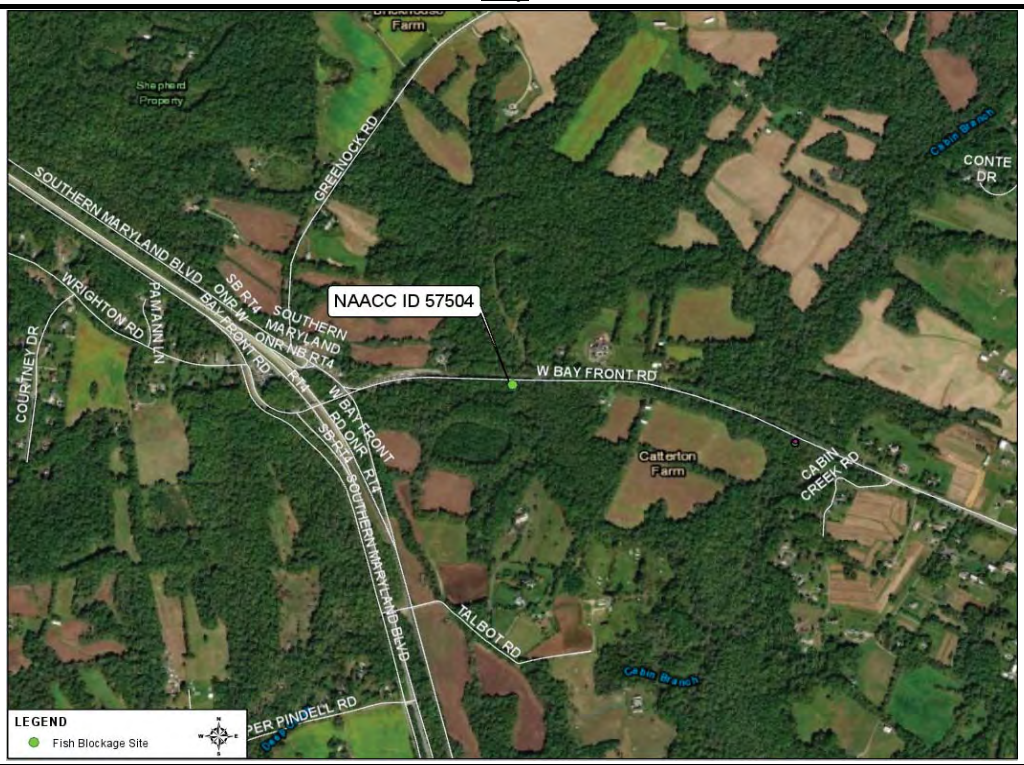
General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: Likely would need access to downstream property for instream structure. Possible upstream access under power lines.

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 2.26 miles		Describe: 2 inches water in culvert. 6.5 inches to invert. 7 inches to water. Note 0.5 inches night before site visit, stream water level up by about 1 to 2 inches.	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Surrounded by mid successional upland forest: American beech, tulip poplar, white oak	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 12		Describe: 7 ft wide box culvert, 6.5 inch drop	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 2.80%		Describe: Surrounded by forest, some steep slopes near road	
Fish Habitat Diversity	10	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: LWD, riffles, deep pools, overhanging vegetation, unercut banks, root mats; 6 types		Describe: Overhead power line on upstream side just outside of site	
		Total Score out of 100	58

Map



Site No.	NAACC 57504		Scale: 1 in. = 2,000

Site Photos

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57507 or MD_PXM05
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/15/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: MD 258 (W Bay Front Rd), E of MD 4, W of Cabin Creek Rd
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131102
Proximity to Impacted Stream (mi.): 13.2
Lat/Long: 38.789509 -76.648672

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 2
Site Opportunities: __X__Fish Passage __X__Channel Restoration __X__Habitat Enhancement ___Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Box culvert
Culvert/Dam Dimensions: 14 ft wide, 7 ft tall
Blockage Type: ___Complete __X_ Partial ___None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): ___120_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% _X__50-75% __75-100%
Property Address: SHA ROW - just north of 6000 Cabin Creek Rd., Lothian MD 20711
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: One rare mussel species noted in HUC8 watershed (Freshwater Network, Chesapeake Region). American eel records two miles south (MBSS).	Explain: Partial blockage removal may require access onto downstream private property due to narrow ROW.

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No blockage	
Describe: 1.63 miles		Describe: DS culvert invert to DS water surface - 1 inch. Water depth in culvert - 2 inches.	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Mid successional tulip poplar forest in ROW and private properties.	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No blockage	
Describe: 13		Describe: 14 ft wide box culvert, 1 inch partial blockage	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 0.40%		Describe: Site surrounded by mid successional forest and steep slopes along roadway embankment.	
Fish Habitat Diversity	5	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Large woody debris, deep pools, overhanging vegetation, root mats - 4 types		Describe: Overhead power lines run parallel to roadway just upstream of culvert.	
		Total Score out of 100	49

Map

Site No.	NAACC 57507 or MD_PXM05	Scale: 1 in. = 2,000

Site Photos

Culvert outfall/partial blockage - facing upstream

Channel overview downstream of culvert - facing downstream

Potential access downstream of culvert - facing upstream

Culvert inlet - facing downstream

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57511A
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 3/7/2019
Consultant Firm/Investigator(s) RK&K; KJH, DWB

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: MD 4/William Beanes Rd
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131103
Proximity to Impacted Stream (mi.): 4.8
Lat/Long: 38.813056 -76.794188

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.82
Site Opportunities: __X__Fish Passage __X__Channel Restoration ___X___Habitat Enhancement __X__Riparian Buffer Planting (Upstream)
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: CMP
Culvert/Dam Dimensions: US 15 ft, DS 12 ft
Blockage Type: __X_Complete ___ Partial ___None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): ___120_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% __X_50-75% __75-100%
Property Address: Federal Spring Branch along MD 4 near William Beanes Rd
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: Possibly could be completed inside ROW

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	1	**Fish Blockage Height - Ecological Benefits of Removal**	5
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 0.3 miles		Describe: 1.9 ft downstream water surface to culvert invert. 0.4 ft water depth within culvert	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Roadside culvert, but adjacent property is forested	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 12		Describe: Upstream: 15 ft circular; Downstream: 12 ft arch; 1.9 ft blockage	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 12.80%		Describe: Forest, steep slopes	
Fish Habitat Diversity	5	**Utilities Present**	10
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Deep pools, overhanging vegetation, LWD, undercut banks, root wads; 5 types. Exposed clay bottom just downstream of blockage		Describe: None visible	
		Total Score out of 100	53

Map

Site No.	NAACC 57511A		Scale: 1 in. = 2,000

Site Photos

Culvert inlet - facing downstream

Channel overview upstream of culvert - facing upstream

Culvert outfall - facing upstream

Channel overview downstream of culvert - facing downstream

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57518
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 3/5/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: MD 223 (Woodyard Rd)/Johensu Dr
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131103
Proximity to Impacted Stream (mi.): 4
Lat/Long: 38.801108 -76.825585

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 1.41
Site Opportunities: ___Fish Passage __X__Channel Restoration ___X___Habitat Enhancement __X__Riparian Buffer Planting
Stream Order: 2nd
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Arched culvert
Culvert/Dam Dimensions: 12 ft wide, 6.5 ft tall
Blockage Type: ___Complete ___ Partial __X_None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): _____191_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%
Property Address: along MD 223 (Woodyard Rd), N of Pond Dr and Johensu Dr
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: No blockage - remove site

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 3.81 miles		Describe: No blockage, deposition in culvert. Water depth in culvert approximately 5 inches. Arched culvert - base flow across	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	5
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Downstream: Scrub/shrub on park land; Upstream: forest	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 12		Describe: 12 ft wide culvert - no blockage. Water 5 inches deep in culvert	
Percentage of Upstream Impervious Surface	1	**Ease of Access**	5
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 36.90%		Describe: Upstream: would require forest clearing; Downstream: cleared recently under power lines	
Fish Habitat Diversity	10	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: LWD, riffles, deep pools, overhanging vegetation, undercut banks, root mats, backwater pools; 7 types		Describe: Upstream: water line; Downstream: overhead power lines	
		Total Score out of 100	53

Map

Site No.	NAACC 57518		Scale: 1 in. = 2,000

Site Photos

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57526
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 3/7/2019
Consultant Firm/Investigator(s) RK&K; KJH, DWB

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: Ritchie Marlboro Rd/Old Marlboro Pike
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131103
Proximity to Impacted Stream (mi.): 6
Lat/Long: 38.814583 -76.777547

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 2.87
Site Opportunities: ___Fish Passage __X__Channel Restoration ___X___Habitat Enhancement ____Riparian Buffer Planting (Upstream)
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Twin concrete box
Culvert/Dam Dimensions: 8 ft wide, 8 ft tall
Blockage Type: ___Complete ___ Partial _X__None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): ___120_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% __X_50-75% __75-100%
Property Address: Federal Spring Branch along Ritchie Marlboro Rd near Old Marlboro Pike
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: No blockage. Would require access onto private property

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	0
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 3.33 miles		Describe: No blockage; debris jam on upstream	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Mid-successional forest	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	0
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 12		Describe: No blockage	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	5
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 9.67%		Describe:	
Fish Habitat Diversity	10	**Utilities Present**	10
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: LWD, root wad, overhanging vegetation, undercut banks, deep pools, riffles; 6 types		Describe: None visible	
		Total Score out of 100	61

Map

Site No.	NAACC 57526		Scale: 1 in. = 2,000

Site Photos

Culvert inlet - facing downstream

Channel overview upstream of culvert - facing upstream

Culvert outfall - facing upstream

Channel overview downstream of culvert - facing downstream

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57533
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 3/7/2019
Consultant Firm/Investigator(s) RK&K; KJH, DWB

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: MD 4 N/Ritchie Marlboro Rd
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131103
Proximity to Impacted Stream (mi.): 5.4
Lat/Long: 38.812102 -76.784063

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 2.05
Site Opportunities: __X__Fish Passage __X__Channel Restoration ___X___Habitat Enhancement ____Riparian Buffer Planting (Upstream)
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: CMP
Culvert/Dam Dimensions: 8 ft wide, 8 ft tall
Blockage Type: _X__Complete ___ Partial ___None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): ___120_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% __X_50-75% __75-100%
Property Address: Federal Spring Branch along MD 4 near Ritchie Marlboro Rd
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: According to Chesapeake Fish Passage Prioritization, a nearby upstream dam lists alewife, blueback, American eel, and one or more anadromous species as occurring downstream.	Explain: Upstream and downstream extend beyond SHA ROW

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	5
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 3.92 miles		Describe: 2.3 ft natural debris blockage downstream from culvert. 1 ft deposition in pipe.	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Roadside culvert with adjacent forest	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 12		Describe: 2.3 ft natural blockage debris jam downstream of culvert	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 7.52%		Describe: Steep slopes, forested, some clearing needed.	
Fish Habitat Diversity	5	**Utilities Present**	10
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: LWD, root wad, overhanging vegetation, undercut banks, deep pools; 5 types		Describe: None visible	
		Total Score out of 100	62

Map

Site No.	NAACC 57533		Scale: 1 in. = 2,000

Site Photos

Culvert inlet - facing downstream

Channel overview downstream of culvert - facing downstream

Culvert outfall - facing upstream

Slopes adjacent to culvert outfall, facing roadway

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57561
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/25/2019
Consultant Firm/Investigator(s) CRI; JG, DS, LE

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: MD 214 (Central Ave.), W of Queen Anne Bridge Rd.
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 2131104
Proximity to Impacted Stream (mi.): 8.4
Lat/Long: 38.904759 -76.682769

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 1.3
Site Opportunities: _X_Fish Passage _X__Channel Restoration __X__Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 2nd
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Double Box
Culvert/Dam Dimensions: H: 5.35' to TW, W: 11.2'; 50 feet long
Blockage Type: ___Complete ____ Partial _X_None
USGS Gage Station #: 01049150
USGS Gage Discharge (fs3 2.2
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100% 169% of mean
Property Address: SHA ROW - at MD 214 west of Queen Anne Bridge Rd., Bowie MD 20716
Property Owner(s): SHA

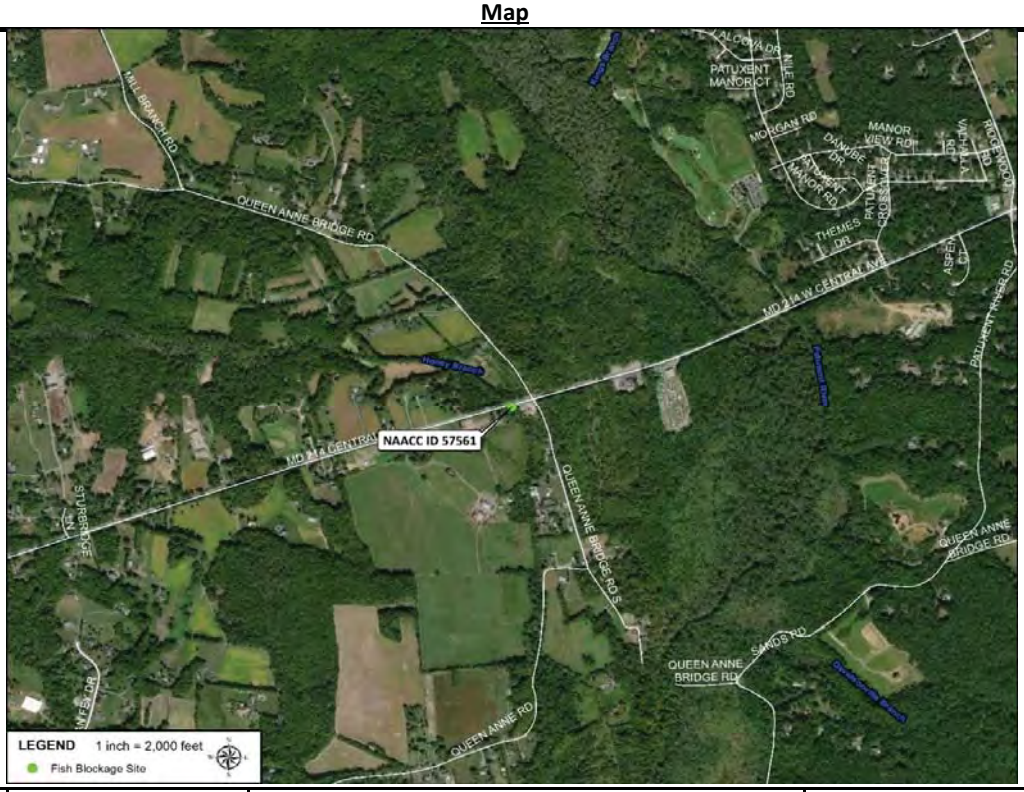
General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending.	Explain: No blockage

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	0
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 2.3 miles of US network		Describe: No blockage	
Number of Downstream Fish Blockages	5	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 1 DS barrier		Describe: Forested	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	0
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 11		Describe: No blockage	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 1.95%		Describe: Steep slopes, clearing needed, guardrail	
Fish Habitat Diversity	5	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: DS: woody, deep pool, riffle, undercut banks, roots. US: deep pool, undercut banks, roots		Describe: Low powerlines downstream of culvert	
		Total Score out of 100	42

Map



Site No.	NAACC 57561		Scale: 1 in. = 2,000 ft.

Site Photos

Downstream looking upstream at culvert/no blockage

Downstream of culvert looking downstream

Upstream of culvert looking upstream

Upstream looking downstream at culvert

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57565
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 3/5/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: Croom Station Rd/US 301 (Crain Highway)
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131103
Proximity to Impacted Stream (mi.): 7.6
Lat/Long: 38.79775 -76.759915

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.48
Site Opportunities: __X__Fish Passage __X__Channel Restoration ___X___Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: DS: CIPP lined culvert US: RCP
Culvert/Dam Dimensions: 5 ft wide, 5 ft tall, twin; flow in left
Blockage Type: ___Complete _X__ Partial ___None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): ___191_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%
Property Address: Horse Tavern Branch near Croom Station Rd and Crain Hwy
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: Would require access onto private property due to narrow ROW

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	1	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 0.85 miles		Describe: Upstream: 3 inches drop water to invert; Downstream: 2 inches drop water to invert	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Mostly mid-successional forest: sycamore, tulip poplar	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 12		Describe: Large pipe, less than 1 ft tall	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 18.80%		Describe: Mostly forested, site surrounded by steep slopes. Private driveway on downstream end could be used for access.	
Fish Habitat Diversity	5	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: LWD, riffles, overhanging vegetation, undercut banks, root mats; 5 types		Describe: Overhead utilities on upstream side	
		Total Score out of 100	44

Map

Site No.	NAACC 57565		Scale: 1 in. = 2,000

Site Photos

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57566
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 3/5/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: US 301/Trumps Hill Rd
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131103
Proximity to Impacted Stream (mi.): 10
Lat/Long: 38.782963 -76.796289

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 6.44
Site Opportunities: ___Fish Passage __X__Channel Restoration _____Habitat Enhancement ___Riparian Buffer Planting
Stream Order: 2nd
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Triple CMP - grouted 4 inches
Culvert/Dam Dimensions: 14 ft wide, 14 ft tall
Blockage Type: ___Complete ___ Partial __X_None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): _____191_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%
Property Address: Charles Branch along US 301 near Trumps Hill Rd
Property Owner(s): SHA

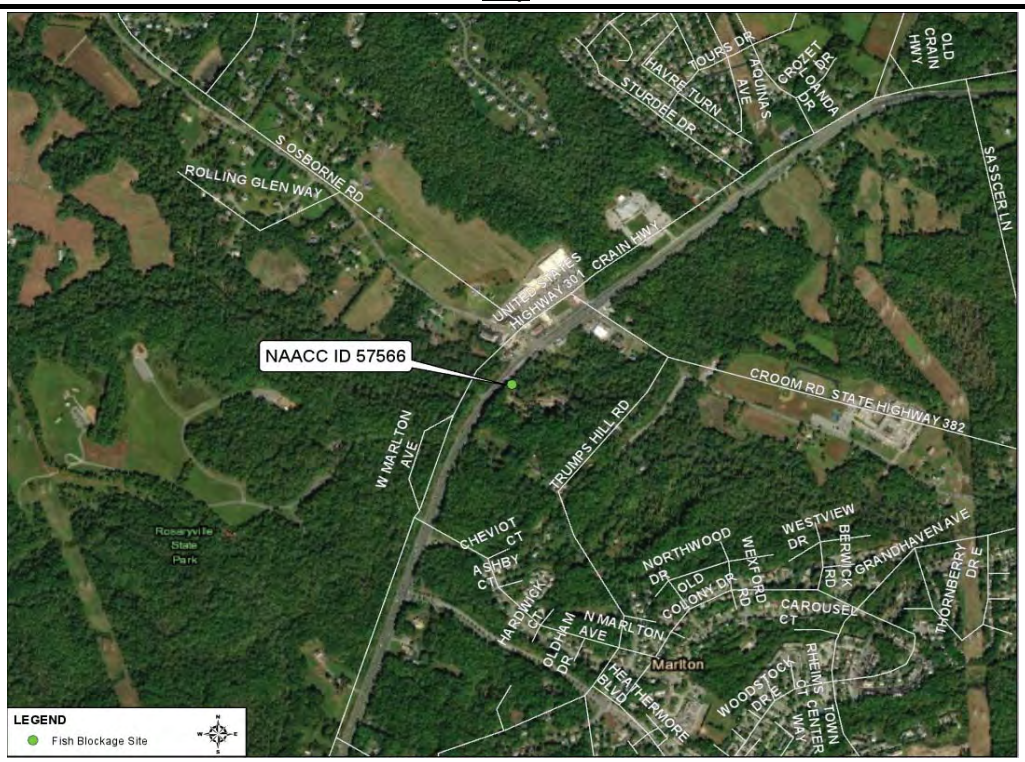
General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: No blockage - triple CMP culvert. Baseflow moving through center culvert, approximately 2 ft deep

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	10	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 19.60 miles		Describe: No blockage - 2 ft deep water in culvert	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Mid-successional forest: tulip poplar, beech, sweet gum	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 12		Describe: 14 ft CMP - no blockage	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 16.20%		Describe: Surrounded by forest, steep slopes along roadway embankment	
Fish Habitat Diversity	10	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: LWD, riffles, deep pools, overhanging vegetation, undercut banks, root mats; 6 types		Describe: Sewer line and overhead utilities within site	
		Total Score out of 100	54

Map



Site No.	NAACC 57566		Scale: 1 in. = 2,000

Site Photos

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 57652
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/15/2019
Consultant Firm/Investigator(s) RK&K; KJH, BM

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: Croom Rd (MD 382)/S of Whites Landing Rd
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 02131101
Proximity to Impacted Stream (mi.): 27.5 (straight line)
Lat/Long: 38.664127 -76.714366

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 1.77
Site Opportunities: __X__Fish Passage __X__Channel Restoration _____Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Box culvert
Culvert/Dam Dimensions: 5 ft tall, 8 ft wide
Blockage Type: ___Complete _X__ Partial ___None
USGS Gage Station #: 01594526
USGS Gage Discharge (fs3/s): ____120_____
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% _X__50-75% __75-100%
Property Address: Full Mill Branch under MD 382
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending	Explain: Removal would require access onto private property - narrow ROW

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	10	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1'	
Describe: 6.28 miles		Describe: 6 inches from downstream water surface to bottom of water at drop; 8 inches to top of water	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: None		Describe: Downstream: forested on private properties; Upstream: forested meadow and scrub-shrub	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex	
Describe: 7		Describe: 8 ft wide box culvert	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 4.20%		Describe: Downstream: surrounded by forest, narrow ROW guard rail; Upstream: clear on eastern side	
Fish Habitat Diversity	5	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Deep pool downstream of culvert (1 to 2 ft), overhanging vegetation, undercut banks; 3 types. Extensive sand deposition		Describe: Overhead powerlines on upstream side; None observed on downstream side	
		Total Score out of 100	54

Map

Site No.	NAACC 57652		Scale: 1 in. = 2,000

Site Photos

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 63410
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/21/2019
Consultant Firm/Investigator(s) CRI; DS, LE

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: MD 3 (N. Craine Hwy), S of Annapolis Rd.
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 2131104
Proximity to Impacted Stream (mi.): 7.4
Lat/Long: 38.982583 -76.711365

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 1.3
Site Opportunities: __Fish Passage __Channel Restoration ____Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Box Culvert
Culvert/Dam Dimensions: 18' W x 3.34' to thalweg; 55 feet long
Blockage Type: __Complete ___ Partial _X_None
USGS Gage Station #: 01049150
USGS Gage Discharge (fs3 2.39
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% ___75-100%
Property Address: SHA ROW - at MD 3 south of Annapolis Rd., Bowie MD 20715
Property Owner(s): SHA

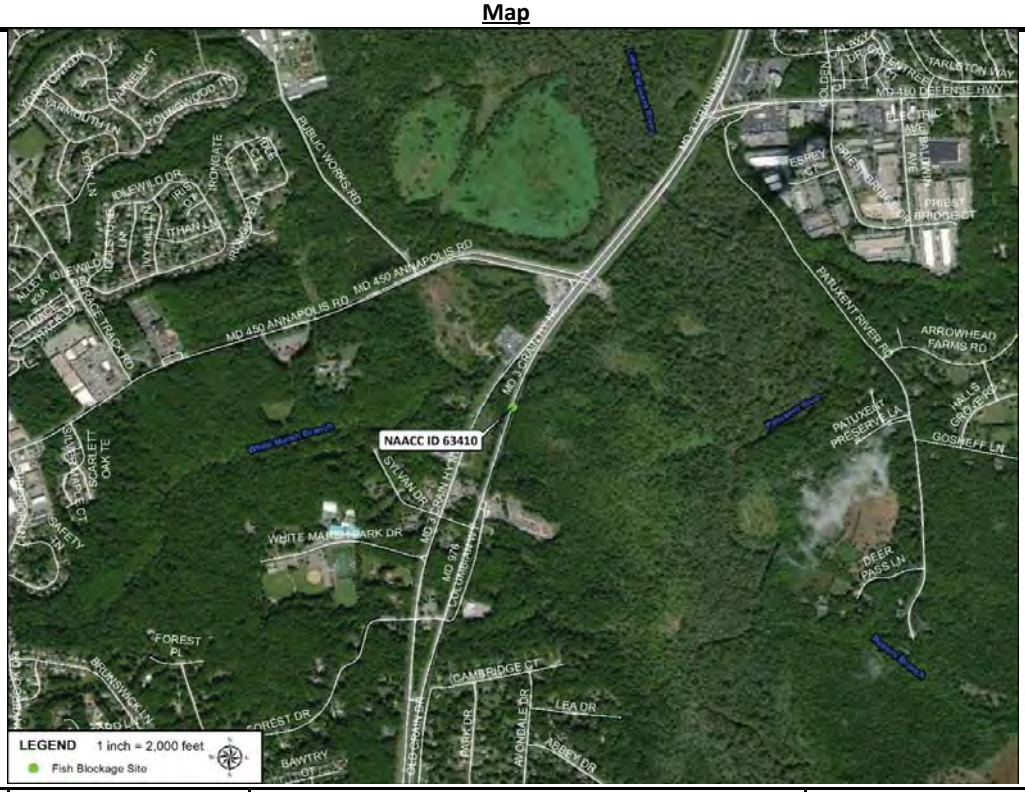
General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending.	Explain: No blockage

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	1	**Fish Blockage Height - Ecological Benefits of Removal**	0
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 0.3 miles of US network		Describe: No blockage	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe:		Describe: All forest	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	0
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 11		Describe: No blockage	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 17.70%		Describe: Clearing needed, not open	
Fish Habitat Diversity	1	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: US: deep pool; DS: roots		Describe: Overhead lines within ROW	
		Total Score out of 100	34

Map



Site No.	NAACC 63410		Scale: 1 in. = 2,000 ft.

Site Photos

Right bank from upstream end of culvert

Downstream of culvert looking downstream

Downstream looking upstream at culvert/no blockage

Left bank from downstream end of culvert, powerlines

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 63413
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/21/2019
Consultant Firm/Investigator(s) CRI; DS, LE

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: MD 3 (N. Craine Hwy), S of Annapolis Rd.
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 2131104
Proximity to Impacted Stream (mi.): 7.3
Lat/Long: 38.982234 -76.712577

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 1.3
Site Opportunities: __Fish Passage __Channel Restoration ____Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Box culvert
Culvert/Dam Dimensions: 18' W x 3.5' H to thalweg
Blockage Type: __Complete ___ Partial _X_None
USGS Gage Station #: 01049150
USGS Gage Discharge (fs3 2.39
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% ___75-100%
Property Address: SHA ROW - at MD 3 south of Annapolis Rd., Bowie MD 20715
Property Owner(s): SHA

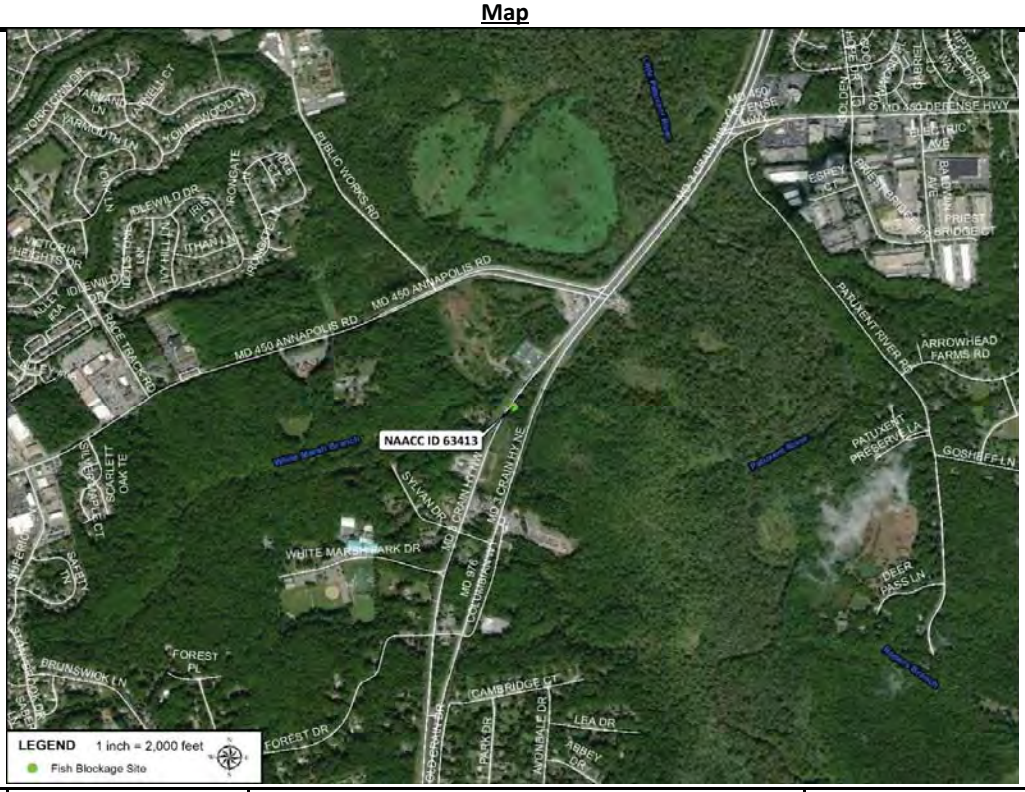
General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending.	Explain: No blockage

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	1	**Fish Blockage Height - Ecological Benefits of Removal**	0
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 0.3 miles of US network		Describe: No blockage	
Number of Downstream Fish Blockages	5	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 1 DS barrier		Describe: All forest	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	0
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 11		Describe: No blockage	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 17.60%		Describe: Clearing needed, not open	
Fish Habitat Diversity	1	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: DS: roots, riffle; US: deep pool, riffle		Describe: Overhead lines within ROW	
		Total Score out of 100	29

Map



Site No.	NAACC 63413		Scale: 1 in. = 2,000 ft.

Site Photos

Downstream looking upstream at culvert/no blockage

Left bank at downstream end

Upstream of culvert looking upstream

Left bank at upstream end looking at powerlines

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 63777
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/25/2019
Consultant Firm/Investigator(s) CRI; JG, DS, LE

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: MD 3 (Craine Hwy), N of Defense Hwy
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 2131105
Proximity to Impacted Stream (mi.): 9.1
Lat/Long: 39.000079 -76.700608

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 2.3
Site Opportunities: _X_Fish Passage _X_Channel Restoration __X__Habitat Enhancement _X__Riparian Buffer Planting
Stream Order: 2nd
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Pipe arch w/ concrete bottom
Culvert/Dam Dimensions: Depth: 3/10' W:15'
Blockage Type: __Complete ___ Partial _X_None
USGS Gage Station #: 01049150
USGS Gage Discharge (fs3 2.2
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% __75-100%
Property Address: SHA ROW - at MD 3 north of Defence Hwy., Crofton MD 21114
Property Owner(s): SHA

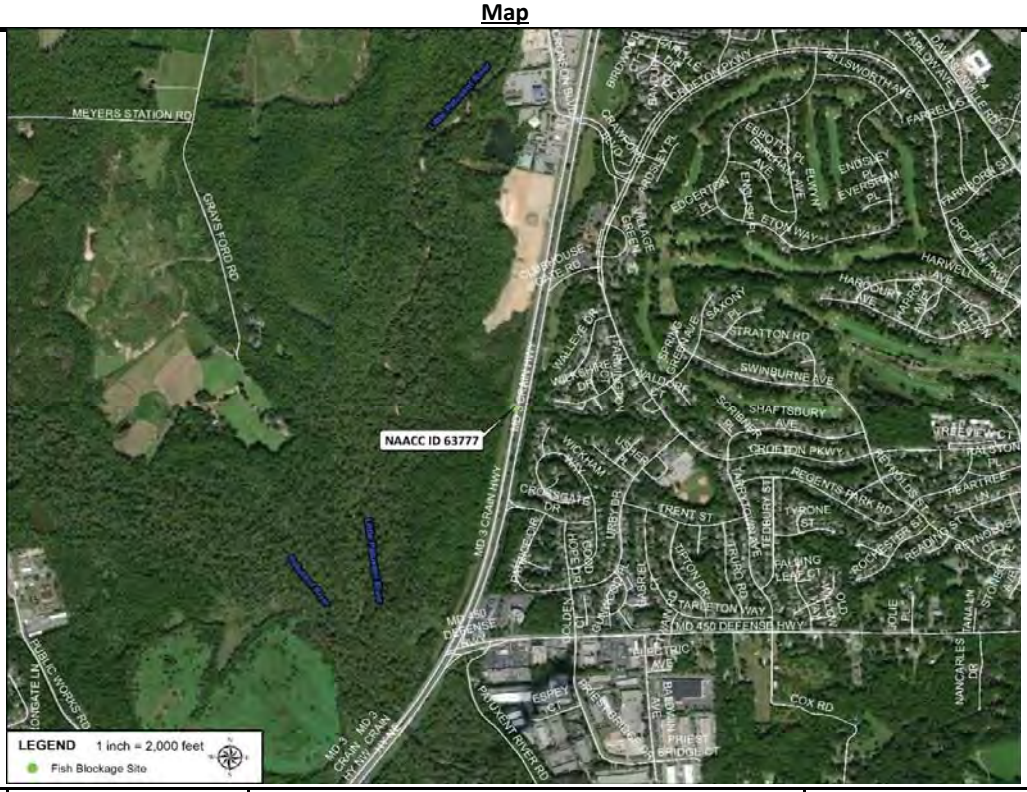
General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending.	Explain: No blockage

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	1	**Fish Blockage Height - Ecological Benefits of Removal**	0
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 0.4 miles of US network		Describe: No blockage	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	5
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: No blockages		Describe: DS: field; US: forest	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	0
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 14		Describe: No blockage	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	5
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 21.50%		Describe: DS - no clearing needed, but no direct road. US - sewage line parallel to stream, no immediate access	
Fish Habitat Diversity	5	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: DS: riffle, deep pool, overhanging vegetation; US: riffle		Describe: DS - powerlines overhead, but high at edge of ROW; US - lower powerlines and sewer line	
		Total Score out of 100	46

Map



Site No.	NAACC 63777		Scale: 1 in. = 2,000 ft.

Site Photos

Downstream looking upstream at culvert/no blockage

Downstream of culvert looking downstream

Left bank looking at ROW access and overhead lines

Upstream of culvert looking upstream

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 63785
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/28/2019
Consultant Firm/Investigator(s) CRI; DS, KS

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: MD 32, NW of MD 295
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 2131105
Proximity to Impacted Stream (mi.): 9.9
Lat/Long: 39.119754 -76.782597

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 11.9
Site Opportunities: _X_Fish Passage _X_Channel Restoration __X__Habitat Enhancement _X__Riparian Buffer Planting
Stream Order: 3rd
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Boulder/rip-rap
Culvert/Dam Dimensions: 23' wide
Blockage Type: ___Complete _X__ Partial ___None
USGS Gage Station #: 01594440
USGS Gage Discharge (fs3 590 cfs
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% _X_50-75% ___75-100%
Property Address: SHA ROW - at MD 32 northwest of MD 295, Annapolis Junction MD 20701
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending.	Explain: No blockage DS of MD 32. Scored riprap blockage US of MD 32, DS of National Business Hwy - located in ROW between roadways

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	10	**Fish Blockage Height - Ecological Benefits of Removal**	5
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: >10 miles of US network		Describe: 1.2 foot drop in water surface boulder/riprap blockage - likely a partial/complete blockage during low flows.	
Number of Downstream Fish Blockages	5	**Adjacent Land Use**	5
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 1 blockage		Describe: LB - scrub-shrub/small tree forest in ROW. RB scrub-shrub/forest	
NAACC Diadromous Fish HUC 12 Watershed Score	1	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 48		Describe: "Natural blockage" although not natural. No evidence that it is sewer crossing, but not ruled out.	
Percentage of Upstream Impervious Surface	1	**Ease of Access**	5
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 32.10%		Describe: Clearing may be needed on LB, but RB is open and in ROW	
Fish Habitat Diversity	5	**Utilities Present**	10
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Riffle, deep pool, cobble/boulder, roots		Describe: No evidence of utilities on site.	
		Total Score out of 100	52

Map

Site No.	NAACC 63785		Scale: 1 in. =

Site Photos

Upstream of blockage looking upstream

Upstream of blockage looking downstream

Left bank upstream of blockage

Downstream looking upstream at partial blockage

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 64432
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 3/6/2019
Consultant Firm/Investigator(s) CRI; JG, DS

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: MD 197 (Laurel Bowie Rd.), N of Lemons Bridge Rd./S of Old Laurel Bowie Rd.
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 2060006
Proximity to Impacted Stream (mi.): 5.6
Lat/Long: 39.025808 -76.77116

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.6
Site Opportunities: _X_Fish Passage __Channel Restoration ____Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Double culvert RCP
Culvert/Dam Dimensions: 8'
Blockage Type: _X_Complete ___ Partial ___None
USGS Gage Station #: 01594440
USGS Gage Discharge (fs3 1020 cfs
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%
Property Address: SHA ROW - at MD 197 north of Lemons Bridge Rd., south of Laurel Bowie Rd., Bowie MD 20720
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending.	Explain: Yes, well within ROW with additional ROW upstream

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	5	**Fish Blockage Height - Ecological Benefits of Removal**	5
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 1.3 miles of US network		Describe: Riprap/boulder just US of culvert causing 1.3 foot drop	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 0 blockages DS; however partial blockage at site NAACC 64432B		Describe: Forested upstream but ROW extends well upstream	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 17		Describe: "Natural Blockage" riprap. 1-5ft (1.3')	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 4.57%		Describe: Moderate slope from road, clearing needed. Mature/young/regen deciduous	
Fish Habitat Diversity	10	**Utilities Present**	10
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Roots, woody, riffle, cobble/boulder, deep pool, backwater pools		Describe: None observed	
		Total Score out of 100	67

Map

Site No.	NAACC 64432		Scale: 1 in. = 2,000 ft.

Site Photos

Upstream of blockage looking upstream

Left bank looking at riparian area

Rip-rap placed at blockage

Looking upstream at blockage

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 64434
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/28/2019
Consultant Firm/Investigator(s) CRI; DS, KS

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: MD 197 (Laurel Bowie Rd.), S of Race Track Rd.
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 2131104
Proximity to Impacted Stream (mi.): 5.8
Lat/Long: 39.003508 -76.761299

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 5.94
Site Opportunities: __Fish Passage __Channel Restoration ___Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 3rd
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Double Box Culvert
Culvert/Dam Dimensions: 12 ft wide, 200 feet long
Blockage Type: __Complete ___ Partial _X_None
USGS Gage Station #: 01594440
USGS Gage Discharge (fs3 590 cfs
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% _X_50-75% ___75-100%
Property Address: SHA ROW - at MD 197, south of Race Track Rd., Bowie MD 20715
Property Owner(s): SHA

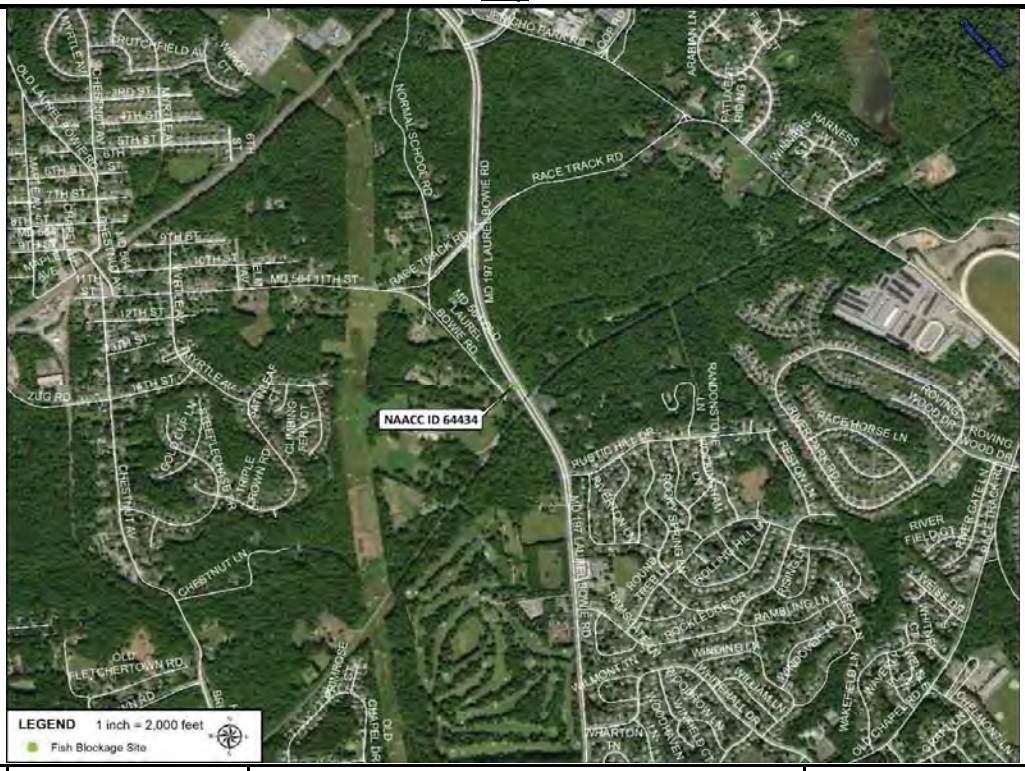
General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies pending.	Explain: No blockage, steep grade control riffles at both ends of culvert. Within ROW

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	10	**Fish Blockage Height - Ecological Benefits of Removal**	0
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: >10 miles of US network		Describe: No blockage, just riffle grade control DS of crossing	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe:		Describe: Forest on both banks	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	0
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 17		Describe: Not a true blockage	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 11.70%		Describe: Tree clearing needed, no vehicular access exising	
Fish Habitat Diversity	10	**Utilities Present**	10
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Riffle, cobble/boulder, roots, deep pool, woody, backwater pool		Describe: No utilities located DS	
		Total Score out of 100	57

Map



Site No.	NAACC 64434		Scale: 1 in. = 2,000 ft.

Site Photos

Downstream of culvert looking downstream

Downstream looking upstream at culvert/no blockage

Right bank downstream of culvert

Upstream of culvert looking upstream

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 64498
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/25/2019
Consultant Firm/Investigator(s) CRI; JG, DS, LE

Site Location Details-taken from desktop review

County: Anne Arundel
Cross Roads: MD 3 (Crain Hwy), S of MD 424/N of Defense Hwy
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 2131105
Proximity to Impacted Stream (mi.): 9.1
Lat/Long: 38.999801 -76.700676

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.5
Site Opportunities: _X_Fish Passage _X_Channel Restoration __X__Habitat Enhancement _X__Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: CMP
Culvert/Dam Dimensions: W: 11.5' H: 8'
Blockage Type: ___Complete _X__ Partial ___None
USGS Gage Station #: 01649150
USGS Gage Discharge (fs3 2.2
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% ___75-100%
Property Address: SHA ROW - at MD 3, south of MD 424 and north of Defense Hwy., Crofton MD 21114
Property Owner(s): SHA

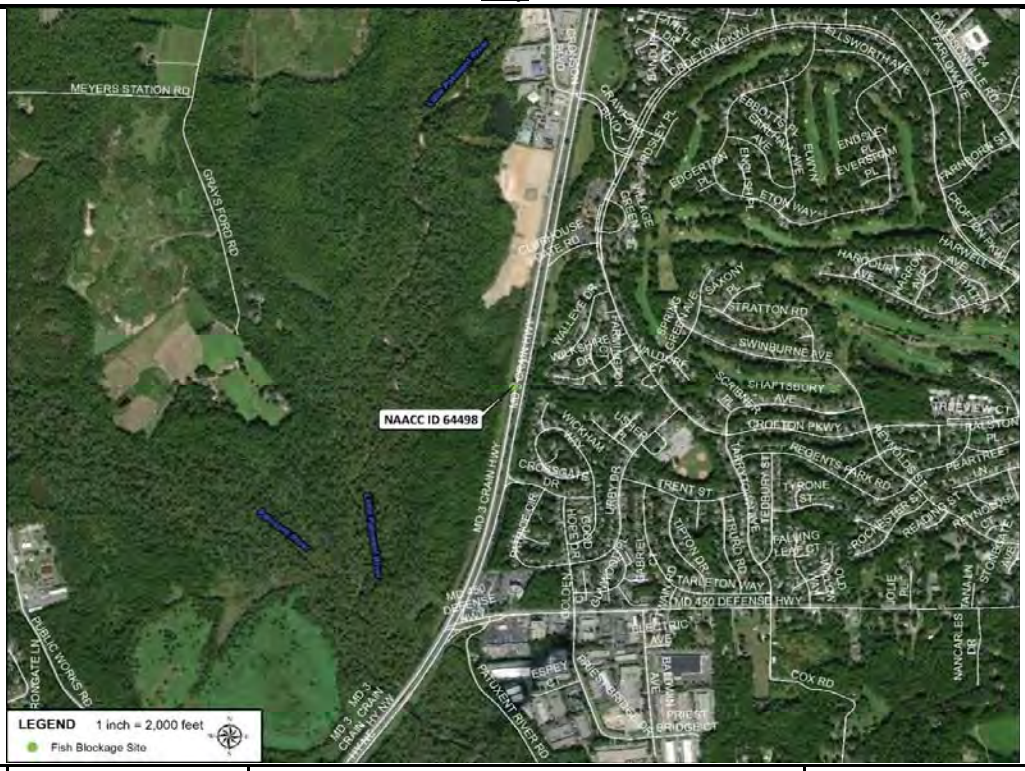
General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending.	Explain: Within ROW

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	1	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 0.6 miles of US network		Describe: 0.7 feet from bottom of CMP to bottom of stream. Water depth is 0.2 feet inside culvert.	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	5
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 0		Describe: US: forested; DS: field	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 14		Describe: Less than 1 foot drop with diameter > 48 inches	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	5
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 21.70%		Describe: LB no clearing needed, grading necessary	
Fish Habitat Diversity	1	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: US: riffle; DS: pool, overhanging vegetation		Describe: Low powerlines US. High powerlines at edge of ROW	
		Total Score out of 100	48

Map



Site No.	NAACC 64498		Scale: 1 in. = 2,000 ft.

Site Photos

Upstream looking downstream at culvert/partial blockage

Upstream looking upstream at old cement structure outside of ROW

Right bank looking at powerlines and plantings

Downstream looking upstream at culverts/partial blockages

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 64596
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 2/25/2019
Consultant Firm/Investigator(s) CRI; JG, DS

Site Location Details-taken from desktop review

County: Montgomery
Cross Roads: MD 108 (Ashton Rd.), E of New Hampshire Ave.
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 2131107
Proximity to Impacted Stream (mi.): 9.8
Lat/Long: 39.151371 -77.00691

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.5
Site Opportunities: ___Fish Passage _X_Channel Restoration __X__Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: IV
Culvert/Dam Type: Double RCP
Culvert/Dam Dimensions: 48'' RCP, 25 feet long
Blockage Type: __Complete ___ Partial _X_None
USGS Gage Station #: 01591700
USGS Gage Discharge (fs3 59.7
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% ___75-100%
Property Address: SHA ROW - at MD 108, east of New Hampshire Ave, Ashton MD 20861
Property Owner(s): SHA

General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies pending.	Explain: No blockage

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	1	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 0.2 miles of US network		Describe: None. 0.2' water depth in RCP at US end.	
Number of Downstream Fish Blockages	5	**Adjacent Land Use**	5
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 1 DS barrier		Describe: US: Forested. DS: residential lawn (field)	
NAACC Diadromous Fish HUC 12 Watershed Score	1	**Ease of Construction**	0
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 43		Describe: No blockage	
Percentage of Upstream Impervious Surface	10	**Ease of Access**	5
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 3.59%		Describe: Open downstream (some clearing), clearing needed upstream	
Fish Habitat Diversity	10	**Utilities Present**	1
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Riffle, cobble/boulder, undercut bank, backwater, deep pool, roots		Describe: Water line DS; powerlines US and DS	
		Total Score out of 100	39

Map

Site No.	NAACC 64596		Scale: 1 in. = 2,000 ft.

Site Photos

Downstream looking upstream at culvert/no blockage

Downstream of culvert looking downstream

Upstream of culvert looking upstream

Left bank at upstream end of culvert looking at utilities

I-495/I-270 Managed Lanes Study - Fish Passage Field Site Assessment Form

Project Details

Project Name: I-495/I-270 Managed Lanes Study
Mitigation Site Number: NAACC 64628
Projects Estimated Stream Mitigation Needs (LF): TBD
Date of Field Assessment: 3/6/2019
Consultant Firm/Investigator(s) CRI; JG, DS

Site Location Details-taken from desktop review

County: Prince George's
Cross Roads: MD 197 (Laurel Bowie Rd.), N of Race Track Rd.
Basin (HUC 8): Patuxent
MDE Watershed (8 digit): 2131104
Proximity to Impacted Stream (mi.): 6.1
Lat/Long: 39.012859 -76.762718

Site Data

Parcel Size (ac): Within SHA ROW
Drainage Area to Reach (sq. mi. 0.45
Site Opportunities: _X_Fish Passage _X_Channel Restoration __X__Habitat Enhancement ____Riparian Buffer Planting
Stream Order: 1st
Stream Hydrology: Perennial
Stream Use: I
Culvert/Dam Type: Pipe arch
Culvert/Dam Dimensions: 9.5' x 6.8', 130 feet long
Blockage Type: ___Complete _X__ Partial ___None
USGS Gage Station #: 01594440
USGS Gage Discharge (fs3 1020 cfs
USGS Gage Daily Discharge Percentile: ___0-25% ___25-50% ___50-75% _X_75-100%
Property Address: SHA ROW - at MD 197, north of Race Track Rd, Bowie MD 20720
Property Owner(s): SHA

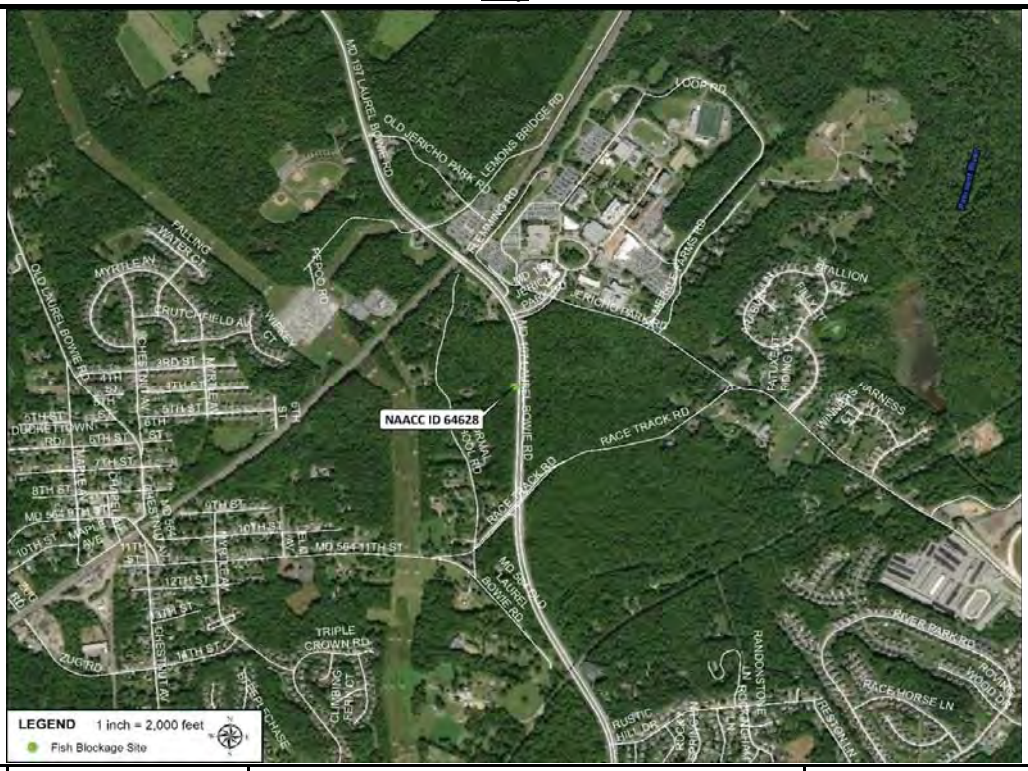
General Field Observations

Are there records for diadromous fish, mussels, RTE crayfish, or other RTE species within or in close proximity to the fish blockage site? Explain	Can the fish blockage be removed within the road right-of-way or does it require access to parcels beyond right-of-way limits? Explain
Explain: RTE coordination with agencies is pending.	Explain: Yes, blockage is partial, low flow in upstream end of crossing at gradient change within CMP.

Fish Passage Site Rating

Criteria	Score	Criteria	Score
Functional Upstream Network	1	**Fish Blockage Height - Ecological Benefits of Removal**	1
10 - Greater than 4 miles 5 - 1 to 4 miles 1 - Less than 1 mile		10 - Greater than 5' 5- 1' to 5' 1 - Less than 1' 0 - No Blockage	
Describe: 0.7 miles of US network		Describe: Water depth at top of gradient: 0.15 feet; Water depth at bottom of gradient in CMP: 0.20 feet. Potential partial blockage during low flows DS of culvert at rip rap.	
Number of Downstream Fish Blockages	10	**Adjacent Land Use**	1
10 - 0 Blockages 5 - 1 Blockage 1 - >1 Blockage		10 - Commercial/Agriculture/Bare Ground 5- Field/Scrub-shrub 1 - Forest	
Describe: 0 blockages		Describe: Forest upstream and downstream	
NAACC Diadromous Fish HUC 12 Watershed Score	10	**Ease of Construction**	5
10 - 3 to 22 5 - 23 to 41 1 - 42 to 61		10 - Easy 5- Average 1 - Difficult/Complex 0 - No Blockage	
Describe: 17		Describe: Large pipe, less than 1 foot	
Percentage of Upstream Impervious Surface	5	**Ease of Access**	1
10 - Less than 10% 5 - 10 to 25% 1 - Greater than 25%		10 - Yes (with existing direct vehicular access to potential site) 5- Yes (open but no existing vehicular access) 1 - No (no vehicular access, clearing needed, steep slopes surrounding site)	
Describe: 10.20%		Describe: Clearing of young regen trees required. Some mature deciduous.	
Fish Habitat Diversity	5	**Utilities Present**	5
10 - Greater than 5 cover types 5 - 3-5 cover types 1 - Less than 3 cover types		10 - No utilities on site 5 - Utilities but not within site 1 - Utilities within potential site	
Describe: Deep pool, riffle, boulder/cobble, backwater pool, roots		Describe: Sewer downstream. Transformer above inlet of culvert (traffic light)	
		Total Score out of 100	44

Map



Site No.	NAACC 64628		Scale: 1 in. =

Site Photos

Closeup of inlet, upper end of gradient change

Downstream looking upstream at culvert

Right bank at downstream end

Looking at potential partial blockage downstream of culvert

APPENDIX F: PUBLIC SITE WINDSHIELD & WALKTHROUGH VICINITY MAP & LISTS

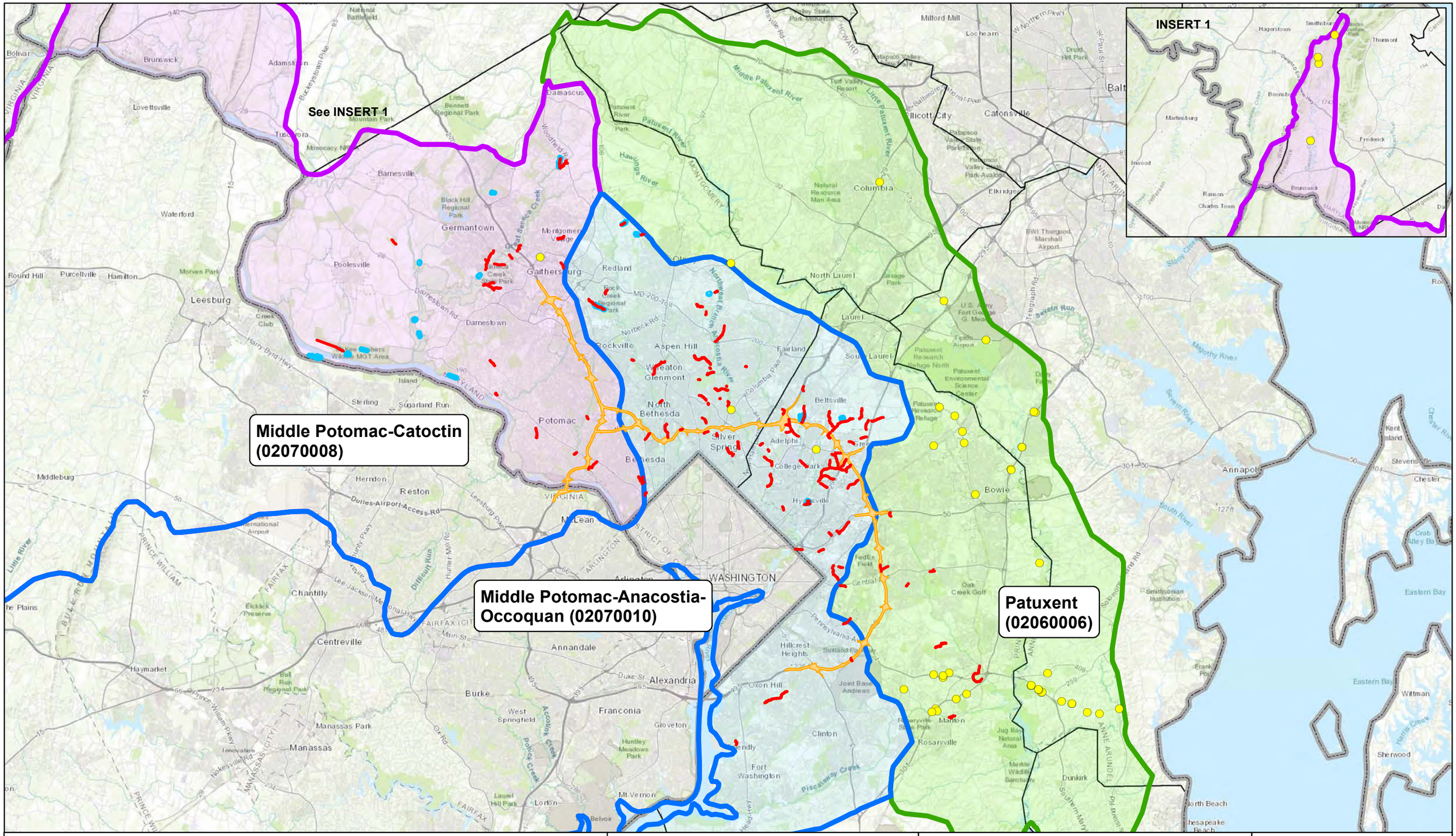


Figure F-1. Public Mitigation Windshield & Walkthrough Site Vicinity Map

270 495 MANAGED LANES STUDY

WINDSHIELD & WALKTHROUGH WETLAND MITIGATION SITE LISTS

Table F-1. Windshield and Walkthrough Wetland Mitigation Sites - Middle Potomac-Anacostia-Occoquan

Database ID	County	Owner	Lat/Long	Location	Potential Creation Credits (ac)	Potential Enhancement Credits (ac)	Potential Preservation Credits (ac)	Comments	Status	Field Score
MPAO0008	Prince George's	BARC	39.026019 -76.930444	North of Yuma St. & West of N Farm Rd.	0.0	0.0	0.7	BARC recommendation. Site added during walkthrough survey. Large man-made wet pond with extensive PEM wetland fringe located adjacent to Little Paint Branch. Site surrounded by berms dominated by dry scrub-shrub habitat. Water depth is approximately 4" - 2' deep. Low potential for ecological uplift due to site already providing habitat for reptiles, amphibians, waterfowl, etc.	Removed due to limited potential for functional uplift	63
MPAO0032	Montgomery	M-NCPPC & Derwood Station HOA	39.11553546 -77.14594816	Southeast of Redland Rd. Crabbs Branch Stream Valley Park	1.6	1.9	0.2	Site added during waklthrough survey. Good potential for wetland creation, enhancement, preservation, and stream restoration. Majority of site consists of floodplain wetlands dominated by reed canary grass with scattered trees. Groundwater observed 3.5 feet below surface in non wetland areas in August. High potential for overall ecological uplift. Potential access from maintained HOA roads.	Selected for Potential Mitigation Site List (Site AN-1). Combine with stream site MPAO0012.	71
WSS-150078	Montgomery	M-NCPPC	39.126198 -77.030596	Northwest of Layhill Rd. & Norwood Rd. intersection. Red Door Store Historical/Cultural Park.	0.0	0.0	0.0	Ag. field located in high landscape position. Site removed following windshield survey.	Removed due to high position in landscape	NA
WSS-150093	Montgomery	M-NCPPC	39.174483 -77.107148	North of Ashbourne Pl. NB Stream Valley Unit 4.	0.0	0.0	0.0	Mix of forest and scrub shrub located in high landscape position. Site removed following windshield survey.	Removed due to high position in landscape	NA
WSS-150149	Montgomery	M-NCPPC	39.184225 -77.119341	South of Stanbrook Ln. Upper Rock Creek LP & Rock Creek SVU 16.	0.0	0.0	0.0	Open meadow, scrub shrub, and tree plantings in high landscape position. Appears to lack a source of hydrology. Site removed following windshield survey.	Removed due to high position in landscape	NA
WSS-160078	Prince George's	BARC	39.0233398 -76.889736	South of Beaver Dam Rd.	0.0	0.0	0.0	Ag. field in high landscape position currently being used by BARC. Removed following windshield survey.	Removed due to land use conflicts & high position in landscape	NA
WSS-160097	Prince George's	BARC	39.023895 -76.933111	Southwest of South Dr.	0.0	0.0	0.0	Ag. field in high landscape position currently being used by BARC. Removed following windshield survey.	Removed due to land use conflicts & high position in landscape	NA
WSS-160137	Prince George's	M-NCPPC	38.955140 -76.926332	West of Greenway Dr. Anacostia River SVP.	0.0	0.0	0.0	Neighborhood park with specimen trees throughout site. Site removed following windshield survey.	Removed due to specimen tree impacts	NA

Site selected for Potential Mitigation Site List

Table F-2. Windshield and Walkthrough Wetland Mitigation Sites - Middle Potomac-Catoctin

Database ID	County	Owner	Lat/Long	Location	Potential Creation Credits (ac)	Potential Enhancement Credits (ac)	Potential Preservation Credits (ac)	Comments	Status	Field Score
MPOC0001	Montgomery	DNR	39.079584 -77.392588	South of Hunting Quarter Rd. McKee Beshers Wildlife Management Area.	7.3	0.0	0.0	DNR recommendation. Site added during walkthrough survey. Site consists of active farm field with open water areas located in Potomac River floodplain. Groundwater observed 14" below ground surface in unsaturated areas in March. No hydric soil indicators observed, likely due to annual tilling. High potential for overall ecological uplift. Existing gravel road provides direct access to site with no tree impacts. Wetlands of Special State Concern north of site. No utilities observed within site.	Selected for Potential Mitigation Site List (Site CA-1)	95
MPOC0002	Montgomery	DNR	39.057434 -77.298221	West of Pennyfield Lock Rd. Dierssen Wildlife Management Area.	0.0	12.2	0.0	DNR recommendation. Site added during walktrhoguh survey. Two large wet/dry ponds managed by DNR for waterfowl habitat just north of the Potomac River. Reed canary wetlands throughout site with groundwater observed at 3 inches below ground surface. To meet DNR's goal of providing open water habitat in winter and PEM wetlands in summer, the site would require seasonal management of siphons and C&O canal locks. Access is limited to the 10 foot wide C&O canal trail that would require crossing two foot bridges, one of which requires replacement.	Removed due to required seasonal management & access constraints	81
WSS-150056	Montgomery	M-NCPPC	39.209133 -77.258672	North of Milestone Manor Ln. North Germantown Greenway SVP.	0.0	0.0	0.5	High quality PSS throughout majority of site. Site removed following windshield survey.	Removed due to existing high quality PSS wetlands	NA
WSS-150069	Montgomery	M-NCPPC	39.15145062 -77.3353438	South of Schaeffer Rd. Little Seneca Stream Valley Park.	0.0	0.0	0.4	Majority of site consists of high quality PSS floodplain wetland adjacent to Little Seneca Creek. 0-2 inches of surface water observed throughout site in November. Common species include persimmon, river birch, black willow, button bush, swamp rose, sensitive fern, soft rush, and arthraxon. Few upland scrub shrub islands dominated by red cedar. Site is accessible from Schaeffer Rd, however access within site would require tree clearing.	Removed due to existing high quality PSS wetland throughout site	72
WSS-150088	Montgomery	DNR	39.073307 -77.441736	Selden Island on the south bank of the Potomac River	0.0	1.9	0.0	Open meadow located on island just south of the Potomac River. Site removed following windshield survey.	Removed due to access constraints	NA
WSS-150089	Montgomery	DNR	39.074506 -77.448431	Selden Island on the south bank of the Potomac River	0.0	5.5	0.0	Open meadow located on island just south of the Potomac River. Site removed following windshield survey.	Removed due to access constraints	NA
WSS-150085	Montgomery	DNR	39.104228 -77.340277	East of Montevideo Rd. Seneca Creek State Park.	0.0	0.0	0.0	Site dominated by upland scrub shrub in high landscape position. Site removed following windshield survey.	Removed due to high position in landscape	NA
WSS-150086	Montgomery	DNR	39.091571 -77.334493	West of Berryville Rd. Seneca Creek State Park	0.0	0.0	0.0	Majority of site consists of forest surrounding perennial stream in high landscape position. Site removed following windshield survey.	Removed due to existing forest and high position in landscape	NA

Site selected for Potential Mitigation Site List

Table F-2. Windshield and Walkthrough Wetland Mitigation Sites - Middle Potomac-Catoctin

Database ID	County	Owner	Lat/Long	Location	Potential Creation Credits (ac)	Potential Enhancement Credits (ac)	Potential Preservation Credits (ac)	Comments	Status	Field Score
WSS-150087	Montgomery	DNR	39.07594861 -77.41050967	East of Sycamore Landing Rd. McKee Beshers Wildlife Management Area.	5.8	0.7	0.0	Site managed by DNR for woodcock habitat & hunting. Majority of site is dry meadow with a few small PEM wetlands located in the Potomac River floodplain. Site surrounded by PFO wetlands. Groundwater observed 6"-2' below ground surface in December. High potential for ecological uplift. Existing access to site along edge of adjacent farm fields. No utilities observed within site.	Removed at DNR's request due to site management for woodcock habitat	91
WSS-150133	Montgomery	DNR	39.14076147 - 77.27203494	Southwest of Great Seneca Hwy. Seneca Creek State Park	0.9	0.5	0.0	Majority of site consists of upland hillslope where wetland creation is not feasible. Existing PEM wetlands at eastern and western ends of site dominated by invasives and scattered trees. Western wetland hydrology source is from upstream sewage treatment plant. Western end of site is located in the Seneca Creek floodplain. Potential access from dirt road off Seneca Creek Hwy. and under adjacent overhead powerlines.	Removed due to majority of site consisting of upland hillslopes	52
WSS-150147A	Montgomery	M-NCPPC	39.23278219 - 77.18832166	South of Watkins Rd. Great Seneca SVU 4.	7.1	0.9	0.0	Good potential for wetland creation/enhancement and stream restoration. Site consists of floodplain dominated by reed canary grass with scattered trees. Two large PEM wetlands in western floodplain dominated by cattail and reed canary grass. No wetlands observed in eastern floodplain. Groundwater observed 2.5 feet below surface in non wetland areas in November. No utilities observed within site. High potential for overall ecological uplift. Potential Access from Watkins Rd. Located just downstream of wetland site WSS-150147B.	Selected for Potential Mitigation Site List (Site CA-2). Combine with stream site MO_00013A.	85
WSS-150147B	Montgomery	M-NCPPC	39.23521278 - 77.18778527	North of Watkins Rd. Magruder SVU 1.	1.5	0.9	0.2	Site added during windshield survey. Good potential for wetland creation, enhancement, preservation and stream restoration. Site consists of floodplain dominated by reed canary grass with scattered trees. Large reed canary wetland in western floodplain. Groundwater observed 2-3 feet below surface in non wetland areas. High quality PSS wetland just east of site. High potential for overall ecological uplift. No utilities observed within site. Potential access from Watkins Rd. Located just upstream of wetland site WSS-150147B.	Selected for Potential Mitigation Site List (Site CA-3). Combine with stream site MO_00013B.	85

Site selected for Potential Mitigation Site List

WINDSHIELD & WALKTHROUGH STREAM MITIGATION SITE LISTS

Table F-3. Windshield and Walkthrough Stream Mitigation Sites - Middle Potomac-Anacostia-Occoquan

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
MO_00029	Montgomery	M-NCPPC	39.013798 -77.075727	East of Kensington Pkwy. Kensington Pkwy SVP & Rock Creek SVU 2.	4,948	4-6 foot tall banks throughout the site, with approximately 15% that are eroded. Floodplain consists of a narrow strip of mowed lawn. Potential functional uplift limited to bed and bank stabilization. Site becomes more incised at downstream end of reach. Riparian enhancement and floodplain development limited due to adjacent trails, roadways, and residential communities. Existing open access to entire site. Several exposed instream utility crossings.	Removed. Culvert would need to be replaced to address residential concerns with flooding problems. Limited potential for ecological uplift.	53
MO_00034	Montgomery	M-NCPPC	39.014726 -77.059196	South of Campbell Dr. Rock Creek SVU 2.	882	Majority of bed and banks are stabilized by bedrock and large boulders. 3-5 foot tall banks throughout most of site. Floodplain consists of steep, confined valley with mature forest. Functional uplift limited to a few areas of bank stabilization. Access would be difficult due to surrounding steep slopes and mature forest.	Removed due to limited uplift potential and access constraints	36
MO_00038	Montgomery	M-NCPPC	39.116035 -77.040559	North of Chapel Hill Rd. Norwood Village NCA.	2,912	Evidence of previous restoration within downstream 1,100 LF of site. 4-8 foot tall banks with approximately 40% that are eroded within site. Majority of site surrounded by mature forest. Potential for channel stabilization, riparian enhancements, and upstream habitat improvements. Some access to site from Chapel Hill Road, however forest clearing would be required for haul roads and upstream access. Several instream sewer crossings.	Removed at M-NCPPC's request due to existing stream restoration	31
MO_00042	Montgomery	M-NCPPC	39.067483 -77.084188	East of Turkey Branch Pkwy. Mathew Henson State Park.	6,936	Evidence of previous restoration throughout site. 5-15 foot tall banks with approximately 60% that are eroded within site, with several areas of severe erosion. Site surrounded by forest. Potential uplift limited to geomorphic and bank stabilization. Urban watershed would make biological and water quality improvements difficult. Forest clearing would be required to access entire site. Several instream sewer crossings within site.	Removed at M-NCPPC's request due to existing stream restoration	35
MO_00044	Montgomery	M-NCPPC	39.128343 -77.022104	North of Ednor Rd. Woodlawn Cultural SP.	1,151	1-3 foot wide channel with minor to moderate localized bank erosion. Site surrounded by forest. Majority of site appears stable with limited potential for functional uplift. Site removed following windshield survey.	Removed due to site stability and limited uplift potential	NA
MO_00053	Montgomery	M-NCPPC	39.009242 -77.094523	North of Cedar Ln. Elmhirst Parkway NCA.	2,391	3-5 foot tall banks throughout site that are mostly stable. Good instream habitat. Old walls stabilizing some banks. Site removed following windshield survey.	Removed due to site stability and limited uplift potential	NA
MPAO0001	Prince George's	BARC	39.018526 -76.949208	East of I-95/I-495 Park & Ride. North of Marlbrough Way.	1,202	BARC recommendation. Upstream section is concrete lined and natural channel that is highly unstable with severe bank erosion and exposed sewer line. Middle section is incised but stabilized by tree roots and not recommended for restoration. Downstream section has moderate localized bank erosion. Site surrounded by active agricultural fields and forest. Potential for sediment reduction and instream habitat improvements. Access from adjacent agriculture fields.	Selected for Potential Mitigation Site List (Site AN-7). Combine with MPAO0003.	52
MPAO0002	Prince George's	BARC	39.014569 -76.943005	Southwest of Cherry Hill Rd. & I-95	4,795	BARC recommendation. Paint Branch. Majority of site consists of 8-12 foot tall banks stabilized by tree roots or rip-rap. Three localized severe bank erosion areas. Two sewer crossings. Very limited uplift potential due to stability of site and floodplain consisting of agricultural fields that are used by BARC.	Removed due to limited uplift potential & land use conflicts	50

Site selected for Potential Mitigation Site List

Table F-3. Windshield and Walkthrough Stream Mitigation Sites - Middle Potomac-Anacostia-Occoquan

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
MPAO0003	Prince George's	BARC	39.012977 -76.945156	East of Marlbrough Way	1,987	BARC recommendation. Upstream section stable and removed from further consideration. Section downstream of culvert is unstable with two culverts (1 failure) creating fish blockages. Site surrounded by forest with extensive invasives. Potential for fish blockage removal, instream habitat improvements, and invasive treatment. Access from adjacent agricultural fields.	Selected for Potential Mitigation Site List. (Site AN-7). Upstream section removed due to stability. Combine with MPAO0001.	44
MPAO0004A	Prince George's	BARC	39.026726 -76.929588	South of Sellman Rd.	4,212	BARC recommendation. Little Paint Branch. Majority of site has 6-10 foot that are stabilized by tree roots or rip rap. Channel appears to have been straightened and is surrounded by floodplain berms. Site surrounded by farm fields used by BARC. Good existing instream habitat. No opportunity for floodplain development due to adjacent berms and farm fields. Site connects downstream to MPAO0004B.	Removed due to limited uplift potential & land use conflicts	36
MPAO0004B	Prince George's	BARC	39.021452 -76.931587	North of I-495 & South of Yuma St.	1,124	BARC recommendation. Little Paint Branch. Majority of site has of 3-6 foot tall banks that are stable. Two areas with localized moderate to severe erosion. Site surrounded by forest and farm field. Limited opportunity for floodplain development due to adjacent farm field. Access would require forest clearing. Site connects upstream to MPAO0004B.	Removed due to limited uplift potential & land use conflicts	26
MPAO0005	Prince George's	BARC	39.021837 -76.903277	West of Edmonston Rd.	5,773	BARC recommendation. Indian Creek. Banks are less than three feet tall throughout most of site with minimal erosion areas. Braided channels throughout site. Site is surrounded by forest with some wetlands that would make access difficult. Overall potential uplift potential is very limited.	Removed due to limited uplift potential	27
MPAO0006	Prince George's	BARC	39.014942 -76.898731	Southwest of Edmonston Rd.	1,407	BARC recommendation. Indian Creek. Consistent 3 foot tall eroded banks upstream of braided section and downstream of Edmonston Road. Channel is surrounded by a mix of young and mature deciduous forest, limiting floodplain development. Potential for lateral stability, habitat enhancement, floodplain reconnection, and bedform diversity improvements. Potential access through field on southeastern bank, however access to majority of stream would require tree impacts.	Removed due to limited potential for ecological uplift	44
MPAO0007	Prince George's	BARC	39.028099 -76.869391	North & South of Beaver Dam Rd.	3,859	BARC recommendation. Downstream section contains mapped wetlands of special state concern. Upper 2/3 of reach is completely eroded due to downcutting. Lower 1/3 has 4 foot tall eroded banks. Channel surrounded by a mix of young and mature deciduous forest. Potential for floodplain development, vertical and lateral stabilization, and in-stream habitat improvements. Potential access through existing BARC roadways, however access to sections of the stream would require tree clearing. Culvert under Beaverdam Rd should be considered for replacement. Sewer line above stream and surrounding mature forest may limit available restoration methods.	Removed due to wetlands of special state concern	53

Site selected for Potential Mitigation Site List

Table F-3. Windshield and Walkthrough Stream Mitigation Sites - Middle Potomac-Anacostia-Occoquan

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
MPAO0009	Montgomery	M-NCPPC	38.996538 -77.009364	South of Sligo Creek Pkwy. Sligo Creek SVU 2.	2,668	M-NCPPC recommendation. Riprap along 70-80% of banks within site. 5 foot tall eroded banks along 20-30% of reach. Most of site is stable due to riprap along channel and not many opportunities exist for ecological uplift. Site surrounded by forest and recreational park. Multiple access routes exist with trails/parking lots/ and roads adjacent to channel. Site could be combined with MPAO0028.	Removed due to limited potential for ecological uplift	30
MPAO0010	Montgomery	M-NCPPC	39.010793 -77.02182	West of Brunette Ave. Sligo Creek SVU 3.	644	M-NCPPC recommendation. Riprap along majority of reach. 3 foot tall eroded banks along 10% of reach. Channel is surrounded by a roadway and a mix of scrub-shrub and forest, limiting floodplain development. Potential uplift limited to lateral channel stability and instream habitat improvements. Potential access through adjacent M-NCPPC roadway. Site could be combined with MPAO0017.	Removed due to limited potential for ecological uplift	48
MPAO0011	Montgomery	M-NCPPC	39.035736 -77.030943	South of University Blvd. Sligo Creek SVU 4.	546	M-NCPPC recommendation. 4.5 foot tall eroded banks within 40% of site. Site surrounded by forested parkland. Floodplain development limited by adjacent trail and roadway. Potential for fish passage, lateral stabilization, floodplain access, and bedform diversity improvements. Potential access through adjacent roadway and trail with minor tree clearing required.	Removed due to small site size	43
MPAO0012	Montgomery	M-NCPPC & Derwood Station HOA	39.117108 -77.149593	Southeast of Redland Rd. Crabbs Branch SVP.	7,657	M-NCPPC recommendation. Crabbs Branch. 3-8 foot tall severely eroded banks throughout site. Incised channel surrounded by reed canary floodplain with scattered trees. Upstream end of site is forested. Potential for sediment reduction, floodplain connectivity, wetland creation/enhancement, aquatic habitat improvements, and riparian buffer plantings. Potential access through adjacent HOA roads.	Selected for Potential Mitigation Site List (Site AN-1). Combine with wetland site MPAO0032.	71
MPAO0013	Montgomery	M-NCPPC	39.110435 -77.032964	East of Layhill Rd. Northwest Branch Golf Course.	1,014	M-NCPPC recommendation. Existing stream restoration within site that appears mostly stable or buried. 5 foot tall banks throughout site with localized areas of moderate to severe bank erosion. Channel surrounded by mid-successional forested parkland and a golf course. Limited opportunities for sediment reduction and floodplain development improvements. Potential access from golf course, however most access to the stream would require forest clearing. Site located just upstream of ICC site NW-170.	Removed due to site stability and limited uplift potential	35
MPAO0014	Montgomery	M-NCPPC & South Stonegate HOA	39.092946 -77.016077	South of Bonifant Rd. Northwest Branch SVU 5.	5,967	M-NCPPC recommendation. 3-8 foot tall severely eroded banks throughout site. Incised channel surrounded by poor quality forest with extensive invasives. Potential for sediment reduction, floodplain development, fish passage, invasive treatment, and aquatic habitat improvements. Potential access through old access used for adjacent ICC stream restoration project (NW-4).	Selected for Potential Mitigation Site List (Site AN-3). Section upstream of Bonifant Rd. removed due limited functional uplift potential and site constraints.	58

Site selected for Potential Mitigation Site List

Table F-3. Windshield and Walkthrough Stream Mitigation Sites - Middle Potomac-Anacostia-Occoquan

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
MPAO0015	Montgomery	M-NCPPC	39.071546 -77.110477	South of Veirs Mill Rd. & east of Twinbrook Pkwy. Rock Creek SVU 6.	720	M-NCPPC recommendation. Majority of reach appears stable with the exception of three localized severe bank erosion areas. Culvert failure at downstream end of site. Channel surrounded by mid successional forest and steep valley slope to the north limiting potential for floodplain development. Improvements limited to sediment reduction and removal of failed culvert. Good existing instream habitat. Potential access through existing sewerline clearing would require minimal tree impacts.	Removed due to site stability and limited uplift potential	22
MPAO0016	Montgomery	M-NCPPC	39.020415 -77.033087	East of Dublin Dr. Sligo Creek SVU 4.	177	M-NCPPC recommendation. Localized areas of minor to moderate erosion along 4-8 foot tall banks. Old ford crossing at upstream end of site creating fish blockage. Site surrounded by forest with patchy open invasive areas. Potential for sediment reduction, fish passage, and riparian plantings. Potential access along trail or upstream MPAO0031 old clearing. Recommend avoiding restoration near pedestrian bridge where stream appears stable. Combine with MPAO0031.	Removed due to previous stream restoration & less potential for ecological uplift	39
MPAO0017	Montgomery	M-NCPPC	39.009773 -77.021112	South of Leighton Ave. Sligo Creek SVU 3.	283	M-NCPPC recommendation. Bank erosion limited to perched culvert outfall. Channel surrounded by narrow strip of marginal forest adjacent to an open field. Potential for buffer enhancements and vertical/lateral stabilization at perched culvert outfall. Potential access through adjacent roadway and open field.	Removed due to small site size and limited potential for ecological uplift	61
MPAO0018	Montgomery	M-NCPPC	39.055863 -77.040362	South of Femmont Ln. Wheaton Regional Park.	530	M-NCPPC recommendation. Deeply incised ephemeral channel surrounded by mature forested parkland. 4-7 foot tall eroded banks within 70% of reach. Potential for vertical stabilization to reduce sediment transport to downstream pond. Potential access through paved park trail parallel to channel. Easy access to both banks/floodplains. Bedrock and sand deposition throughout reach.	Removed due to ephemeral channel	63
MPAO0019	Montgomery	M-NCPPC	39.034176 -77.010231	North of Columbia Pike (Rt. 29). Northwest Branch SVU 4.	3,616	M-NCPPC recommendation. Northwest Branch just upstream from 25 foot tall dam. 4 foot tall stable banks throughout majority of reach. Active floodplain provides no potential for floodplain development. Opportunities for dam removal and fish passage, release of trapped sediment behind dam, and bank stabilization. Potential access through forested floodplain requiring tree impacts.	Removed due to natural fish blockage downstream of dam and limited potential for ecological uplift upstream of dam.	35
MPAO0020	Montgomery	M-NCPPC	39.065186 -77.028844	East of Kemp Mill Rd. Northwest Branch SVU 4.	448	M-NCPPC recommendation. 8-10 foot tall banks throughout reach. 40% of banks appear unstable/slumping, while 60% of banks appear stable. Channel surrounded by mature forest with some wetlands. Floodplain slightly less than 10 times the width of the channel, confined by steep valley slope and roadway. Potential for fish blockage removal, aquatic habitat enhancements, and lateral/vertical channel stabilization. Some potential for floodplain connectivity. Potential access through existing utility access road.	Removed due to small site size	43

Site selected for Potential Mitigation Site List

Table F-3. Windshield and Walkthrough Stream Mitigation Sites - Middle Potomac-Anacostia-Occoquan

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
MPAO0021	Montgomery	M-NCPPC & Mo. County	39.065186 -77.028844	North of Lamberton Dr. Northwest Branch SVU 4.	4,832	M-NCPPC recommendation. Northwest Branch trib. Greater than 50% of reach with moderate to severe bank erosion. Channel surrounded by mature forest and steep valley slopes limiting floodplain development. Potential for lateral migration, geomorphic stability, aquatic habitat, and bedform diversity improvements. Several potential access routes exist through adjacent trails requiring some tree clearing.	Selected for Potential Mitigation Site List (Site AN-5). Majority of downstream section is on the USACE's priority list for the Anacostia Watershed Restoration Program and was therefore removed.	54
MPAO0022	Montgomery	M-NCPPC	39.041527 -77.036395	North of Ladd St. Sligo Creek SVU 5.	3,218	M-NCPPC recommendation. Five foot tall eroded banks throughout majority of site. Channel surrounded by mature forests with scattered wetlands. Potential for lateral and vertical channel stabilization and floodplain reconnection in upstream reach. Potential access routes through wide trails adjacent to stream and open mature forest for remaining areas.	Removed due to less potential for ecological uplift	49
MPAO0023	Montgomery	Mo. County	39.037829 -77.080548	Median on Denfeld Ave.	1,078	M-NCPPC recommendation. Small ephemeral channel in Mo. County ROW. 1-3 foot tall banks that are mostly stable with localized areas of minor erosion. Channel has been stabilized in several areas with imbricated walls and rip-rap. No potential for ecological uplift due to ephemeral nature of channel.	Removed due to ephemeral channel	55
MPAO0024	Montgomery	M-NCPPC	39.066586 -76.991351	Northeast of Maple St. Cannon Road Local Park.	462	M-NCPPC recommendation. 8-9 foot tall eroded banks throughout site. Incised channel surrounded by mature forest, limiting floodplain development. Potential for lateral migration and vertical stability improvements. Potential access from Maple Street requiring some tree impacts. Site could tie into downstream ICC stream restoration site (PB-12).	Removed due to small site size	53
MPAO0025	Montgomery	Mo. County	39.04022 -77.01838	Northeast of Kenbrook Dr.	266	M-NCPPC recommendation. 5 foot tall eroded banks within 60% of site. Concrete lined channel at upstream end of site. Majority of site consists of incised channel surrounded by mature forest. Potential for lateral migration and vertical stability improvements. Potential access through trail off of Hillsboro Drive. Existing stream restoration downstream of site.	Removed due to small site size	49
MPAO0026	Montgomery	M-NCPPC	39.050182 -77.011505	Northeast of Hermleigh Rd. Northwest Branch SVU 4.	238	M-NCPPC recommendation. No channel observed. Flow disperses into PFO wetland. Site consists of mature forest.	Removed due to no restoration potential	28
MPAO0027	Montgomery	Mo. County	39.01234 -77.034252	Northeast of Columbia Blvd.	1,369	M-NCPPC recommendation. 4-8 foot tall eroded banks within 40% of site. Channel surrounded mostly by forest. Limited potential for floodplain development south of channel due to residential community. Potential for fish blockage removal, lateral/vertical channel stabilization, instream habitat and bedform diversity improvements, and floodplain reconnection north of channel. Potential access through adjacent road/trail with minimal tree clearing.	Removed due to tree impacts & limited upstream habitat	43

Site selected for Potential Mitigation Site List

Table F-3. Windshield and Walkthrough Stream Mitigation Sites - Middle Potomac-Anacostia-Occoquan

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
MPAO0028	Montgomery	M-NCPPC	38.993594 -77.005321	East of Devon Rd. Sligo Creek SVU 1.	766	M-NCPPC recommendation. Five foot tall banks throughout most of site stabilized by rip rap and boulder protection. Channel surrounded by narrow forested buffer. Floodplain development limited by adjacent roadway and residential housing. Potential uplift limited to fish blockage removal and vertical stabilization of the channel. Access from Sligo Creek Pkwy.	Removed due to limited potential for ecological uplift	26
MPAO0029	Montgomery	M-NCPPC	39.00188 -76.999002	North of Piney Branch Rd. Long Branch SVU 2.	2,575	M-NCPPC recommendation. 4-7 foot tall eroded banks throughout majority of site. Evidence of past stream restoration at upstream end of site appears stable. Active stream work at downstream end of site. Channel surrounded by forest. Potential for lateral/vertical channel stabilization, floodplain development, and invasive species treatment. Potential access through nearby community center and park requiring some tree clearing.	Removed due to previous restoration & ongoing work on-site	47
MPAO0030	Montgomery	M-NCPPC	39.072737 -77.038804	East of Layhill Rd. Northwest Branch SVU5.	5,800	M-NCPPC recommendation. Bel Pre Creek. 4-7 foot tall eroded banks within 35% of site. Channel surrounded by forest with scattered wetlands and tree plantings. Potential for lateral stabilization, aquatic habitat and riparian buffer improvements and water quality treatment. Potential access to downstream reach from Tivoli Lake Blvd. Access to upstream reach from Middle Bridge Drive or the M-NCPPC Hickory Hill pool.	Removed. Site listed on the USACE's priority list for the Anacostia Watershed Restoration Program (Site AN-2).	44
MPAO0031	Montgomery	M-NCPPC & Mo. County	39.022574 -77.034107	South of Woodman Ave. Sligo Creek SVU 4.	2,156	M-NCPPC recommendation. Localized areas of moderate to severe erosion along 4-8 foot tall banks. Evidence of past stream restoration with some sections appearing stable. Old ford crossing at downstream end of site creating fish blockage. Site surrounded by forest. Potential for sediment reduction, fish passage, and floodplain development east of stream. Potential access along old clearing east of stream. Combine with MPAO0016.	Removed due to previous stream restoration & less potential for ecological uplift	43
PG_00002	Prince George's	M-NCPPC	38.794602 -76.95533	Between Brinkley Rd. & Bock Rd. Henson Creek SVP.	9,051	Henson Creek. 5-7 foot tall banks throughout site mostly stabilized by tree roots, herbaceous veg or rip rap. Localized moderate to severe bank erosion. Site mostly surrounded by mid-successional forest. Good instream habitat. Limited potential for overall ecological uplift. Floodplain development limited by pedestrian trail, horse track, and adjacent land owners. Existing access along pedestrian trail & grass swale.	Removed due to limited uplift potential	31
PG_00016	Prince George's	SHA, PEPCO & M-NCPPC	39.048994 -76.931214	South of Powder Mill Rd & in the median of I-95. Little Paint Branch SVP.	1,569	Little Paint Branch. Section between I-95 consists of concrete lined channel and east of I-95 consists of natural channel with existing imbricated rock structures. Little to no evidence of bank erosion throughout site. Site is surrounded mostly by meadow with some forest at downstream end. Potential limited to riparian improvements and vertical channel stabilization. Potential existing access from I-95, M-NCPPC parkland, or utility ROW with minimal tree impacts.	Removed due to limited uplift potential	53
PG_00077	Prince George's	WMATA, M-NCPPC & Mayor & Town Council of Cheverly	38.915426 -76.912602	South of Columbia Park Rd. Jesse J. Warr Jr. Park	1,669	Majority of site on WMATA properties. Deeply incised channel. 3-10 foot tall banks with the majority of the banks protected by gabion baskets. Some areas of localized severe erosion. Segment east of 64th Avenue is stable. Site surrounded by mature forest with extensive invasives. Potential uplift limited to geomorphic channel stabilization and instream habitat improvements. Access would require forest clearing.	Removed due to site stability and no response from WMATA	40

Site selected for Potential Mitigation Site List

Table F-3. Windshield and Walkthrough Stream Mitigation Sites - Middle Potomac-Anacostia-Occoquan

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
PG_00079	Prince George's	M-NCPPC & City of Seat Pleasant	38.89304891 -76.89516754	South of Birchleaf Ave. J. Franklyn Bourne Pool	1,068	Deeply incised channel with 6-11 foot tall severely eroded banks throughout site. Potential for reducing erosion and improving instream habitat. Some potential for floodplain development in downstream section. Site surrounded by forest. Sewer line clearing east of site with small tree plantings could provide potential access.	Removed due to less potential for ecological uplift	54
PG_00097	Prince George's	M-NCPPC, PG County & Private	38.756622 -77.000749	South of Oxon Hill Rd. Henson Creek SVP.	1,568	Henson Creek. Site located in Historic District. 5-6 foot tall banks with moderate to severe erosion throughout site. Extensive deposition bars within site. Potential for sediment reduction, floodplain development and instream habitat improvements. Site surrounded by forest. Potential access through old WSSC clearing west of site and abandoned road east of site.	Removed due to location within historic district	44
PG_00110	Prince George's	City of Greenbelt	39.004697 -76.881246	North of Lakeside Dr.	1,764	1-3 foot tall banks stabilized by vegetation. Majority of site appears stable. Site surrounded by forest to north and ball fields to the south. Limited potential for functional uplift. Site removed following windshield survey.	Removed due to channel stability and limited uplift potential	NA
PG_00111	Prince George's	BARC	38.915426 -76.912602	West of 295 & South of Beaver Dam Rd.	3,154	Entire site surrounded by wetlands of special state concern and forest. 50% of banks are eroded within site. Upstream section is severely incised with 4-9 foot tall banks. Downstream section has 3-4 foot tall banks and appears to be connected to floodplain that has several wetlands. Potential improvements to upstream section include bed and bank stabilization, instream habitat improvements, and floodplain development. Potential access through utility ROW, however tree clearing would be required to access stream.	Removed due to wetlands of special state concern	48
PG_00112	Prince George's	BARC	39.023302 -76.85279	North of Beaver Dam Rd. & between 295 and Soil Conservation Rd.	4,147	Entire site surrounded by wetlands of special state concern and forest. 2 foot tall banks throughout site with minor erosion. Some areas with localized moderate bank erosion. Limited potential for floodplain development. Potential access along BARC & utility roads, however access to stream would require tree impacts.	Removed due to wetlands of special state concern and limited potential for ecological uplift	27
PG_00114	Prince George's	City of Greenbelt, SHA & Private	39.008461 -76.904091	Cherrywood Ln.	1,235	Three foot tall banks throughout site that are mostly armored and stable. Site mostly surrounded by mature deciduous forest. Potential geomorphic stabilization near confluence with Indian Creek. Otherwise uplift potential is very limited. Access would require forest clearing.	Removed due to limited uplift potential	31
PG_00118	Prince George's	NPS	38.97658 -76.905648	North of Good Luck Rd. Greenbelt Park.	5,067	Trib to Brier Ditch. Severe erosion and headcutting throughout upstream portion of reach. 6-10 foot tall banks throughout upstream 2/3 of site and 3-6 foot tall banks throughout downstream 1/3 of site. Site surrounded by mature forest in National Park. Potential for bed and bank stabilization and instream habitat improvements. Access would require forest impacts. Site flows into SSS-160062C.	Removed due to high quality forest impacts	58
PG_00120A	Prince George's	BARC	39.019955 -76.892741	East of Edmonston Rd.	5,371	Entire site mapped as wetlands of special state concern. Moderate erosion along 4 foot tall banks throughout most of site. Site surrounded by forest. Potential for sediment reduction, increasing geomorphic stability, instream habitat improvements, and wetland enhancement. Multiple access points from upstream and downstream ends of site that would require minimal tree removal.	Removed due to wetlands of special state concern	49

Site selected for Potential Mitigation Site List

Table F-3. Windshield and Walkthrough Stream Mitigation Sites - Middle Potomac-Anacostia-Occoquan

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
PG_00120B	Prince George's	BARC	39.023356 -76.879996	West of Research Rd.	1,420	Site added during walkthrough survey. Entire site mapped as wetlands of special state concern. Unstable 4-5 foot tall banks throughout most of site. Site surrounded by PEM wetlands. Potential for sediment reduction, increasing geomorphic stability, instream habitat improvements, floodplain development and stream buffer improvements. Potential access from adjacent roads and powerline ROW.	Removed due to wetlands of special state concern	67
PG_00121	Prince George's	City of Greenbelt	39.008083 -76.867652	East of Ridge Rd.	1,977	Ephemeral channel with 3 foot tall banks surrounded by forest. Site removed following windshield survey.	Removed due to ephemeral channel	NA
PG_00122	Prince George's	NPS	38.986595 -76.887935	East of 295 & South of 495. Greenbelt Park.	3,548	Trib to Brier Ditch. Downstream quarter of the reach with heavy aggradation to the confluence. Remaining upstream portion of the reach is severely incised with banks averaging 10 feet in height along a narrow stream channel. Several instream utility assets are exposed and threatened by continued downcutting of the stream bed. Potential for lateral/vertical stabilization and bedform diversity improvements. Site surrounded by mature forest and access would likely require significant tree impacts. Potential access at I295/I495 interchange. Site flows into SSS-160062A.	Removed due to high quality forest impacts	53
PG_00124	Prince George's	M-NCPPC	39.028914 -76.950838	West of I-95 & South of Powder Mill Rd. Powder Mill Community Park.	1,958	Paint Branch. Majority of site appears stable. Five foot tall banks with minor erosion throughout site. Site surrounded by mature forest. Little to no potential for functional uplift. Potential access along old sewerline that has young tree plantings	Removed due to limited uplift potential	30
PG_00131	Prince George's	WMATA & Pennsylvania Lines LLC	38.930502 -76.894001	North of Landover Rd.	1,025	Access not granted for walkthrough survey. Windshield survey - Over widened channel with moderate bank erosion.	Removed due to no access	NA
PG_00132	Prince George's	BARC	39.016993 -76.898683	West of Edmonston Rd.	954	Upper 2/3 of site has 1-2 foot tall eroded banks with good floodplain access and lower 1/3 of site has 2-4 foot tall eroded banks with no floodplain access. Site surrounded by mature forest. Limited potential for erosion reduction, floodplain development, and instream habitat improvements. Potential access from Edmonston Rd, however tree clearing would be required to access stream.	Removed due to limited uplift potential	40
PG_00134	Prince George's	WMATA & Pennsylvania Lines LLC	38.934539 -76.887186	West of Pennsy Dr.	4,741	Access not granted for walkthrough survey. Windshield survey - Over widened channel with minor bank erosion.	Removed due to no access	NA
PG_00136	Prince George's	National Railroad Passenger Corp.	38.916389 -76.935788	South of MD-50 & west of 295	2,173	Access not granted for walkthrough survey. Windshield survey - Concrete lined channel under MD 201 that drains to large straightened channel that runs along toe of railroad embankment.	Removed due to no access	NA
PG_00138	Prince George's	Board of Education, WMATA & PG. County	38.88651986 -76.88835557	East of Branch Rd. Central High School.	1,940	Moderate bank erosion with 5-10 foot tall banks throughout most of site. Incised channel surrounded by mid-successional forest. Potential for sediment reduction, instream habitat and aesthetic improvements, and floodplain development south of channel. Potential access along overgrown sewer easement south of channel.	Removed due to design constraints. Narrow valley and adjacent metro embankment.	49

Site selected for Potential Mitigation Site List

Table F-3. Windshield and Walkthrough Stream Mitigation Sites - Middle Potomac-Anacostia-Occoquan

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
SSS-150020	Montgomery	M-NCPPC	39.068978 -77.028791	Northeast of Hugo Circle. Northwest Branch SVU 5.	2,583	Bel Pre Creek. 30% of site consists of 4-5 foot tall eroding banks. Site surrounded by mature floodplain forest. Potential for geomorphic stabilization and instream habitat improvements. Potential access off Trivoli Lake Blvd, however forest impacts will be required to access stream.	Removed. Site listed on the USACE's priority list for the Anacostia Watershed Restoration Program (Site AN-2).	31
SSS-150021	Montgomery	M-NCPPC	39.127546 -77.139088	Northeast of Keats Terrace. Rock Creek Regional Park.	1,781	70% of site consists of 4-9 foot tall eroding banks. Several areas of severe erosion. Site surrounded by forest with extensive invasives. Potential for channel stabilization, floodplain development, and invasive treatment. Potential access from Wick Lane, however access to stream would require forest impacts.	Removed at M-NCPPC's request due to access difficulty and terrestrial impact concerns	62
SSS-150023	Montgomery	M-NCPPC	39.061106 -77.028795	South of Glenallan Ave. Wheaton Regional Park.	3,069	High priority M-NCPPC site. Moderate bank erosion along 4 foot tall banks throughout most of site. Some localized severe bank erosion areas. Site surrounded by forest. Potential for sediment reduction, geomorphic stability, and instream habitat improvements. Potential access from adjacent road would require minimal tree clearing.	Selected for Potential Mitigation Site List (Site AN-4)	52
SSS-150040	Montgomery	M-NCPPC	39.183457 -77.120731	South of Stanbrook Ln. Rock Creek SVU 16 & Upper RC LP.	1,477	1.5 foot tall banks with minor erosion throughout most of site. Majority of site surrounded by PEM/PSS wetlands and tree plantings. Potential uplift limited to riparian enhancements. Existing access from park entrance and path that parallels the stream.	Removed due to limited uplift potential	45
SSS-150041	Montgomery	M-NCPPC	39.17486 -77.100179	West of Olney Laytonsville Rd. North Branch SVU 4.	925	Majority of site consists of undefined channel surrounded by wetland meadow. Bank height is less than one foot throughout site. No bank erosion observed. Potential uplift limited to riparian enhancements. Access would be required through PEM wetlands.	Removed due to limited uplift potential	49
SSS-160039	Prince George's	WSSC & M-NCPPC	38.950194 -76.951858	East of 38th Ave. Anacostia River SVP.	1,123	Five foot tall banks with old erosion that appears to be stabilizing. Site surrounded by mature forest west of stream and open recreational park east of stream. Potential uplift includes lateral stabilization, floodplain development, and instream habitat improvements. Existing open access from adjacent rec. park.	Remove. Site has been controversial in past due to upstream flooding. Numerous landowners. Located in Critical Area. Majority of site on WSSC property (1,093 LF).	52
SSS-160040	Prince George's	M-NCPPC	39.969585 -76.910429	East of 61st Pl. Madison Hill Park.	2,663	Large channel mostly consisting of pool habitat. 4 foot tall banks stabilized by vegetation throughout most of site. Limited potential for functional uplift. Recent WSSC channel stabilization in several sections. Site surrounded by forest. Potential access through old sewer repair route that spans entire site. Site removed following windshield survey.	Removed due to channel stability and limited uplift potential	NA

Site selected for Potential Mitigation Site List

Table F-3. Windshield and Walkthrough Stream Mitigation Sites - Middle Potomac-Anacostia-Occoquan

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
SSS-160041	Prince George's	NPS	38.983607 -76.884114	Northwest of Nashville Rd. Greenbelt Park	2,408	Trib to Brier Ditch. Reach consists of extensive bank erosion, ranging from 4 to 9 feet in height. Site surrounded by mature forest. Potential for vertical/lateral stabilization, bedform diversity improvements, and floodplain access improvements on right bank where there is ample space and less dense forest/wetland. Site surrounded by mature forest and would likely require significant tree impacts. Access from neighborhood at the upstream extent of the reach. Site flows into SSS-160062A.	Removed due to high quality forest impacts	63
SSS-160042	Prince George's	NPS	38.994218 -76.899435	South of MD-193 & east of MD-201	1,091	Deeply incised channel. 5-15 foot tall eroded banks with erosion throughout entire site. Site surrounded by steep forested valley on national park land. Opportunity for headcut/grade control exists within reach, but culvert invert elevations prevent opportunities for significant enhancements. Potential access through roads at upstream and downstream ends, but dense forest throughout reach limit access and floodplain development.	Removed due to limited uplift potential and forest impacts	55
SSS-160053	Prince George's	M-NCPPC	38.987488 -76.964188	East of W Park Dr. & north of MD-193. Northwest Branch SVP.	2,378	Northwest Branch. 5-8 foot tall banks throughout site. 10% of site has bank erosion, with isolated severe erosion on outside meanders. Most of site appears stable. Existing bank armoring observed in several areas. Good existing instream habitat. Site surrounded by mature forest. Potential uplift limited to localized bank stabilization. Potential access from adjacent trails and clearings in the forest.	Removed due to limited uplift potential	35
SSS-160058	Prince George's	M-NCPPC	38.901499 -76.891591	South of Central Hills Ln. Highland Park.	1,361	Deeply incised headwater stream. Localized moderate to severe erosion along 5-10 foot tall banks. Some sections stabilized by tree roots. Potential for sediment reduction and instream habitat improvements. Limited floodplain development potential due to narrow valley and adjacent residential homes. Surrounded by mid successional forest. Old overgrown sewer clearing along north side of channel could be used for access. Extensive trash throughout site.	Removed due to less potential for ecological uplift	44
SSS-160059	Prince George's	M-NCPPC	38.929105 -76.902346	Southeast of Maureen Ct. Cheverly East Park.	1,347	4-5 foot tall banks throughout site with localized moderate erosion. Previous restoration within site, however some areas still appear unstable. Site surrounded by young and mature forests. Potential for lateral and vertical channel stabilization, and instream habitat improvements. Access would require forest impacts.	Removed due to limited uplift potential	39
SSS-160060	Prince George's	City of Seat Pleasant	38.89717533 -76.8994935	South of Martin Luther King Jr. Hwy.	4,478	Entire site consists of 6 foot tall concrete lined channel surrounded by residential homes, forest and recreational park. Banks stable throughout site. Potential ecological uplift limited to instream habitat improvements. Access would require tree clearing behind residential homes.	Removed due to limited uplift potential	27
SSS-160062A	Prince George's	NPS	38.981418 -76.890001	West of Nashville Rd. Greenbelt Park.	3,341	Site added during walkthrough survey. Trib to Brier Ditch. Significant aggradation occurring upstream of the 295 road crossings with moderate erosion on outside meanders (4 foot tall banks) throughout reach. Potential for lateral/vertical stabilization, bedform diversity improvements, floodplain development, and instream/riparian habitat improvements. Site surrounded by mature forest and would likely require significant tree impacts. Site flows into SSS-160062C.	Removed due to high quality forest impacts	48

Site selected for Potential Mitigation Site List

Table F-3. Windshield and Walkthrough Stream Mitigation Sites - Middle Potomac-Anacostia-Occoquan

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
SSS-160062B	Prince George's	NPS	38.982152 -76.906653	South of Greenbelt Rd. and west of I-295. Greenbelt Park	6,669	Site split during walkthrough survey. Trib to Brier Ditch. Incised channel with 6 foot tall banks on average and many overland flow headcuts. Site surrounded by mature forest. Floodplain access exists in some areas but could be expanded in others. Vertical stability at culverts can be addressed. Potential for instream habitat improvements. Adjacent NPS roads and trails could be used for access, however tree clearing would likely still be required. Sewer asset parallels stream for much of the reach. Site flows into SSS-160062C.	Removed due to high quality forest impacts	58
SSS-160062C	Prince George's	NPS	38.990333 -76.895634	East of Kenilworth Ave. Greenbelt Park.	8,894	Site split during walkthrough survey. Trib to Brier Ditch. Mainstem through NPS Greenbelt Park. Stream is incised with 6 foot tall banks on average and many active overland flow headcuts. Downstream section experiencing significant aggradation instream and large depositional features. Upstream two-thirds of the reach is vertically unstable with severe fish blockage at the NPS park road due to continued downcutting. Utility assets parallel and cross the stream. Site surrounded by mature forest. Existing access to the downstream section via MD 201 and old sewer access road, however tree clearing would likely be required for most of the site. Upstream access from NPS road.	Removed due to high quality forest impacts	44
SSS-160062D	Prince George's	NPS	38.986268 -76.903171	South of Westchester Park Dr. Greenbelt Park.	2,423	Site split during walkthrough survey.Trib to Brier Ditch. Extreme headcut at the upstream extent of this reach originating from a stormwater structure on Friends Community School property. Downcutting in this reach has caused a substantial amount of sedimentation and aggradation downstream. Bank heights in the upstream section of this reach were upwards of 20 feet. Site surrounded by mature forest. Potential for vertical/lateral stabilization, bedform diversity improvements, and floodplain development at downstream end of site. Potential access from roadway to the west of the site, however tree clearing would likely be required for most of the site. Site flows into SSS-160062C.	Removed due to high quality forest impacts	67
SSS-160063	Prince George's	M-NCPPC, PG County, WSSC, City of College Park	38.986491 -76.930313	South of Lakeland Rd. Paint Branch SVP II & III.	3,069	Paint Branch. Upstream and downstream segments located on forest conservation easements. 20% of site consists of 4-8 foot tall eroding banks. Site surrounded by mature forest with numerous property owners. Potential for channel stabilization, floodplain development, instream habitat improvements, and connection to upstream and downstream restoration projects. Potential access along trails, however forest clearing would be required to access stream.	Removed due to forest conservation easement restrictions & multiple property owners	40
SSS-160065	Prince George's	M-NCPPC	38.95361314 76.92642596	West of Kenilworth Ave. Anacostia River SVP.	1,904	Four foot tall banks with minor to moderate erosion throughout most of site. Signs of historic channel straightening. Site surrounded by mowed grass with scattered large trees. Sewer crossing at downstream section causing fish blockage. Potential for vertical and lateral channel stabilization, fish blockage removal, and riparian habitat improvements. Existing access throughout most of adjacent park.	Removed due to floodplain constraints & less potential for ecological uplift	66

Site selected for Potential Mitigation Site List

Table F-3. Windshield and Walkthrough Stream Mitigation Sites - Middle Potomac-Anacostia-Occoquan

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
SSS-160066	Prince George's	M-NCPPC	38.95505408 -76.92621304	Southwest of Spring Lane. Anacostia River SVP.	1,552	Approximately 20% of the site has active bank erosion with 3-6 foot tall banks. Signs of historic channel straightening. Site surrounded by mowed grass with scattered large trees. Potential for vertical and lateral channel stabilization and riparian habitat improvements. Existing access throughout most of adjacent park.	Removed due to less potential for ecological uplift	75
SSS-160068	Prince George's	M-NCPPC	38.997809 -76.967345	East of 22nd Pl. Adelphi Road Park.	663	6-7 foot tall banks with severe erosion along outside meanders throughout site. Stream in poor condition. Site surrounded by mature forest with dense understory. Potential for floodplain development, lateral stabilization, and instream habitat improvements. Access would require forest clearing.	Removed due to small site size and forest impacts	63
SSS-160070	Prince George's	Prince George's County	38.969981 -76.878142	Carrolton Pky ROW.	4,332	Site consists of a confined channel located in the County ROW between two roads. Approximately 65% of the site has active bank erosion with 2-6 foot tall banks. The floodplain consists of mowed grass with scattered trees along the stream banks. Potential for geomorphic stability, stormwater treatment and riparian improvements. There is existing access for the majority of the site that would require minimal tree impacts, but may require extensive MOT.	Removed due to limited uplift potential	57
SSS-160074	Prince George's	M-NCPPC	38.991783 -76.971016	Southeast of Riggs Rd. Northwest Branch SVP.	1,468	Northwest Branch. Stream banks relatively stable throughout site with localized erosion. Good instream habitat. Sections of bedrock within reach. Site is surrounded by mid-successional forest. Potential access along trail to north of site. Site removed following windshield survey.	Removed due to channel stability and limited uplift potential	NA
SSS-160075	Prince George's	M-NCPPC	38.972272 -76.964481	East of W Park Dr. & north of MD-410. Northwest Branch SVP.	4,806	Northwest Branch. Majority of site appears stable, however there are some localized areas of severe bank erosion. Site mostly surrounded by mature forest. Some potential for channel stabilization, instream habitat improvements and floodplain development. Potential access from park without extensive forest impacts.	Removed due to channel stability and limited uplift potential	38
SSS-160081	Prince George's	Board of Education	39.002885 -76.975103	South of Metzerott Rd. & west of MD-212	973	3-10 foot tall banks throughout site. 15% of banks are eroded within site, mostly in upstream reach. Perched culvert at upstream end of site. Site surrounded by steep valley with mature forest. Potential for geomorphic stabilization and instream habitat improvements. Access would require forest clearing.	Removed due to limited uplift potential and forest impacts	44

Site selected for Potential Mitigation Site List

Table F-4. Windshield and Walkthrough Stream Mitigation Sites - Middle Potomac-Catoctin

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
MO_00013A	Montgomery	M-NCPPC	39.23201509 -77.18753066	South of Watkins Rd. Great Seneca SVU 4.	2,934	3-4 foot tall banks with moderate to severe erosion throughout site. Several torturous meanders. Extensive floodplain dominated by reed canary grass with scattered trees. Potential for sediment reduction, instream habitat improvements, floodplain development, wetland creation/enhancement, and riparian plantings.	Selected for Potential Mitigation Site List (Site CA-2). Combine with wetland site WSS-150147A.	61
MO_00013B	Montgomery	M-NCPPC	39.23579123 -77.18752835	North of Watkins Rd. Magruder Branch SVU 1.	1,053	Site added during windshield survey. 2-4 foot tall banks with moderate erosion throughout most of site. Extensive floodplain dominated by reed canary grass with scattered trees. Potential for sediment reduction, instream habitat improvements, floodplain development, wetland creation/enhancement, and riparian plantings.	Selected for Potential Mitigation Site List (Site CA-3). Combine with wetland site WSS-150147B.	66
MO_00018	Montgomery	M-NCPPC	39.01127779 -77.21091459	South of Falls Rd. Heritage Farm NP.	3,723	1-5 foot tall banks with minor to moderate erosion throughout site. Site surrounded by mid-successional forest with several scattered wetlands. Old sewer line clearing runs parallel to stream in eastern floodplain that could be used as potential access. Opportunities for ecological lift include sediment reduction, floodplain development, aquatic habitat improvements and fish passage.	Selected for Potential Mitigation Site List (Site CA-6)	43
MO_00027	Montgomery	M-NCPPC	39.16799 -77.362346	West of Bucklodge Rd. Rickman Farm Horse Park.	1,803	Small channel that appeared stable. Dense vegetation along banks. Site removed following windshield survey.	Removed due to stable conditions	NA
MO_00035	Montgomery	DNR	39.14981629 -77.25098908	South of Clopper Rd. Seneca Creek State Park.	3,238	Ephemeral channel with minimal erosion in mature forest. Site removed following windshield survey.	Removed due to ephemeral channel	NA
MO_00037	Montgomery	M-NCPPC	38.985373 -77.151998	West of Helmsdale Rd. Booze Creek SVP.	4,032	Previous restoration throughout site that is failing. 3-9 foot tall eroding banks. Most of site surrounded by forest. Potential for bank stabilization, instream habitat improvements, and riparian enhancements. Existing access roads from past restoration off of Cabin John Pkwy & Helmsdale Rd.	Removed at M-NCPPC's request. Failed stream restoration that DEP is currently restoring.	44
MO_00047A	Montgomery	M-NCPPC	39.1585305 -77.2603644	North of Clopper Rd. Gunner's Branch LP	3,131	3-5 foot tall banks with moderate erosion throughout site. Majority of site is surrounded by mid successional forest and PEM/PSS wetlands. Potential for sediment reduction, instream habitat improvements, fish passage, wetland creation/enhancement, and riparian plantings. Potential access along old sewer clearing in western floodplain.	Removed due to less potential for ecological uplift	43
MO_00047B	Montgomery	DNR	39.15113494 -77.26403347	South of Clopper Rd. Strider Wildlife Management Area.	5,232	Site added during windshield survey. 3-5 foot tall banks with localized moderate erosion. Some sections of the site appear stable. Majority of site is surrounded by mid successional forest, with extensive PEM/PSS wetlands at upstream end of site. Potential access along old sewer clearing in western floodplain. Opportunities for ecological lift include sediment reduction, aquatic habitat improvements and floodplain development. DNR WHS stated that the majority of the site appears stable and the surrounding area is providing good wildlife habitat that should not be disturbed.	Removed at DNR's request due to existing good wildlife habitat	34

Site selected for Potential Mitigation Site List

Table F-4. Windshield and Walkthrough Stream Mitigation Sites - Middle Potomac-Catoctin

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
MO_00048	Montgomery	DNR	39.15680585 -77.23925466	Adjacent to Game Preserve Rd. Seneca Creek State Park.	1,489	Small channel with 3-8 foot tall banks and localized moderate to severe erosion. Majority of site has minor bank erosion and appears stable. Existing instream habitat is in good condition. Limited potential for overall ecological uplift. Most of site surrounded by high quality mid successional forest with bedrock outcrops. Access would require forest clearing and would be challenging due to narrow/steep valley confined by roadway.	Removed due to limited potential for ecological uplift and access constraints	31
MO_00050	Montgomery	M-NCPPC	39.04313403 -77.25399448	North of River Road. Watts Branch SVU 1.	923	Watts Branch. Large channel with 6-8 foot tall banks that are mostly stabilized by vegetation and bedrock. Good existing instream habitat. Floodplain development limited due to adjacent valley wall. Limited potential for ecological uplift. Majority of site surrounded by mid-successional forest. Potential access along old sewer clearing in northern floodplain. Large watershed size would make construction challenging.	Removed due to limited potential for ecological uplift and large watershed size	27
MO_00051	Montgomery	M-NCPPC & Mo. County	38.974004 -77.102571	West of Little Falls Pkwy. Little Falls SVU 2.	2,160	High priority M-NCPPC site. Approximately 30% of the site has active bank erosion with 3-5 foot tall banks. Deeply incised channel with evidence of previous stream restoration at downstream end of site. Eastern floodplain is mostly developed and consists of mowed lawn and roadway. Western floodplain is forested. Potential for sediment reduction and some floodplain development. Potential access along routes used for previous restoration. Combine with MPOC0006, MPOC0010 & MPOC0011.	Removed due to limited potential for ecological uplift	43
MO_00052	Montgomery	M-NCPPC	38.96127074 -77.09727952	North of River Road. Willard Avenue NP.	1,068	Majority of site appears stable with localized minor bank erosion. Good instream habitat. Access would require forest impacts. Site removed following windshield survey.	Removed due to channel stability and limited uplift potential	NA
MO_00060	Montgomery	City of Gaithersburg	39.149794 -77.184313	West of Belle Grove Rd. Kelley Park	1,934	Small stream with 40-50% of site having active bank erosion along 2-6 foot tall banks. Western floodplain consists of sparse tree plantings and man-made wetland/pond. Eastern floodplain consists of narrow riparian forest with a PSS wetland. Potential for hydraulic, hydrology, and geomorphic improvements. Potential access from paved path that parallels entire site. Some tree clearing would be required to access the stream.	Removed due to less potential for ecological uplift	52
MO_00063	Montgomery	DNR	39.13487705 -77.26027051	South of Great Seneca Highway. Seneca Creek State Park.	2,240	Small, deeply incised channel with 3-10 foot tall banks and moderate to severe erosion throughout site. Site surrounded by narrow/steep valley with mid successional forest. Several specimen trees along channel. Opportunities for ecological uplift include erosion reduction, instream habitat improvements and fish passage. Potential access along sewer line clearing and disc golf course in northern floodplain.	Removed at DNR's request due to potential tree impacts	58
MO_00064	Montgomery	M-NCPPC & DNR	39.13030063 -77.25646132	East of Riffle Ford Rd. Seneca Creek State Park & Quince Orchard Valley Park.	6,945	3-6 foot tall banks with moderate to severe erosion throughout site. Several sewer line crossings and torturous meanders within site. Site surrounded by mid-successional forest. Upstream segment has narrow/steep valley, while downstream segment consists of a flatter, wider floodplain. Opportunities for ecological uplift include erosion reduction, instream habitat improvements, and downstream floodplain development. Potential access along sewer line clearing and disc golf course.	Selected for Potential Mitigation Site List (Site CA-5). Downstream section removed at DNR's request due to potential tree & disc golf impacts.	53

Site selected for Potential Mitigation Site List

Table F-4. Windshield and Walkthrough Stream Mitigation Sites - Middle Potomac-Catoctin

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
MPOC0003	Montgomery	DNR	39.163101 -77.229916	North of Game Preserve Rd. Seneca Creek State Park.	207	DNR recommendation. Small, deeply incised intermittent channel with 9-10 foot tall banks and severe bank/bed erosion. Severe bank erosion caused by upstream SW pond. Site surrounded by sparse trees in Seneca Creek floodplain. Old road used to move foot bridge could be used for potential access. Potential ecological lift limited to erosion reduction. Small intermittent channel with short length has limited potential for instream habitat and floodplain improvements.	Removed due to limited potential for ecological uplift and small site size	45
MPOC0004	Montgomery	DNR	39.163436 -77.230249	North of Dwight D Eisenhower Hwy. Seneca Creek State Park	2,503	Seneca Creek. Large channel with 3-4 foot tall severely eroded banks throughout most of site. Site surrounded by mid-successional forest with no existing access. Good instream habitat and evidence of flooding in floodplain. Extensive work required for limited ecological lift. Large watershed size would make construction challenging.	Removed due to large watershed size, limited potential for ecological uplift, and forest impacts	23
MPOC0005	Montgomery	DNR	39.133133 -77.267205	East of Riffle Ford Rd. Seneca Creek State Park.	448	DNR recommendation. Seneca Creek. Localized severe bank/bed erosion is threat to pedestrian trail. 5-6 foot tall banks. Site surrounded by mid-successional forest. Direct access from adjacent parking lot. Low potential for ecological uplift and restoration credits. Large watershed size would make construction challenging.	Removed due to large watershed size and limited potential for ecological uplift	27
MPOC0006	Montgomery	M-NCPPC & Mo. County	38.975032 -77.099841	West of Hillandale Rd. Little Falls SVU 2.	673	M-NCPPC Recommendation. 6 -8 foot tall eroded banks within 40% of site. Channel surrounded by forests. Potential for fish blockage removal, bank stabilization, aquatic habitat, lateral and vertical channel stabilization. Potential access through road/trail on upstream end and through an old restoration route on the downstream end. Combine with MO_00051, MPOC0010 & MPOC0011.	Removed due to limited potential for ecological uplift	43
MPOC0008	Montgomery	M-NCPPC	39.069438 -77.258469	North of Glen Rd. Greenbriar LP.	2,419	M-NCPPC recommendation. 3-6 foot tall banks with moderate erosion throughout site. Bedrock observed within channel throughout most of site that may limit potential for instream habitat improvements. Site surrounded by forested floodplain with extensive invasives. Potential for sediment reduction and riparian habitat improvements. Access would require forest clearing. Note: Site MPOC0007 overlapped with this site and was therefore removed from the table.	Removed due to less potential for ecological uplift	44
MPOC0009	Montgomery	M-NCPPC & Mo. County	39.171692 -77.186706	East of Goshen Rd. Cabin Branch SVP.	3,457	M-NCPPC recommendation. 3-6 foot tall banks with severe erosion throughout most of site. Majority of site surrounded by forest. Upland meadow along downstream reach. Potential for sediment reduction, floodplain development, aquatic habitat improvements, wetland creation, and riparian buffer plantings. Potential access throughout downstream section through upland meadow. Upstream section would require forest impacts.	Selected for Potential Mitigation Site List (Site CA-4)	53
MPOC0010	Montgomery	M-NCPPC	38.97123 -77.098712	East of Little Falls Pkwy. Little Falls SVU 2.	1,203	M-NCPPC Recommendation. Concrete channel with 2:1 slopes, approximately 4 foot tall. Channel surrounded by extensive invasives/vines with some forested areas. Potential for aquatic habitat, floodplain development, and bedform diversity improvements. Potential access through adjacent, utility clearings and road crossings. Combine with MO_00051, MPOC0006 & MPOC0011.	Removed due to limited potential for ecological uplift	57

Site selected for Potential Mitigation Site List

Table F-4. Windshield and Walkthrough Stream Mitigation Sites - Middle Potomac-Catoctin

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
MPOC0011	Montgomery	M-NCPPC	38.97293 -77.09917	East of Hillandale Rd. Little Falls SVU 2.	709	M-NCPPC Recommendation. 4-6 foot tall eroded banks within 40% of the site. Channel surrounded by forested parkland with some clearings near the road. Potential for aquatic habitat, bank stabilization, and floodplain connectivity improvements. Potential access through adjacent M-NCPPC trail. Some tree clearing would be required. Combine with MO_00051, MPOC0006 & MPOC0010.	Removed due to limited potential for ecological uplift	48
MPOC0012	Montgomery	M-NCPPC	39.024472 -77.158008	North of Democracy Blvd. & east of Seven Locks Rd. Locust Grove Nature Center.	939	M-NCPPC recommendation. Ephemeral channel surrounded by forested parkland and steep valley slopes. 0.5-3 foot tall banks with minor to moderate erosion throughout site. No opportunities exist for ecological uplift due to ephemeral nature of channel.	Removed due to ephemeral channel	50
SSS-150004	Montgomery	DNR	39.08458657 -77.43377242	West of Sycamore Landing Rd. Within McKee Beshers Wildlife Management Area.	8,674	Low gradient channel. Banks appear low/stable. Stream is connected to floodplain. Extensive wetlands throughout site. Access would require high quality forest/wetland impacts for very limited uplift potential. Site removed following windshield survey.	Removed due to channel stability, limited uplift potential, and high quality forest/wetlands.	NA
SSS-150006	Montgomery	SHA	39.23314874 -77.18283808	West of Woodfield Rd.	3,529	Site is an existing ICC stream/wetland mitigation site (SC-19). SHA EPD stated in meeting on 1/28/19 that site should not be pursued for stream mitigation.	Removed at SHA EPD's request due to existing mitigation site	22
SSS-150017	Montgomery	M-NCPPC	38.99502015 -77.17030611	South of River Rd. Cabin John Creek SVU 3.	1,084	4-8 foot tall banks with moderate erosion throughout site. A few localized severe bank erosion and stable areas. Site is surrounded by mid successional forest and has good instream habitat. Floodplain development limited by narrow/steep valley and roadway. Ecological lift limited to erosion reduction. Potential access through clearings at center and upstream end of site.	Removed due to limited potential for ecological uplift	44

Site selected for Potential Mitigation Site List

Table F-5. Windshield and Walkthrough Stream Mitigation Sites - Patuxent

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
PG_00008	Prince George's	WMATA	38.90121886 -76.84465743	East of Harry S Truman Dr.	1,682	Small, straightened channel in narrow strip of trees between developments. 1-3 foot tall banks with localized minor to moderate bank erosion. Sections of the stream appear stable. Ecological lift potential limited to erosion reduction. No potential for floodplain development. Access would require tree removals.	Removed due to limited potential for ecological uplift	31
PG_00017	Prince George's	M-NCPPC	38.778987 -76.774976	Southwest of Croom Rd. Marlton Park.	2,935	Deeply incised channel with 8-10 foot tall banks. Most of site consists of old severe bank erosion that has stabilized with vegetation, however there are localized areas of active severe erosion. Site surrounded by good quality mid successional floodplain forest with dense understory. Good existing instream habitat. Ecological uplift limited to stabilizing localized severe erosion areas. Access would require forest clearing. A large section of the site is on private property.	Removed due to limited potential for ecological uplift and high quality forest	40
PG_00049A	Prince George's	PG County & Private	38.80716792 -76.74881669	South of Pennsylvania Ave.	4,231	Western Branch. 6-12 foot tall banks with moderate to severe erosion throughout majority of site. Vertical, sandy banks. Northern floodplain consists of maintained grass areas and scattered trees. Southern floodplain consists of mid-successional forest with extensive PFO wetlands. Sections of southern floodplain located on private property. Functional uplift limited to erosion reduction. Extensive work required with likely minimum uplift potential. Existing access from northern floodplain. Large watershed size (91 sq mi) would make construction challenging. Downstream of PG_00049A.	Removed due to large watershed size and limited potential for ecological uplift	48
PG_00049B	Prince George's	PG County, Town of Upper Marlboro, Marlboro Fire Dept & Private	38.81456046 -76.74699715	North of Pennsylvania Ave.	4,260	Site added during windshield survey. Western Branch. 8-11 foot tall banks with moderate to severe erosion throughout most of site. Some banks are vertical yet appear stable. Majority of site surrounded by mid-successional forest with several large floodplain wetlands. Functional uplift limited to erosion reduction. Extensive work required with likely minimum uplift potential. Access would require forest & wetland impacts. Large watershed size (90 sq mi) would make construction challenging. Upstream of PG_00049A.	Removed due to large watershed size, limited potential for ecological uplift, and forest impacts.	32
PG_00149	Prince George's	PG County	38.89810854 -76.79590878	North of Hunterton St.	1,995	Most of site within wetlands of special state concern. 6 foot tall sandy banks with moderate to severe erosion throughout most of site. Site surrounded by mid-successional forest and extensive PFO wetlands. Ecological lift limited to reducing erosion. Limited potential for fish habitat and floodplain development. Access would require forest and wetland impacts.	Removed due to wetlands of special state concern and limited potential for ecological uplift	30
PG_00156	Prince George's	PG County & WMATA	38.900633 -76.849189	West of Harry S Truman Dr.	2,015	Access not granted for walkthrough survey. Site not visible from roadway during windshield survey.	Removed due to no access	NA
PG_00160	Prince George's	Board of Education, PG County DoE & Private	38.83722883 -7678668749	North of Brooke Ln. Dr. Henry A. Wise Jr. High School.	6,742	3-5 foot tall banks with moderate to severe bank erosion throughout most of site. Site surrounded by mid-successional forest. Potential for reducing erosion, instream habitat improvements and floodplain development. Access would require impacts to surrounding forest.	Selected for Potential Mitigation Site List (Site PA-1).	44

Site selected for Potential Mitigation Site List

Table F-5. Windshield and Walkthrough Stream Mitigation Sites - Patuxent

Database ID	County	Owner	Lat/Long	Location	Potential Mitigation Credit (LF)	Comments	Status	Field Score
SSS-160023	Prince George's	M-NCPPC	38.94477221 -76.84008555	West of Cleary Ln. Ball Hill SVP.	1,513	3-7 foot tall banks with 50% erosion throughout site. Majority of floodplain consists of scrub-shrub and invasive herbaceous species. Opportunities for ecological uplift include vertical and lateral channel stabilization, floodplain development, fish passage, and instream habitat improvements. Existing access from recent utility work.	Removed due to less potential for ecological uplift	62
SSS-160026	Prince George's	Board of Education	38.88735545 -76.82128910	South of Largo Rd.	1,030	Piped channel between high school and community college. No opportunity for daylighting. Site removed following windshield Survey.	Removed due to no restoration potential	NA
SSS-160034	Prince George's	PG County	38.85702841 -76.88380062	South of Marbury Dr.	2,868	Three foot tall concrete lined channel within PG county ROW. Site surrounded by grass lawn with scattered trees. Potential uplift limited to instream habitat and riparian improvements. No potential for erosion reduction or floodplain development. Floodplain confined by roads and residential housing on both sides of channel. Existing access along entire site.	Removed due to limited potential for ecological uplift.	50

Site selected for Potential Mitigation Site List

WALKTHROUGH FISH PASSAGE SITE LISTS

Table F-6. Walkthrough Fish Passage Mitigation Sites - Middle Potomac-Anacostia-Occoquan

Database ID	County	Lat/Long	Location	Culvert Type	Height of Blockage (ft)	Status	Field Score
MD_AN015	Prince George's	38.998348 -76.917222	Indian Creek. Between Greenbelt Rd Branchville Rd.	Quadruple box culvert - 15' wide X 4' tall each	0.0	Removed due to no blockage	37
MPAO0033	Prince George's	39.021027 -76.945642	Paint Branch under I-495/I-95 Interchange	Two Quadruple box culverts - 10' wide X 14' tall each	1.0	Selected for Potential Mitigation Site List (Site AN-6). Paint Branch Site provided by SHA EPD. Site added during walkthrough survey. Proposed removal of 3 blockages. 1,544 LF of in-stream work. 5,258 LF of potential credit. SHA ROW & BARC properties	40
MPAO0034	Prince George's	38.826221 -76.880724	Southwest of Rena Rd. and just north of I-495.	Pipe arch - 9' wide X 6' tall	6.0	USACE & MDE Recommendation. Site added during walkthrough survey. Removed due to limited credit potential	31
MPAO0035	Prince George's	39.011305 -76.903637	Indian Creek. Between I495 and Greenbelt Metro Dr.	Three Quadruple box culverts - 17' wide each	0.0	USACE Recommendation. Site added during walkthrough survey. Removed due to no blockage.	44

Site selected for Potential Mitigation Site List

Table F-7. Walkthrough Fish Passage Mitigation Sites - Middle Potomac-Catoctin

Database ID	County	Lat/Long	Location	Culvert Type	Height of Blockage (ft)	Status	Field Score
MD_12066	Montgomery	39.155574 -77.208059	Northwest of Montgomery Village Ave	RCP - 4-5' diameter	2.5	Removed due to blockage located on private property	26
NAACC_38347	Frederick	39.418362 -77.576515	East of Quebec School Rd and south of Burkittsville Rd.	Box culvert - 12.5' wide X 8 ' tall	1.9	Removed due to access and construction required on private property and limited upstream network	39
NAACC_38385	Frederick	39.638376 -77.513944	MD 77, just south of Quirauck School rd.	Box culvert - 12' wide X 6.7' tall	0.7	Removed due to small upstream network and limited credit potential	39
NAACC_38455	Frederick	39.591704 -77.558824	MD 17, just north of Martin Rd.	Box culvert - 11.5' wide X 5.5' tall	0.0	Removed due to no blockage	38
NAACC_38672	Frederick	39.578487 -77.556051	MD 17, just north of Black Rock Rd.	Triple pipe arch - 8' diameter each	0.0	Removed due to no blockage	42

Site selected for Potential Mitigation Site List

Table F-8. Walkthrough Fish Passage Mitigation Sites - Patuxent

Database ID	County	Lat/Long	Location	Culvert Type	Height of Blockage (ft)	Status	Field Score
MD_LPX15	Howard	39.217813 -76.850298	US 29, just west of Wandering Wy.	Double RCP - 6' diameter each	0.8	Removed due to minor debris jam creating temporary blockage	30
MD_PXM23	Anne Arundel	38.961661 -76.74988	East of MD 197 and south of Faith Ln. DS of Woodward Pond.	Box culvert - 9.5' wide X 5' tall; Dam spillway - 9.5' wide	4.8	Removed due to blockage located on private property	48
MD_PXM29	Prince George's	38.811731 -76.784023	MD 4 Median, west of Beech Hill Rd.	CMP - 8' diameter	0.0	Removed due to no blockage	44
MD_PXM30	Prince George's	38.811266 -76.783974	South of William Beanes Rd.	CMP - 3' diameter	0.5	Removed due to blockage located on private property	62
NAACC_27544	Anne Arundel	38.782029 -76.633024	South of W Bay Front Rd. and east of Fishers Station Rd.	Pipe arch - 8' wide X 4.5' tall	0.0	Removed due to no blockage	71
NAACC_27548	Anne Arundel	38.780954 -76.620245	South of W Bay Front Rd. and west of Dawn Dr.	Box culvert - 8' wide X 6' tall	0.0	Removed due to no blockage	48
NAACC_32437	Prince George's	39.032974 -76.787302	North of MD 197 and west of Old Laurel Bowie Rd. Downstream of Cash Lake.	Double RCP - 5' wide X 5' tall each	1.0	Removed due to upstream lake	61
NAACC_33809	Anne Arundel	39.08787 -76.738265	South of MD 32 and east of MD 198	NA - Site Inaccessible	NA	Inaccessible due to NSA fence	NA
NAACC_44542	Anne Arundel	39.028803 -76.687628	MD3, just south of Evergreen Rd.	CMP w/ grouted bottom - 8' diameter	4.3	Removed due to construction required on private property and upstream pond	43
NAACC_44544	Anne Arundel	39.028441 -76.686597	MD 3, just south of John Hopkins	CMP w/ grouted bottom - 5' diameter	0.0	Removed due to no blockage	39
NAACC_50349	Prince George's	39.001275 -76.79367	MD 564, east of Springfield Rd.	Box culvert	0.0	Removed due to no blockage	42
NAACC_57440	Anne Arundel	38.79878 -76.680172	North of MD 4, west of Greenock Rd.	Double RCP w/ flared ends - 4.5' wide X 2.5' tall each	0.0	Removed due to no blockage	44
NAACC_57441	Anne Arundel	38.80448 -76.692119	South of MD4, west of Plummer Ln.	Pipe arch - 12' wide X 5' tall	0.0	Removed due to no blockage	44
NAACC_57443	Anne Arundel	38.804762 -76.691302	South of MD4, north of Southern Maryland Blvd.	Box culvert - 14' wide X 4.5' tall	0.0	Removed due to no blockage	39
NAACC_57445	Prince George's	38.793005 -76.769992	North of 301, east of Old Crain Hwy.	RCP - 6' wide X 5.5' tall	2.0	Removed due to blockage consisting of log jam at US end of culvert that will eventually break through	49
NAACC_57470	Anne Arundel	38.798645 -76.681186	South of MD 4, east of Plummer Ln.	Elliptical pipe w/ grouted bottom - 9' wide X 6.5' tall	2.0	Removed due to 3 foot complex blockage downstream that would require extensive work on private property	31
NAACC_57482	Anne Arundel	38.785015 -76.599821	South of W Bay Front Rd. and west of Solomons Island Rd.	Twin box culvert - 9' wide X 8 ' tall each	0.5	Site recommended for Draft Mitigation Plan. Pending Private landowner coordination.	67
NAACC_57494	Anne Arundel	38.814191 -76.674711	MD 408, north of Sollers Ln.	Bridge - 15' wide X 5' tall	0.0	Removed due to no blockage	72
NAACC_57496	Anne Arundel	38.800916 -76.68399	North of MD4 and Southern Maryland Blvd.	CMP - 2' diameter	0.0	Removed. Clogged ephemeral pipe.	37
NAACC_57498	Prince George's	38.785678 -76.792231	MD 301, northeast of Croom Rd.	CMP - 12' diameter	0.0	Removed due to no blockage	54

Site selected for Potential Mitigation Site List

Table F-8. Walkthrough Fish Passage Mitigation Sites - Patuxent

NAACC_57501	Prince George's	38.783646 -76.790279	Croom Rd, northwest of Trumps Hill Rd.	Bridge - 16' wide X 6' tall	0.0	Removed due to no blockage	45
NAACC_57502	Anne Arundel	38.800275 -76.683598	North of MD 4 and south of Southern Maryland Blvd.	Elliptical pipe with grouted bottom - 9' wide X 4.5' tall	3.0	Removed due to extensive work required on private property	54
NAACC_57504	Anne Arundel	38.791381 -76.660114	South of W Bay Front Rd. and east of MD 4.	Box culvert - 7' wide X 7' tall	0.5	Removed due to partial blockage and small upstream network	58
NAACC_57507	Anne Arundel	38.789509 -76.648672	South of W Bay Front Rd. and west of Cabin Creek Rd.	Box culvert - 14' wide X 7' tall	0.1	Removed due to minor blockage	49
NAACC_57511A	Prince George's	38.813056 -76.794188	North of Pennsylvania Ave and south of Old Marlboro Pike.	CMP - 12' diameter	1.9	Removed due to small upstream network and limited credit potential	53
NAACC_57518	Prince George's	38.801108 -76.825585	East of Woodyard Rd and Northwest of Mellwood Pond Community Park	Arched culvert - 12' wide X 6.5' tall	0.0	Removed due to no blockage	53
NAACC_57526	Prince George's	38.814583 -76.777547	West of Ritchie Marlboro Rd. and south of Old Marlboro Pike	Twin box culvert - 8' wide X 8' tall each	0.0	Removed due to no blockage	61
NAACC_57533	Anne Arundel	38.812102 -76.784063	North of MD 4 and south of Old Marlboro Pike	CMP - 8' diameter	2.3	Debris jam downstream of culvert creating fish blockage. Removed due to extensive work required on private property.	62
NAACC_57561	Prince George's	38.904759 -76.682769	South of MD 214 and west of Queen Anne Bridge Rd.	Twin box culvert - 11.2' wide X 5.35' tall each	0.0	Removed due to no blockage	42
NAACC_57565	Prince George's	38.79775 -76.759915	South of MD 301 and east of Croom Station Rd.	Double RCP - 5' diameter each	0.3	Removed due to partial blockage and small upstream network	44
NAACC_57566	Prince George's	38.782963 -76.796289	East of MD 301 and south of S. Osborne Rd.	Triple CMP with grouted bottom - 14' diameter each	0.0	Removed due to no blockage	54
NAACC_57652	Prince George's	38.664127 -76.714366	East of Croom Rd.	Box culvert - 5' wide X 8' tall	0.5	Removed due to access and construction required on private property	54
NAACC_63410	Prince George's	38.982583 -76.711365	East of MD 301	Box culvert - 18' wide X 3.3' tall	0.0	Removed due to no blockage	34
NAACC_63413	Prince George's	38.982234 -76.712577	MD 301 median, south of Annapolis Rd.	Box culvert - 18' wide X 3.3' tall	0.0	Removed due to no blockage	29
NAACC_63777	Anne Arundel	39.000079 -76.700608	West of MD3 and east of Grays Ford Rd.	Pipe arch w/ grouted bottom - 15' wide	0.0	Removed due to no blockage	46
NAACC_63785	Anne Arundel	39.119754 -76.782597	Northeast of MD 32 and Southeast of Guilford Rd.	Triple box culvert - 7' wide each	1.2	Removed due to partial riprap blockage upstream of culvert	52
NAACC_64432	Prince George's	39.025808 -76.77116	West of MD 197	Double RCP - 8' diameter	1.3	Removed due to small upstream network and limited credit potential	67
NAACC_64434	Prince George's	39.003508 -76.761299	MD 197, east of Old Laurel Bowie Rd.	Twin box culvert - 12' wide	0.0	Removed due to no blockage	57
NAACC_64498	Anne Arundel	38.999801 -76.700676	West of MD 301	Pipe arch - 11.5' wide X 8' tall	0.7	Removed due to minor blockage and 1 foot blockage upstream of site outside ROW	48
NAACC_64596	Montgomery	39.151371 -77.00691	MD 108, east of New Hampshire Ave.	Double RCP - 4' diameter	0.0	Removed due to no blockage	39
NAACC_64628	Prince George's	39.012859 -76.762718	West of MD 197 and east of Normal School Rd.	Pipe arch - 9.5' wide X 6.8' tall	0.0	Removed due to no blockage	44

Site selected for Potential Mitigation Site List

APPENDIX G: PUBLIC LANDOWNER MEETING MINUTES

MEMORANDUM

DATE: March 14, 2019

TO:
George Meyers (USDA RFS)
Jen Showalter (USDA RFS)
Linda Mooney (USDA RFS)
Chris Bentley (BARC)
Jeanette Mar (FHWA)
Dana Jackson (USDA)
Eric Almquist (MDOT SHA NEPA Team/RK&K)
Karl Hellmann (MDOT SHA NEPA Team/RK&K)
Justin Reel (MDOT SHA NEPA Team/RK&K)
Daniel Spradlin (MDOT SHA NEPA Team/CRI)
Matthew Drennan (MDOT SHA NEPA Team/CRI)
Maddy Sigrist (MDOT SHA NEPA Team/RK&K)

*This memorandum is addressed to the meeting attendees.

CC:
Caryn Brookman (I-495 & I-270 MLS GEC)
Karen Kahl (MDOT SHA NEPA Team/RK&K)
Erron Ramsey (MDOT SHA NEPA Team/RK&K)
Rick Maddox (MDOT SHA NEPA Team/RK&K)
Greg O'Hare (MDOT SHA NEPA Team/RK&K)

FROM: MDOT SHA I-495 & I-270 MLS P3 Team

SUBJECT: Contract/FMIS #: BCS 2014-09B/AW073A11
Description: I-495 & I-270 Managed Lanes Study

RE: Minutes from February 27, 2019 – BARC Mitigation Coordination Meeting at the Beltsville Agricultural Research Center, 10300 Baltimore Avenue, Building 003, Beltsville, MD

The meeting began with introductions. Eric Almquist provided an overview of the Managed Lanes Study, the seven Screened Alternatives, and the status of the NEPA study. The preferred alternative is expected to be identified in the summer of 2019; Draft EIS in late 2019; and ROD in 2020. The study will prepare a combined FEIS/ROD. The cooperating federal agencies include USDA, USACE, EPA, and NPS (and others); FHWA is the lead federal agency. The Screened Alternatives were presented to cooperating and participating agencies at the Interagency Working Group (IAWG) Meeting held in February 2019. Alternatives Retained for Detailed Study (ARDS) and potential environmental impacts will be presented at the April 10th IAWG meeting.

Under the One Federal Decision rule, USDA agencies will be asked to use the same EIS as FHWA for completing NEPA. Therefore, USDA will need to review the EIS outline and provide relevant language for the document to allow approval of the EIS and facilitate a single Record of Decision. Dana Jackson also noted that the EIS should be coordinated with two USDA agencies: the USDOT Secretary's office and the Agricultural Research Service (ARS).

Justin Reel and Karl Hellman explained that the MLS will require a considerable amount of wetlands and waters mitigation and outlined their initial process in identifying potential mitigation sites on public land. Karl Hellman explained that initially the MDOT SHA NEPA Natural Resources Team conducted a desktop site search within potentially impacted watersheds using the MDOT SHA mitigation database and the Water Resource Registry. After identifying potential sites, teams of environmental scientists conducted a

"windshield survey" that consisted of investigating sites from the road right-of-way to determine their potential for mitigation purposes. Sites that appeared to have potential were investigated further with a site walk and ranked based on ecological uplift and construction feasibility criteria. The team is currently contacting public landowners to set-up meetings, like this one, to obtain feedback and discuss the sites that show high potential for mitigation.

- Action Item: Eric Almquist will provide the FEIS outline to Dana Jackson.

- Action Item: Maddy Sigrist will provide the Natural Resources Technical Report to BARC when it is complete.

A brief discussion of impacts from roadway improvements ensued and Dana Jackson explained that the Carver Center property, located next to the WMATA Greenbelt rail yard, is owned by USDA and transferring land from this property to FHWA may require a Department level decision, while other areas of BARC require Congressional action to transfer land to another federal agency. BARC would be interested in a maintenance agreement to ensure continued maintenance beyond the construction phase of any mitigation sites on their land.

The group first discussed the Paint Branch Fish Passage site. Dana Jackson explained that the fish passage project was reviewed by USDA BARC throughout the design process and approved with the current design. If major changes are planned, the project would have to go through the USDA internal review process again. If the project as designed works with any improvements that are planned by the P3 with only minimal modification, it can go through a brief re-affirmation process with USDA BARC and will not need to go through the entire internal review process again.

George Meyers asked why the second site was chosen as a potential mitigation site, because BARC does not have it on their list of areas that are in need of improvement. Daniel Spradlin and Matthew Drennon described the site. They explained that they split the site into two separate areas for assessment, since the western section is forested and the eastern section is more open. Daniel Spradlin explained that there is bank erosion and sloughing of the banks with no root protection along much of the reach. He explained that it would be beneficial to target the local sediment source and stabilize it, as well as connect the stream to its floodplain by lowering the banks. He suggested that the stream would benefit from bank grading and stability structures. USDA BARC was open to the idea of investigating this stream reach further as a potential mitigation site and mentioned that MCOG did a fish passage and riparian buffer restoration project in the middle section of the stream.

- Action Item: Dana Jackson requested that sediment reduction analysis be provided to them for this stream to use in the decision-making process.

USDA BARC is interested in reducing sediment loading to the Anacostia River. They identified several additional sites on their land that they would like the MDOT SHA NEPA Team to consider as potential wetland and stream mitigation sites. They also have stormwater BMPs that are in need of retrofitting. Justin Reel suggested that the NEPA Stormwater Team may need off-site stormwater credits and these could help them meet their need.

- Action Item: BARC will provide a shapefile of the potential additional mitigation and BMP sites to

the MDOT SHA NEPA Team.

The potential additional mitigation sites presented by BARC include:

1. Indian Creek Stream Restoration – North and south of Sunnyside Avenue. Downstream of an existing ICC mitigation site (IC-62) located just south of Powder Mill Road. This reach may need the most work near I-495.

2. Beaverdam Creek Tributary Stream Restoration – North and South of Beaver Dam Road.

3. Paint Branch Tributary Stream Restoration I - Exposed WSSC water line, just southeast of the I-495/I-95 Interchange.

4. Paint Branch Tributary Stream Restoration II – Small incised channel and exposed pipes just south of recommended BARC Site 3.

5. Paint Branch Stream Restoration and Floodplain Reconnection – In an area where Paint Branch is close to blowing out into the fields (from the USACE levy).

6. Little Paint Branch Stream Restoration – Section west of Ikea that is encroaching on sewer line.

7. Off-site stormwater management – Sheet flow erosion & headcut in the woods near E-line Road and North Drive (runoff from adjacent neighborhood).

8. Wetland mitigation/off-site stormwater management – Potentially convert lagoon to wetland creation/stormwater management site? Located near Yuma Street, fed by a SWM facility.

Dana Jackson explained that all of BARC is a historic district, but none of the potential mitigation areas involve historic structures, except perhaps the USACE levy (1972). Two projects on South Farm have broken through the levies and let water spread out, so impacting the levy is feasible, if necessary.

Dana Jackson asked when construction would likely begin if the road improvement were to go forward. Eric Almquist replied that construction could begin as early as 2023.

The remainder of the meeting was a site walk of some of the potential mitigation and stormwater areas on BARC property, including:

- Stormwater management area in need of repair south of I-495
- Paint Branch Tributary Stream Restoration sites I and II
- Off-site stormwater management site near E-line Road
- Beaverdam Creek Stream Restoration
- Beaverdam Creek Tributary Stream Restoration

➢ Action Item: MLS NEPA Team will draft an additional mitigation sites map for attendees to review to be followed with a request to amend the site walk access agreement to include these additional areas for field review.

Maryland Department of Natural Resources Mitigation Coordination Meeting
I-495 & I-270 Managed Lanes Study
P3 Office Classroom
February 28, 2019 @ 1:00 pm

Handouts: Agenda, I-495 & I-270 Managed Lanes Study Map, Mitigation Sites Maps, and DNR Policy (*Requests and conditions for mitigation projects on DNR land*).

A meeting was conducted on February 28, 2019 with representatives of the Maryland Department of Natural Resources (DNR) to discuss potential stream and wetland mitigation sites located on DNR properties for the I-495/I-270 Managed Lanes Study. A summary of the topics discussed at the meeting follows.

Introductions, Project Overview, and Status

The meeting began with introductions. Caryn Brookman provided an overview of the Managed Lanes Study, the seven Screened Alternatives, and the status of the NEPA effort. The preferred alternative is expected to be identified in the summer of 2019. A DEIS will be completed in late 2019. The study will complete a combined FEIS/ROD in 2020.

Mitigation Opportunities

Justin Reel outlined the traditional mitigation site search process that was used to identify potential mitigation sites on public land. The SHA NEPA Natural Resources Team conducted a desktop site search within potentially impacted watersheds using the MDOT SHA mitigation database that includes sites from the Water Resource Registry (WRR). After identifying potential sites, teams of environmental scientists conducted a "windshield survey" that consisted of investigating sites from the road right-of-way to determine their potential for mitigation purposes. Sites that appeared to have potential were further investigated with a site walk that included scoring the site based on construction feasibility and ecological uplift criteria. The NEPA team is currently coordinating with public landowners to determine if they are amenable to considering these sites for potential stream and/or wetland mitigation.

WSS-150087 – McKee Beshers Wildlife Management Area

Justin Reel confirmed that the potential wetland mitigation site located in the McKee Beshers Wildlife Management Area (WSS-150087) has been removed from the potential list of I-495/I-270 mitigation sites. DNR-WHS manages the site for woodcock and would like to avoid altering the landscape at this location. The NEPA Team will inform MDOT SHA to remove the site from their database so that the site is not included in future mitigation site searches.

MO_00047B – Strider Wildlife Management Area

Karl Hellmann gave a description of the existing site conditions at the potential stream mitigation site (MO_00047B) located in the Strider Wildlife Management Area. Upstream sections of the site appear less stable with 3-5 foot high vertical banks, while downstream sections near Seneca Creek appear more stable. A clearing along the western side of the channel that was likely used for past sewer repairs could potentially be used to access the site for restoration purposes. Jim Bennett stated that some of the existing undercut banks could be providing fish habitat and asked about the proposed design. Karl stated that some type of bank stabilization in combination with instream

habitat and floodplain access improvements could improve site conditions. Improving floodplain access would be limited in certain areas due to adjacent residential housing. Justin Reel clarified that the mitigation site boundaries displayed on the location map are conservative and would likely be revised after further field investigations.

MO_00063 – Seneca Creek State Park and MO_00064 – Seneca Creek State Park
The group agreed that it would be beneficial to schedule a field meeting to further discuss the existing site conditions and restoration potential at the the Strider Wildlife Management Area site (MO_00047B), the two Seneca Creek sites (MO_00063 & MO_00064), and any other additional mitigation sites that DNR recommends. Christine Conn stated that DNR was aware that the two Seneca Creek sites had potential for improvements. Shea Niemann stated that access along the existing sewer line for the Seneca Creek sites would require a temporary bridge and effect the disk golf course within the park. It was agreed that a field meeting would be scheduled sometime within the next four weeks to meet the NEPA Team's schedule.

Potential DNR Sites
DNR presented the following additional potential mitigation sites:

1. McKee Beshers Wildlife Management Area – Potential Wetland Mitigation Site. ~10 acres, area is currently a field.

2. Dierssen Wildlife Management Area – Two Potential Impoundment Retrofits located between Violets Lock and Pennyfield Lock along the C&O Canal Towpath. ~10 acres each. The impoundments were originally created for waterfowl habitat, but are not functioning as designed. They can only be accessed through C&O Canal towpath.

3. Seneca Creek Kayak Launch Area – Potential Stream Restoration

DNR stated that proposed mitigation sites should not be considered on state-designated Wildlands. Maryland Wildlands are areas of state-owned land or water that have retained their wilderness character or contain rare or vanishing species of plant or animal life or similar features worthy of preservation. Wildlands may include unique ecological, geological, scenic and contemplative recreational areas. Approximate locations of Wildlands are displayed on Maryland's Environmental Resource & Land Information Network (MERLIN), which is an online interactive map.

DNR Land Mitigation Policy
Mary Owens gave an overview of DNR's draft policy for mitigation projects on DNR land. A handout of the draft policy was provided at the meeting. The policy provides a framework for evaluating and approving mitigation projects proposed on DNR land by non-DNR state entities for regulated environmental impacts that occur outside lands owned and managed by DNR. The goal of the policy is to ensure that any mitigation projects allowed on DNR land meet the Department's standards for ecological benefit and are consistent with the Land Management Unit's management and public use objectives. Requests from State agencies will be considered, but only in the best interest of the Land Management Unit's management and public use objectives. Proposed sites for Chesapeake Bay TMDL credit will take priority over mitigation sites. Land Management Unit Internal Review is responsible for approving proposed mitigation sites. The agency pursuing mitigation must show due diligence in exhausting all other options on private property before submitting a formal mitigation

request to DNR. The proposed design must be approved by DNR during all phases of planning and construction. DNR stated that the draft policy should be followed for all currently proposed mitigation sites.

MO_00042 – Mathew Henson State Park Field Walk – Site PG 00120A/B
Karl Hellmann gave a description of existing site conditions of the potential stream mitigation site (MO_00042) located in Mathew Henson State Park. The site consists of a 2007 DEP stream restoration site that appears unstable. Most of the structures are buried or are unstable, and moderate to severe erosion is evident throughout the site with banks ranging from 5-15 feet high. Justin Reel stated that the NEPA team will need to confirm whether the restoration was used for mitigation and if the site can be used for future mitigation. DNR owns the parcel, however M-NCPPC maintains the park. DNR stated that any proposed work within the park will also require coordination with M-NCPPC.

Other Discussions
Eric Almquist stated that the NEPA team is also interested in potential offsite stormwater management opportunities. DNR mentioned a failing pond near the Greenway Trail that may have offsite stormwater management potential.

Gwen Gibson stated that Chris Homeister is the SHA internal reviewer for the project and should be included on all coordination involving DNR. Gwen also recommended contacting Ray Li (USFWS) and Jim Thompson (DNR) for ideas on pursuing fish blockage sites for mitigation purposes. Justin Reel stated that the Paint Branch Fish Passage site that was originally proposed for the Greenbelt Metro Project is now part of the I-495/I-270 mitigation package. Gwen stated that any proposed fish blockage mitigation sites will need to be in combination with other types of mitigation.

- The NEPA Team will confirm removal of Site WSS-150087 from the MDOT SHA site database.
- Action Item: Chris Homeister will provide the group with a list/locations of additional potential mitigation sites recommended by DNR.
- Action Item: SHA will send out a poll to schedule the mitigation site review field meeting.
- Action Item: Karl Hellmann will send digital copies of the site photos to DNR-MES that were provided at the meeting.

Attendees:

Name	Agency	Email
Jim Bennett	DNR-WHS	jim.bennett@maryland.gov
Candice Collison	DNR-WHS	candice.collison@maryland.gov
Christine Conn	DNR-CCS	christine.conn@maryland.gov
Gwen Gibson	DNR-MES	gwendolyn.gibson@maryland.gov
Chris Homeister	DNR-MES	christopher.homeister@maryland.gov
Shea Niemann	DNR-MPS	shea.niemann@maryland.gov
Mary Owens	DNR – MPS	mary.owens@maryland.gov
Eric Almquist	P3 / RK&K	ealmquist@rkk.com
Eric Beightel	P3 / WSP	ebeightel@sha.state.md.us
Caryn Brookman	P3 / MDOT SHA	cbrookman@sha.state.md.us
Kyndal Gehlbach	P3 / WSP	kyndal.gehlbach@wsp.com
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Erron Ramsey	P3 / RK&K	eramsey@rkk.com
Justin Reel	P3 / RK&K	jreel@rkk.com
Maddy Sigrist	P3 / RK&K	msigrist@rkk.com
Stacy Talmadge	P3 NEPA / Blackwater Environmental	stalmadge@sha.state.md.us

Maryland Department of Natural Resources Mitigation Field Review Meeting
I-495 & I-270 Managed Lanes Study
McKee Beshers Wildlife Management Area & Dierssen Wildlife Management Area
March 14, 2019 @ 12:00 pm

Handouts: None

A meeting was conducted on March 14, 2019 with representatives of the Maryland Department of Natural Resources (DNR) to discuss potential wetland mitigation sites located on DNR properties for the I-495/I-270 Managed Lanes Study. A summary of the topics discussed at the meeting follows.

Introductions and Site Discussions

All participants met at the McKee Beshers Wildlife Management Area. The meeting began with introductions. Candice Collison provided a brief background on the potential wetland mitigation site located in the McKee Beshers Wildlife Management Area (WSS-150087) that was removed from the potential list of I-495/I-270 mitigation sites. DNR-WHS manages the site for woodcock and the site was planted with alders as part of the governor's Forest Brigade efforts. Many of the surrounding fields are maintained as scrub/shrub and brush habitat for various bird species.

Jim Bennett confirmed that the potential stream mitigation site (MO_00047B) located in the Strider Wildlife Management Area discussed in the February 28, 2019 meeting should not be considered for mitigation. Karl Hellmann responded that the site would be removed from the I-495/I-270 potential mitigation site list and MDOT SHA's mitigation database.

Mitigation Opportunities

McKee Beshers Wildlife Management Area

The group viewed and discussed the McKee Beshers Wildlife Management Area site recommended by DNR in the February 28, 2019 meeting. The site is an approximately 10 acre agricultural field, but no crops were planted at the time of the site visit. Candice and Jim stated that the field is usually farmed year-round, but the winter crop could not be planted last year due to high rainfall. The site floods regularly and a stream runs along the western border. DNR would be open to mitigation at this site and discussed mitigation with other outside companies about five years ago. DNR provided further information about the site, stating that many bird species would utilize the area if it was converted to wetland. Candice mentioned that 100 year floods may result in several feet of surface water on the site. She identified water control structures on the north and south side of the site used to control flooding in the adjacent forested habitat which mimics beaver behavior. These structures help provide proper wood duck habitat and are maintained to prevent beavers from blocking the structures.

The group discussed several mitigation strategies and logistics of property management regarding the McKee Beshers site. DNR suggested that implementing impoundments might provide ecological uplift in this area. They firmly suggested a scrub/shrub or emergent wetland rather than a forested wetland since much of the adjacent land is flooded forest. A hedgerow on the northern border of the site will be removed by DNR. The land is currently leased to a farmer who will plant the field this year, and the lease will expire at the end of 2019. DNR stated that they will re-negotiate the five-year

lease in the late summer/early fall of 2019, and if chosen for mitigation, could remove this area from next year's negotiation if provided enough notice. The next lease for the area is scheduled for the beginning of 2020. If notice is not provided before lease negotiations are necessary, DNR said they could re-negotiate the lease at any time since they own the land. However, DNR would have to work closely with the tenant farmer and would prefer to receive notice before a new lease is signed.

Dierssen Wildlife Management Area

The group drove to the Dierssen Wildlife Management Area and accessed the two potential impoundment retrofit sites via the C&O Canal towpath through Violets Lock. The two sites are each approximately 10 acres and are located near Pennyfield Lock between the C&O Canal towpath and the Potomac River. DNR stated that both potential sites were gifted to the state with a deed restriction that the land would be designated waterfowl habitat. DNR's design preference for both sites is emergent vegetation and grasses habitat that is flooded in the winter and drained in the summer. Coordination with National Park Service (NPS) would be required to achieve proper water levels at the sites because hydrology is interconnected to syphons installed in the C&O Canal, and water levels within the canal are currently too low to reach the syphon inlets. DNR was not aware of the operational status of the syphons.

DNR explained that surface water is frequently present in the western impoundment and it remains saturated throughout the year. The water control structure within this impoundment was functional, but aged and is frequently clogged with sediment. At the time of the site visit, a high amount of sediment was observed near the structure, but some appeared to have been washed away from the inlet and water was flowing into the structure. DNR identified the outlet pipe east of the control structure under a berm which discharged into a channel, then discharged into the Potomac River. The pipe was collapsed at its outfall location into the channel. DNR would like to repair function of the water control structure with preference to replace it as a part of mitigation efforts.

DNR explained that the eastern impoundment remains relatively dry in comparison to the western impoundment, although the area appears saturated enough to prevent tree growth because a grass species is the dominant cover. The water control structure in this impoundment was non-functional and full replacement would likely be necessary to restore functionality. The outlet pipe is likely damaged and/or clogged underneath the berm and the outfall was not visible at the time of the site visit.

The group discussed several challenges of implementing mitigation at the impoundments. Access must be negotiated with the NPS since they own the canal and the towpath is the only access path into the sites. The towpath at the nearest lock is accessed by a footbridge, therefore the installation of a larger bridge would be necessary to accommodate vehicles. Hydrology of the created wetland would rely heavily on the C&O Canal water levels and proper management of the syphons and water control structures. The repairs and/or replacement structures design and hydrologic design would be more complicated compared to traditional wetland mitigation. The impoundments may be considered for wetland enhancement credit instead of wetland creation credit due to current land use and water saturation levels, though the relatively dry impoundment may have some potential for wetland creation credit.

Other Discussions

Chris Homeister proposed another meeting to visit additional DNR recommended mitigation sites. The group agreed to set up future meetings based on Chris's proposed sites.

- Action Item: The NEPA Team will confirm removal of the Strider Wildlife Management Area stream site (MO_00047B) from the MDOT SHA site database.

- Action Item: Chris Homeister will provide the group with a list/locations of additional potential mitigation sites recommended by DNR.

- Action Item: The NEPA team will revisit the potential McKee Beshers and Dierssen sites recommended by DNR to rate the sites based on their potential for ecological uplift and construction feasibility.

Attendees:

Name	Agency	Email
Jim Bennett	DNR-WHS	jim.bennett@maryland.gov
Candice Collison	DNR-WHS	candice.collison@maryland.gov
Chris Homeister	DNR-MES	christopher.homeister@maryland.gov
Karl Hellmann	P3 / RK&K	Khellmann@rkk.com
Christina Simini	P3 / RK&K	Csimini@rkk.com

Maryland-National Capital Park & Planning Commission Mitigation Coordination Meeting
I-495 & I-270 Managed Lanes Study
M-NCPPC Parkside Headquarters
March 20, 2019 @ 10:00 am

Handouts: M-NCPPC Montgomery County Mitigation Sites Map & List, and USB drive with shapefiles of M-NCPPC mitigation site boundaries

A meeting was conducted on March 20, 2019 with representatives of the Maryland-National Capital Park & Planning Commission (M-NCPPC) to discuss potential stream and wetland mitigation sites located on M-NCPPC Montgomery County properties for the I-495/I-270 Managed Lanes Study. A summary of the topics discussed at the meeting follows.

Introductions, Project Overview, and Status

The meeting began with introductions. Caryn Brookman stated that the purpose of the meeting was to discuss the potential stream and wetland mitigation sites identified by the NEPA team on M-NCPPC Montgomery County parkland and M-NCPPC potential mitigation site recommendations. The group was provided with a site list and vicinity map of the potential mitigation sites. Permission to access potential M-NCPPC Prince George's County mitigation sites remains pending and therefore Prince George's County mitigation sites were not discussed.

Laura Connelly asked about the status of woodland conservation requirements for the project. Caryn Brookman stated that work on the woodland conservation requirements is ongoing.

Justin Reel outlined the traditional mitigation site search process that was used to identify potential mitigation sites on public land. The SHA NEPA Natural Resources Team conducted a desktop site search within potentially impacted watersheds using the MDOT SHA mitigation database. After identifying potential sites, teams of environmental scientists conducted a "windshield survey" that consisted of investigating sites from the road right-of-way to determine their potential for mitigation purposes. Sites that appeared to have potential were further investigated with a site walk that included scoring the site based on construction feasibility and ecological uplift criteria. The NEPA team is currently coordinating with public landowners to determine if they are amenable to considering these sites for potential stream and/or wetland mitigation.

Jai Cole asked about the project's proposed stream and wetland impact quantities so that M-NCPPC could get a better understanding of how much credit the NEPA team is pursuing for mitigation purposes. Justin Reel responded that the NEPA team is looking for less than 100,000 linear feet of stream mitigation and less than 50 acres of wetland mitigation. The NEPA team confirmed that the preferred type of wetland mitigation for the project would be palustrine forested wetland (PFO) creation. Caryn Brookman stated that SHA is taking a dual approach that consists of the NEPA team's traditional mitigation site search on public land, along with a request for proposals (RFP) to identify sites on private properties.

Mitigation Opportunities

The group proceeded to discuss the twelve potential stream sites (~36,957 LF) and two potential wetland sites (~12.1 creation acres) identified by the NEPA team on M-NCPPC Montgomery County parkland.

MO_00042 – Mathew Henson State Park

Matt Harper stated that DNR had been in contact with him regarding the Mathew Henson State Park stream site (MO_00042) that is owned by DNR and maintained by M-NCPPC. The site consists of a 2007 Montgomery County DEP stream restoration project that appears to be failing. Karl Hellmann stated that most of the restoration structures are buried or appear unstable and the site would likely need to be completely redesigned if pursued for mitigation. Matt Harper said that he would confirm the NPDES credits that were obtained for the project with DEP. Once the credits have been confirmed, the NEPA team will discuss the site with the agencies to determine if it has potential for Section 404 mitigation credit. Any proposed work at the site will require coordination with M-NCPPC and DNR.

MO_00013A, MO_00013B, WSS-150147A, and WSS-150147B – Lower MacGruder Branch Park

Karl Hellmann gave a description of the potential stream and wetland mitigation sites in Lower MacGruder Branch Park. The sites south of Watkins Road (MO_00013A & WSS-150147A) consist of an unstable channel with 3-4 foot tall vertical banks that are surrounded by an extensive floodplain dominated by reed canary grass. The stream site extends south to the confluence with Great Seneca Creek where there are scattered trees throughout the floodplain. The sites to the north of Watkins Road (MO_00013B & WSS-150147B) have similar conditions with some higher quality scrub-shrub wetlands and old field habitat to the east of the site. Considering the unstable stream conditions and the extensive open floodplain, the NEPA team thought these sites had good potential for a combined wetland/stream restoration project. M-NCPPC stated that both sites are within or partially within County designated Biodiversity Areas, which may limit proposed work at the site. Jai Cole stated that M-NCPPC would need to review the sites to determine what makes them Biodiversity Areas and the quality of the existing wetlands and that a scrub-shrub wetland creation may be preferred over a forested wetland creation. Justin Reel replied that any proposed mitigation sites on parkland will be designed to meet the goals of M-NCPPC.

MO_00018 – Heritage Farm Neighborhood Park

Karl Hellmann described the existing conditions of the Heritage Farm Neighborhood Park stream site (MO_00018). The site has 1-5 foot tall vertical banks with minor to moderate erosion, and is surrounded by forest with a few PFO wetlands just east of the stream. There is a remnant clearing from past sewer line work that could be used to access the site. M-NCPPC was not familiar with the site and would like to review the site in the field to determine it's potential for restoration.

MO_00029 – Kensington Parkway Stream Valley Park

Jai Cole and Matt Harper described the existing conditions and history of the Kensington Parkway Stream Valley Park stream site (MO_00029), also known as Silver Creek. The adjacent residential community has raised concerns in the past regarding flooding on their properties following rain storms, specifically just north of where Silver Creek flows under the intersection of the Kensington Pkwy and Little Dale Rd. WSSC has repaired several sewer lines within the site and is currently investigating other potential areas for fixing and protecting sewer lines. Matt Harper said he would get an update from WSSC on the status of future repairs. Montgomery County DOT is proposing a

bridge replacement over Silver Creek that is scheduled for completion this summer. Matt said he could also request information from DOT on the bridge replacement if necessary. Justin Reel stated that the upstream section of Silver Creek that was not included in the mitigation site search, was removed from consideration on the Purple Line due to the site lacking potential for ecological uplift. M-NCPPC stated that the site had good potential for tree planting opportunities, non-native invasive treatment, and community involvement. M-NCPPC suggested that the team meet with the Mayor of Kensington if interested in moving this site forward. The NEPA team will access the flooding problem prior to considering the site for restoration. M-NCPPC offered to provide existing survey files for this area.

MO_00037 – Booze Creek Park

The Booze Creek Park stream site (MO_00037) site will be removed from the potential M-NCPPC mitigation site list based on M-NCPPC's guidance. The site consists of a failed stream restoration project that DEP is currently restoring.

MO_00038 – Norwood Park

Karl Hellmann gave a description of the existing site conditions at the Norwood Park stream site (MO_00038). The site has 4-8 foot tall banks with moderate to severe erosion and is surrounded by a forest with multiple sewer lines. Matt Harper said the site was another existing restoration project that was constructed by DEP for NPDES credit. The site will need to be coordinated with DEP and the agencies to determine the existing NPDES credit and if the site could be used for Section 404 mitigation credit.

MO_00047A – Gunner's Branch Local Park

Karl Hellmann described the Gunner's Branch Local Park stream site (MO_00047A). The site has 3-5 foot tall banks with moderate erosion and is surrounded by forest with a few open floodplain areas. There is some potential for small wetland creation/enhancement in the adjacent floodplain areas that are dominated by reed canary grass. There is a remnant clearing from past sewer line work to the west of the stream that could be used to access the site. M-NCPPC would like to visit the site to determine it's potential for wetland enhancement and stream restoration.

MO_00051 – Little Falls Stream Valley Unit

The group discussed the existing conditions of the Little Falls Stream Valley Unit stream site (MO_00051). The site consists of an incised channel with moderate bank erosion that is surrounded by forest. There is existing access throughout most of the site from past sewer line repairs. Matt Harper stated that WSSC has done some consent decree work in the downstream section of the site and several bioswales have been constructed upstream of the site. M-NCPPC is interested in restoring the site and recommends extending the site boundaries to include the downstream concrete lined channel.

MO_00064 – Quince Orchard Valley Park

Karl Hellmann gave a description of the Quince Orchard Valley Park stream site (MO_00064). The upstream reach consists of a small unstable tributary in a steep/narrow valley that is owned by M-NCPPC. The downstream reach is a larger channel that has severally eroded banks with several sewer crossings. The entire site is surrounded by forest. There is potential access to the majority of the site through remnant clearings from past sewer line work. The NEPA team has discussed the downstream reach with DNR, and a site walk will be scheduled by DNR in the near future. M-NCPPC was not

familiar with the site and would like to review the site in the field to determine it's potential for restoration.

SSS-150021 – Rock Creek Regional Park
The Rock Creek Regional Park stream site (SSS-150021) is located in a County Biodiversity Area, which may limit proposed work at the site. The stream has 3-10 foot tall banks with moderate to severe erosion and is surrounded by forest. M-NCPPC will review the site in the field to determine the quality of the forest, why this is a Biodiversity Area, and whether the site has potential for restoration.

SSS-150023 – Wheaton Regional Park
The group discussed the Wheaton Regional Park site (SSS-150023) that is located near the Brookside Nature Center, which has expressed interest in restoration being done to this reach. The site has on average four-foot-tall banks with moderate to severe erosion and is surrounded by forest. The site is in a County Biodiversity Area, however M-NCPPC stated that natural resource impacts shouldn't be a concern since the site is adjacent to a roadway. M-NCPPC thought the site had potential for restoration and noted that the site has decent fish species due to its close proximity to Northwest Branch. M-NCPPC is restoring a reach upstream of this site and suggested that some of the area between the two sites may also be a candidate for restoration.

Potential M-NCPPC Sites
M-NCPPC Montgomery County presented the following additional potential mitigation sites:

1. Long Branch – Potential stream restoration, wetland enhancement, and biological uplift opportunities. The Purple Line is enhancing fish passage under Piney Branch Road, and M-NCPPC fixed a sewer line exposure in this area. M-NCPPC wants any future projects to tie into these two projects. M-NCPPC can provide survey files. Tributary to Sligo Creek – ~2,200 LF.
2. Rolling Stone tributary – Potential stream restoration adjacent to ICC site NW-4, upstream and downstream of Bonifant Rd. Includes a number of sewer line exposures, failing outfalls, and headcuts in need of stabilization. M-NCPPC has a lot of data they can share regarding biological uplift potential. Tributary to Northwest Branch – ~ 5,400 LF.
3. Bel Pre Creek – Potential stream restoration. Tributary to Northwest Branch – ~7,400 LF.
4. Wheaton Branch – Potential stream restoration – remove concrete trapezoidal channel and fish blockage. Tributary to Sligo Creek – ~2,200 LF.

Other Discussions
Eric Almquist requested that M-NCPPC send a shapefile of these and any other potential stream restoration and wetland creation sites that they would like the NEPA team to consider for mitigation. Matt Harper agreed to review their list of sites to identify those that he thinks meet the project parameters of > 1,000 LF. Jai Cole offered to send the list of wetland sites identified as good mitigation opportunities for the M-83 project.

Jai Cole recommended investigating other mitigation opportunities within the Sligo Creek, Northwest Branch and Rock Creek watersheds where project impacts will take place and suggested considering a lower stream length threshold in these areas. M-NCPPC also has interest in acquiring private property mitigation sites adjacent to parkland that are purchased by SHA for mitigation purposes. Jai Cole recommended that the NEPA team schedule monthly mitigation meetings with M-NCPPC,

similar to what was done for the ICC.

Jai Cole asked about the timeframe for obtaining a park construction permit and submitting the projects for mandatory referral. Eric Almquist responded that the NEPA team is still early in the mitigation process and that these topics would be discussed in the future. Caryn Brookman stated that the NEPA team is currently working on a schedule for the mitigation process and will let M-NCPPC know what is determined regarding ongoing agency coordination.

The NEPA team will need permission to access the additional potential mitigation sites that M-NCPPC recommended. Jai Cole recommended a global access approval to cover all the mitigation sites. Carol Rubin will investigate a global access approval for the additional mitigation sites and obtaining approval to access potential M-NCPPC Prince George's County mitigation sites.

- Action Item: Matt Harper will coordinate with DEP on the NPDES credits that were obtained at the Mathew Henson State Park stream site (MO_00042) and the Norwood Park stream site (MO_00038).

- Action Item: The NEPA team will discuss the Mathew Henson State Park site with MDE and USACE to determine if the site has potential for Section 404 mitigation credit.

- Action Item: Matt Harper will investigate MacGruder and Rock Creek Regional Park Biodiveristy areas to determine if this removes or limits their availability as candidates for restoration.

- Action Item: Matt Harper will get an update from WSSC on schedule of future repairs at Silver Creek site.

- Action Item: Matt Harper will provide survey files for Silver Creek site area, if needed.

- Action Item: The NEPA team will assess the flood problem at the Silver Creek site (MO_00029).

- Action Item: Matt Harper will request information from DOT regarding the Silver Creek bridge replacement, if necessary.

- Action Item: NEPA team will remove Booze Creek site from potential mitigation site list.

- Action Item: Carol Rubin will investigate a global access approval for the additional M-NCPPC Montgomery County mitigation sites and obtaining approval to access potential M-NCPPC Prince George's County mitigation sites.

- Action Item: Matt Harper will provide NEPA team with a shapefile of the sites discussed as well as additional sites M-NCPPC would like to be considered for MLS mitigation, including the list of wetland opportunities compiled for the M-83 project.

- Action Item: Matt Harper will schedule field visits to the following sites:
    - Lower MacGruder Branch Park stream & wetland sites (MO_00013A, MO_00013B,

WSS-150147A & WSS-150147B)
- Heritage Farm Neighborhood Park stream site (MO_00018)
- Gunner's Branch Local Park stream site (MO_00047A)
- Quince Orchard Valley Park stream site (MO_00064)
- Rock Creek Regional Park stream site (SSS-150021)

- Action Item: Caryn Brookman will let M-NCPPC know what mitigation coordination process will be going forward for the MLS.

Attendees:

Name	Agency	Email
Jai Cole	M-NCPPC / Mo. County	jai.cole@montgomeryparks.org
Matthew Harper	M-NCPPC / Mo. County	matthew.harper@montgomeryparks.org
Carol Rubin	M-NCPPC / Mo. County	carol.rubin@montgomeryplanning.org
Douglas Stephens	M-NCPPC / Mo. County	douglas.stephens@montgomeryparks.org
Laura Connelly	M-NCPPC / Pg. County	Laura.Connelly@pgparks.com
Eric Almquist	P3 / RK&K	ealmquist@rkk.com
Caryn Brookman	P3 / MDOT SHA	cbrookman@sha.state.md.us
Karl Hellmann	P3 / RK&K	khellmann@rkk.com
Erron Ramsey	P3 / RK&K	eramsey@rkk.com
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Maryland Department of Natural Resources Mitigation Field Review Meeting
I-495 & I-270 Managed Lanes Study
Seneca Creek State Park
April 12, 2019 @ 9:00 am

Handouts: None

A meeting was conducted on April 12, 2019 with representatives of the Maryland Department of Natural Resources (DNR) to discuss potential stream mitigation sites located on DNR properties for the I-495/I-270 Managed Lanes Study. A summary of the topics discussed at the meeting follows.

Introductions and Site Discussions

All participants met at the Seneca Creek State Park Offices. The meeting began with introductions. Shea Niemann provided a brief description of the three stream sites proposed by DNR near Game Preserve Road, Long Draft Creek, and Riffle Ford Road, and showed their locations on a park map. Shea confirmed that the two sites proposed by RK&K, sites MO_00063 and MO_00064, could be walked during the meeting.

Mitigation Opportunities

Game Preserve Road and I-270 Overpass

Shea began the site review by identifying a side-by-side culvert that had collapsed and subsequently repaired after a storm. Shea presumes that the culvert is SHA-owned. The stream is a tributary of Seneca Creek and on DNR-owned land. A DNR-maintained foot bridge that was immediately downstream of these culverts was washed out and had to be replaced in a different downstream location. DNR said that the tributary's main inputs are stormwater management ponds and runoff from residential neighborhoods. David Black observed that much of landscape surrounding this tributary and Seneca Creek in general is comprised of "legacy sediments." David explained the concept of legacy sediments – a term used to describe sediment deposited over the hundreds of years since human activity became a greater influence on the landscape, most commonly defined as the period from 1750 to the present. Karl stated that RK&K did not rate this tributary during initial mitigation site survey, but that RK&K could revisit and rate this tributary for inclusion in the site selection process.

The group observed a failed culvert and erosion area near an I-270 overpass just west of Game Preserve Road that are of DNR concern. Karl Hellmann determined, through GIS layers, that the culvert failure and erosion area are within SHA right of way (ROW) property. Shea pointed out these areas of failure/erosion because DNR owns the downstream portion of stream below the failure/erosion. RK&K stated that SHA is likely aware of the failure/erosion, but that RK&K would bring these areas to SHA's attention. RK&K stated that the failure/erosion areas could not be considered for mitigation credit since the gully is ephemeral.

Game Preserve Road near Railroad and Utility Easement

The group drove south on Game Preserve Road to a tributary identified by DNR. Karl stated that RK&K had reviewed the tributary during the walkthrough stage of the mitigation site search process. The tributary was small and appeared to have been previously surveyed. Karl explained that RK&K

would likely not include this portion of the tributary in mitigation credit consideration. Shea asked RK&K to clarify the types of channels and characteristics that are considered when surveying for mitigation eligibility. Karl explained that RK&K mainly considers the linear footage of the stream, the magnitude of ecological uplift that could be established, and examining the area with a wholistic approach.

Downstream of the small tributary, the group observed the area that RK&K had reviewed during their walkthrough investigation. Karl stated that RK&K would likely not include this site on the final list for mitigation due to the overall stability of the channel, the presence of bedrock, and the channel's close proximity to a road with no shoulder or pull-off areas. Access to this channel would be very limited, although DNR noted that WSSC had accessed and worked downstream of this location. Karl further explained the selection process and that access is one of the many factors that is considered when selecting mitigation sites. Karl stated that willing property owners are the first step of the process, then feasibility of access, cost, and conditions such as channel and bank stability are considered.

Riffle Ford Road
The group drove to Riffle Ford Road, a site identified by DNR along the mainstem of Seneca Creek for potential mitigation. The stream banks at this location have been undercut and eroded to approximately 10 feet above the water surface on one side. David identified this area as another example of legacy sediment. Shea stated that the magnitude and frequency of storms last year contributed to the bank erosion that is threatening the adjacent park trail. This site is downstream of a large culvert failure and potential SHA mitigation site number MO_00064. RK&K stated that this site would likely not be considered for mitigation purposes unless it was included as a part of the potential mitigation site just upstream (MO_00064).

Stream Mitigation Site MO_00064
The group walked upstream of Riffle Ford Road to the location of a pipe culvert failure underneath a DNR-managed trail. The culvert failure collapsed several pipes and the trail that had spanned the width of the pipes into the stream bed. DNR can no longer access the trail past the point of the culvert failure. WSSC previously used this path to access their work area further north along the trail, but only constructed a temporary access bridge over the pipe culvert. RK&K stated that the entrance to this area provides excellent stream access and parking/staging area if chosen for mitigation, and site number MO_00064 begins directly upstream of the culvert failure. RK&K stated that they would extend the potential mitigation site to include the culvert failure and channel downstream of the culvert.

LeAnne Chandler asked RK&K to explain the restoration methods that would be used at the proposed sites and whether RK&K favors one method over another. Karl explained that RK&K is still in the process of selecting/reviewing sites and does not have a specific proposed design type for any sites at this time. Karl stated that RK&K would work with each landowner and the agencies to collaborate on the specific design for each site. LeAnne emphasized that one of DNR's main concerns during site design and construction is tree clearing. Karl acknowledged that tree clearing plays an important factor in the site selection process and is minimized during site design, but some tree impacts may be required depending on the proposed design. Karl stated that RK&K would not propose a design that the landowner does not agree with.

David mentioned that RK&K water resources designs implement a method of hydraulic modeling that allows the designer to view how the design would affect the landscape and the shape of the stream before design is complete. Using hydraulic modeling allows the designer to make refinements, rectify mistakes, or examine discrepancies in real time. The method also demonstrates the amount of tree removal necessary before starting work and allows the team to adjust design around tree removal constraints. David stated that he could showcase some current projects if sites within Seneca Creek are included in the next step of the site selection process.

Stream Mitigation Site MO_00063

The group walked upstream along MO_00064 until it's convergence with stream mitigation site MO_00063. The group decided to walk MO_00063 since it abuts the disc golf course. Access near the disc golf course presents a challenge because the course is open year-round. A large factor in the selection of this site by RK&K is whether some of the course can be closed during the mitigation construction process. A major concern for both DNR and RK&K is the presence of large trees within the stream channel that would need to be removed regardless of the selected design type. Karl emphasized that DNR should consider the magnitude of tree removal that RK&K may include with a proposed site design.

The group walked upstream along MO_00063 until its convergence with a smaller tributary that drains a stormwater pond located east of the disc golf course. The tributary flows through the course and into MO_00063, so portions of the course would need to be closed to access the channel. All parties agreed to keep MO_00063 under consideration, and RK&K emphasized that tree removal would likely be part of the proposed design. David discussed using smaller scale equipment and reusing removed trees within the constructed channel.

Long Draught Branch

The group drove to Long Draught Branch just east of Clopper Lake. Shea stated that extremely high sediment deposition in this area creates a large backwatered area which prevents canoe/kayak travel upstream of the lake. The tributary carries runoff from the City of Gaithersburg, and property upstream of this area is the property of the City. RK&K stated that the area on the DNR-portion of the tributary would not be eligible for mitigation credit, only the City-owned portion of the tributary. RK&K added that mitigating upstream would not likely benefit this area because the sediment deposition is mostly caused by the lake.

Disc Golf Course Access

The group drove to the disc golf course parking area near MO_00063 and MO_00064 to assess the viability of access through the northern portion of the course. The area between the course parking lot and the tributary leading to MO_00063 is managed grass area with mature scattered trees. Tree removal and closure of multiple course holes would be necessary if the tributary was accessed at this location. The preferred access route would likely be from the area of convergence with MO_00064 leading north and accessing MO_00064 from downstream of the course.

Other discussions

LeeAnne inquired about the amount of mitigation that is required for the project. RK&K stated that the amount is preliminary, but is a large number, and will likely change by the time the project is finalized. Karl clarified that the project is in the early stages of design and no specific number has been officially issued. The specific impact numbers will be released to the public in the near future.

Karl reiterated that the selection process for mitigation sites is to identify sites, meet with landowners, and examine landowner-suggested sites.

- Action Item: Karl stated that RK&K would revisit the small tributary and Seneca Creek mainstem near Game Preserve Road and I-270 to review the sites in further detail and include them in the mitigation site search selection process.

Attendees:

Name	Agency	Email
Shea Niemann	DNR-MPS	shea.niemann@maryland.gov
LeeAnne Chandler	DNR-MPS	leeanne.chandler@maryland.gov
Chris Homeister	DNR-MES	christopher.homeister@maryland.gov
Karl Hellmann	P3 / RK&K	khellmann@rkk.com
Christina Simini	P3 / RK&K	csimini@rkk.com
David Black	P3 / RK&K	dblack@rkk.com

Maryland-National Capital Park & Planning Commission Mitigation Coordination Meeting
I-495 & I-270 Managed Lanes Study
6000 Kenilworth Avenue Riverdale, MD 20737
June 20, 2019 @ 11:00 am

Handouts: Meeting agenda, M-NCPPC Prince George's County Proposed Mitigation Site Maps & Site List

A meeting was conducted on June 20, 2019 with representatives of the Maryland-National Capital Park & Planning Commission (M-NCPPC) to discuss potential stream mitigation sites located on M-NCPPC Prince George's County properties for the I-495/I-270 Managed Lanes Study. A summary of the topics discussed at the meeting follows.

Introductions, Project Overview, and Status
The meeting began with introductions. The group was provided with a site list and maps of the potential mitigation sites recommended by the NEPA Team.

- Karl Hellmann outlined the traditional mitigation site search process that was used to identify potential mitigation sites on public land.
  - The MDOT SHA NEPA Natural Resources Team conducted a desktop site search within potentially impacted watersheds using the MDOT SHA mitigation database.
  - After identifying potential sites, teams of environmental scientists conducted a "windshield survey" that consisted of investigating sites from the road right-of-way to determine their potential for mitigation purposes.
  - Sites that appeared to have potential were further investigated with a site walk that included scoring the site with the standard SHA rating system based on construction feasibility and ecological uplift criteria.
  - The NEPA team is currently coordinating with public landowners to determine if they are amenable to considering these sites for potential stream and/or wetland mitigation.
- Laura Connelly asked about the project's proposed stream and wetland impact quantities in Prince George's County so that M-NCPPC could get a better understanding of how much credit the NEPA team is pursuing for mitigation purposes.
  - Justin Reel responded that he did not have the breakdown by county with him. He explained that the mitigation process has proceeded with the understanding that there will be large impacts from the MLS and the NEPA team is therefore pursing as much mitigation as possible.
  - All alternatives are still being refined, however the approximate stream impact is 90,000 linear feet, not including in-kind stream replacements, and about 20 acres of wetland impact.
  - Justin stated that SHA is taking a dual approach that consists of the NEPA team's traditional mitigation site search on public land, along with a request for proposals (RFP) to identify sites on private properties.
- Laura noted that of the eight potential mitigation sites proposed by the NEPA team, none appeared to be wetland sites. She said M-NCPPC leases its agricultural fields, which are not available for wetland mitigation and she is unaware of any land available for wetland mitigation.

- Crystal Hancock asked if it was possible for M-NCPPC to acquire an electronic file of the LOD.
  - Justin responded that upper management will not allow the LODs to be distributed electronically at this time.
  - He suggested M-NCPPC continue to follow-up with Caryn Brookman.
  - Crystal expressed that the project is asking participating and cooperating agencies to make decisions without providing them the ability to do their own due diligence. A GIS version of the LOD would allow the agencies to review the LOD against all of their GIS data quickly and efficiently. She indicated that requesting decisions on a preferred alternative without providing electronic LOD files puts the agencies in a difficult position.

Mitigation Opportunities

The group proceeded to discuss the eight potential stream sites identified by the NEPA Team on M-NCPPC Prince George's County parkland.

Site PG-00079 – J. Franklyn Bourne Pool

- Laura asked that the park name be changed from "Cabin Branch SVP" to, "J. Franklyn Bourne Pool Site".
- Karl introduced the site, explaining that the total site is approximately 1,000 linear feet, with about 774 linear feet on parkland. The stream is highly-incised, with 10-foot vertical eroding banks. Karl suggested that the site has potential for in-stream habitat improvements, floodplain connection, and stabilization. The east side of the site has a sewer repair clearing that could be used as access from Valley Park Road.
- M-NCPPC suggested that the NEPA Team add the WSSC sewer easements to its mapping.
- Karl explained that the NEPA Team has looked at the concrete channel downstream of this site and determined that it had minimal functional uplift potential.
- Laura said that she wasn't sure if this site would be acceptable for mitigation or not, but that M-NCPPC would explore this possibility further.

Site PG-00097 – Henson Creek SVP

- Karl introduced this site as part of the mainstem of Henson Creek, extending about 1,400 linear feet downstream of Oxon Hill Road. A small section of the site is located on private property (historic church) and Prince George's County property. The outer bends of the stream are highly unstable and extensive deposition bars have formed on the insides of the channel. The site has potential for improvements to instream habitat, channel stability and floodplain connection. There is potential access along an old sewer line clearing to the west of the stream and an abandoned road (Broad Creek Church Rd) east of the stream.
- M-NCPPC stated that there is a WSSC easement at the site.
- M-NCPPC explained that the site is located in the Broad Creek Historic District and would require a historic work permit.
- Laura explained that Broad Creek Church Road is closed because of a dumping problem. Justin suggested that perhaps the road could be used for access and then removed and restored to floodplain as part of the mitigation project. Laura and Marie agreed that this might be a possibility, but this would have to be negotiated with the historic permitting group.
- Laura said that M-NCPPC has identified about 7.1 miles of Henson Creek as in need of restoration with areas of the stream that are unravelling, starting at the Oxon Hill Road trail

located upstream of the proposed site.

- Sonja Ewing agreed that a more comprehensive project like Henson Creek may be what M-NCPPC PG would want to prioritize.
- Colleen Regotti suggested that M-NCPPC confirm that there are no conflicts between the NEPA team recommended sites and sites that the Department of Environment (DOE) and the Clean Water Partnership have identified in their Watershed Implementation Plans (WIP) Program. There is a high demand for parkland and the WIP Program has a short timeline, so it will be helpful to have a better understanding of the MLS timeline in order to coordinate mitigation needs.
- Justin said that the MLS needs to have an approved Conceptual Mitigation Package by October 2020. Phasing of the study has yet to be determined, but PG County would likely be in one of the later phases and potentially programmed for about 3 years after 2020. MLS would likely focus on sites that are not a high priority for WIP, such as more expensive or challenging sites.
- Colleen said that the WIP projects tend to be small, self-certifying projects such as culvert repair projects and not full stream restoration projects.

<u>Site SSS-160023 – Bald Hill SVP</u>

- Matt Drennan introduced the site as including approximately 1,500 linear feet of stream that flows north to south. The upper 600 linear feet consists of braided channel that originates at a culvert under Route 50. The biggest potential for the site would be to replicate this braided condition at the downstream end of the site where the channel is incised with six foot tall eroded banks. There are a few active side channels that could also be restored. An existing WSSC easement has already been cleared and could be used for access. The floodplain is fairly open, with few trees, so little clearing would be required. Ecological uplift opportunities include floodplain connectivity, geomorphic stability through revegetation, bedform stability, and lowering stream temperatures with riparian plantings.
- Laura indicated that WSSC recently installed a new sewer line along this site.
- Matt added that the culvert at the top of the site appears to be a fish passage blockage and could be improved.
- Laura explained that the channel originates at a nearby stormwater pond, but removing the fish blockage would be worth looking into.
- Maria Martin stated that the site would need to be coordinated with WSSC.
- Sonja explained that the community around this area was suffering from flooding from work in the stormwater pond to the north of this site. It may be too soon to interrupt this community with further construction.

<u>Site SSS-160039 – Anacostia River SVP</u>

- Matt introduced the site as including approximately 1,500 linear feet of stream (420 LF on parkland) that flows south into Northwest Branch. The site consists of an incised channel with five foot banks. There is a fish passage blockage at the confluence with Northwest Branch. The channel was over-widened and appears to have been straightened in the past. Ecological uplift potential includes re-connection with the floodplain by narrowing the channel and adding riparian vegetation to provide bank stability and lower stream temperatures.
- Maria explained that the channel was widened in the 70s and 80s due to flooding issues

upstream after a Giant grocery store was flooded.

- Laura stated that the site is in the Chesapeake Bay Critical Area.
- This site is in a Capper-Cramton park and would have to be coordinated with the National Capital Planning Commission (NCPC) through M-NCPPC.
- Sonja indicated that this site would also have to be coordinated with the City of Hyattsville.
- Justin indicated that the site would probably be a lower priority, due to all of the past issues and numerous agencies that would need to be involved.
- Justin stated that the NEPA Team could provide a shapefile of the recommended mitigation sites to M-NCPPC for review.

Site SSS-160058 – Highland Park

- Karl summarized the existing conditions of the stream site that is approximately 1,300 linear feet. The site consists of a small channel that is deeply incised, with localized sections of moderate to severely eroded banks. Potential functional uplift includes reducing bank erosion and improving instream habitat. Extensive trash was observed within the site, which could be removed as part of the restoration to improve park aesthetics. The site has little to no potential for floodplain development due to the vicinity of adjacent residential houses and recreational ball fields. There is an overgrown sewer clearing north of the site that would require the removal of small trees to access the site.
- Laura stated that she is not familiar with the site and would have to investigate its potential for mitigation.
- Laura clarified to the group that all of the proposed NEPA team mitigation sites are for project wide impacts and not just impacts within Prince George's County. She indicated that mitigation on M-NCPPC land is a benefit to the State, because property does not have to be purchased or negotiated with numerous landowners, and a benefit to M-NCPPC because the restoration improves their resources.
- Crystal mentioned that once M-NCPPC receives the mitigation site shapefile from the NEPA Team, they will discuss internally to determine which agencies need to be involved in site coordination. M-NCPPC may need to share the sites with the DOE CIP Program, because they have a MOU with DOE and would like to avoid duplication. DOE mitigation sites can be viewed on their website under "Clean Water Map."

Site SSS-160063 – Paint Branch SVP I & II

- Matt described the existing conditions of the site that consists of approximately 1,500 linear feet (676 LF on parkland) along the mainstem of Paint Branch. The section upstream of parkland is located on numerous properties including WSSC, City of College Park, and Prince George's County. This site was chosen because it has the potential to connect upstream and downstream restoration sites. The channel is incised with eight foot tall banks and there is an exposed sewer line just downstream of the pedestrian bridge. The stream has alternating eroding banks with extensive deposition bars. There is existing access to the stream along the pedestrian bridge that bisects the site.
- Laura asked why the site was not extended upstream to Route 1 and downstream to the railroad tracks.
- Karl explained that the site originally extended from Route 1 to the railroad tracks, however these upstream and downstream segments were removed to avoid impacts to several University of Maryland forest conservation easements. The University of Maryland provided

the NEPA team with easement documentation that stated the easements could not be disturbed for mitigation purposes.

- Sonja explained that she thought this site could be very worthwhile, but would require careful coordination, since M-NCPPC is currently in coordination with the Board of Education for the land downstream of this site.

Sites SSS-160065 & SSS-160066 – Fletcher's Field Park

- Matt introduced site SSS-160065 as including approximately 1,900 linear feet of stream that flows west into Northeast Branch. The upstream section is confined by adjacent parking lots and the downstream section opens up and is surrounded by grass lawn with scattered trees. The site is relatively open and would require minimal if any tree removals for access. The stream bank heights are approximately four feet tall throughout most of the site. There are two potential fish blockages and a few pedestrian crossings that confine the stream elevation and geometry. The stream appears to have been straightened in the past and is disconnected from the floodplain.
- Matt summarized the existing conditions of site SSS-160066 that includes approximately 1,500 linear feet of stream that flows southwest into SSS-160065. The upper section consists of 5-6 foot tall banks and the lower section has 3-4 foot tall banks. Erosion is localized to approximately 20% of the banks. The stream appears to have been straightened in the past and is disconnected from the floodplain. There is one potential fish blockage at the upstream culvert and no utilities were observed within the site.
- Sites SSS-160065 and SSS-160066 have potential for stream geometry improvements, riparian plantings, and trash removal. These improvements would improve the aesthetics of the park and provide experiential and education opportunities.
- Sonja said she thinks it would be very beneficial to provide a stream that the public can interact with and learn from in a well-used urban park within an underserved community that could use more amenities. She added that the clean-up element would be helpful in this high use area of the trail.
- M-NCPPC stated that the site is in a Capper-Cramton park and would have to be coordinated with the National Capital Planning Commission (NCPC) through M-NCPPC.
- Colleen mentioned that there is a bioretention/submerged gravel wetland project underway near the parking lot in this park, but it is not near the stream.

Other Discussions

- Laura said that due to the 3-year timeline, M-NCPPC did not want to provide their potential mitigation site list that consisted of projects with more immediate needs.
- Colleen said that they have shared their eight sites with DOE and would like to hear back from them before sharing the sites with MDOT SHA.
- Justin asked how quickly Colleen thought she would hear back from DOE and Colleen replied that she expected to hear back within a week. Justin clarified that the NEPA Team needs to have identified the sites they are pursuing for additional study by October.
- Sonja suggested the group reconvene in 30 days.
- Laura agreed that M-NCPPC would look through the potential sites in the next few weeks and come up with a list of sites to consider.

- Action Item: The NEPA Team will provide a copy of the sign-in sheet and meeting summary to M-NCPPC along with a shapefile of the potential M-NCPPC PG mitigation sites within a week.

- Action Item: M-NCPPC will coordinate internally in the next few weeks to determine potential mitigation sites.

- Action Item: The NEPA Team will schedule a follow-up meeting 30 days from this meeting.

Attendees:

Name	Agency	Email
Crystal Hancock	M-NCPPC / Pg. County	crystal.hancock@ppd.mncppc.org
Maria Martin	M-NCPPC / Pg. County	maria.martin@ppd.mncppc.org
Laura Connelly	M-NCPPC / Pg. County	laura.connelly@pgparks.com
Sonja Ewing	M-NCPPC / Pg. County	sonja.ewing@pgparks.com
Colleen Regotti	M-NCPPC / Pg. County	colleen.regotti@pgparks.com
Karl Hellmann	NEPA / RK&K	khellmann@rkk.com
Justin Reel	NEPA / RK&K	jreel@rkk.com
Maddy Sigrist	NEPA/ RK&K	msigrist@rkk.com
Matthew Drennan	NEPA / CRI	matthewd@cri.biz

Maryland-National Capital Park and Planning Commission Field Review Meeting
I-495 & I-270 Managed Lanes Study
Quince Orchard Valley Park
August 13, 2019 @ 12:30 pm

Handouts: None

A meeting was conducted on August 13, 2019 with representatives of the Maryland-National Capital Park & Planning Commission (M-NCPPC) to discuss a potential stream mitigation site (MO_00064) located on M-NCPPC and DNR properties for the I-495/I-270 Managed Lanes Study (MLS). The meeting focused on the upstream reach located on M-NCPPC property. The downstream reach was discussed with DNR at a previous field meeting on April 12, 2019. A summary of the topics discussed at the meeting follows.

Introductions and Background Information

Participants met at the park access path off of Suffolk Terrace and proceeded south to the upstream end of the site. The meeting began with introductions. Karl Hellmann provided a brief background on the stream site. The upstream reach on M-NCPPC parkland consists of approximately 2,600 linear feet of a small channel located in a steep/narrow valley within the Quince Orchard Valley Park. This upstream reach converges with another small tributary before flowing into the larger reach on DNR parkland. The downstream DNR reach is approximately 3,700 linear feet of channel located in a broader floodplain within Seneca Creek State Park.

Karl mentioned that DNR is currently conducting their internal review of the restoration reach proposed on DNR property. At a previous field meeting, DNR mentioned some concerns with impacts to trees and their adjacent disk golf course. Karl and Matt agreed that even if DNR does not want to move forward with restoration on their property, the M-NCPPC reach could still be pursued due its length and potential for improvements.

Doug Stephens mentioned that they had reviewed potential MLS stream mitigation site MO_00018 (Heritage Farm NP) and MO_00047A (Gunner's Branch LP) and would send their recommendations on the sites following the meeting.

Site Walk & Discussions

The site walk began at the upstream end of the M-NCPPC reach, just south of Suffolk Terrace. The channel begins to degrade just downstream of a foot bridge, where the proposed restoration reach begins. The channel upstream of the bridge appears stabilized by bedrock outcrops and rip-rap, and was therefore removed from the proposed restoration site. Matt Harper agreed that the segment upstream of the bridge could be removed from consideration due to its stability.

The proposed reach downstream of the foot bridge has many unstable sections with torturous meanders and 4-5 foot tall vertical banks that are actively eroding. Potential site improvements identified during the NEPA team walkthrough evaluation included bank/bed stabilization, instream habitat improvements, and invasive species treatment. While the majority of the site appears unstable, some sections are stabilized by bedrock outcrops that are providing natural bank protection and grade control. Karl stated that restoration work would likely not be proposed in these

stable sections. Matt noted that the bedrock wouldn't be a concern for M-NCPPC, but it may limit the site's potential for instream habitat improvements.

Extensive herbaceous invasives, including wavy leaf basket grass (*Oplismenus undulatifolius*) and Japanese stilt grass (*Microstegium vimineum*), were observed in the floodplain during the site walk. Potential restoration efforts could include treating some of these invasive areas and replacing them with native species.

Doug confirmed through GIS data that there are two sewer lines and one water line located within the site. A few exposed sewer lines and a stormwater outfall on the verge of failing were observed within the site that could be replaced/stabilized as part of the proposed restoration. A small abandoned farm pond was also observed within the floodplain at the downstream end of the site. Doug stated that the pond could be drained and converted to a wetland as part of the restoration to remove its potential as a hazard to park users.

Karl stated that the small tributary at the downstream end of the M-NCPPC reach that flows under the power lines was removed from consideration due to its short length on M-NCPPC property. This tributary converges with the proposed M-NCPPC reach before flowing into the DNR reach.

M-NCPPC agreed at the end of the meeting that the site has potential for restoration and could be kept on the mitigation site list for the project. Although the surrounding area is forested, access to the M-NCPPC reach could be obtained with minimal tree impacts by using a previous WSSC access route that spans the entire site. Matt stated that M-NCPPC would like to consider the overall project impacts to resources on parkland and see the proposed mitigation package prior to making final decisions on specific sites. He concluded that MDOT SHA made a commitment to provide mitigation within close proximity to the project's proposed impacts, and M-NCPPC would like to see that commitment upheld. Karl stated that all of the sites will be reviewed and compared following completion of the walkthrough evaluations to determine which sites provide the greatest potential for functional uplift. Sites with the greatest potential will be included in the proposed draft mitigation plan and further reviewed with the agencies and landowners.

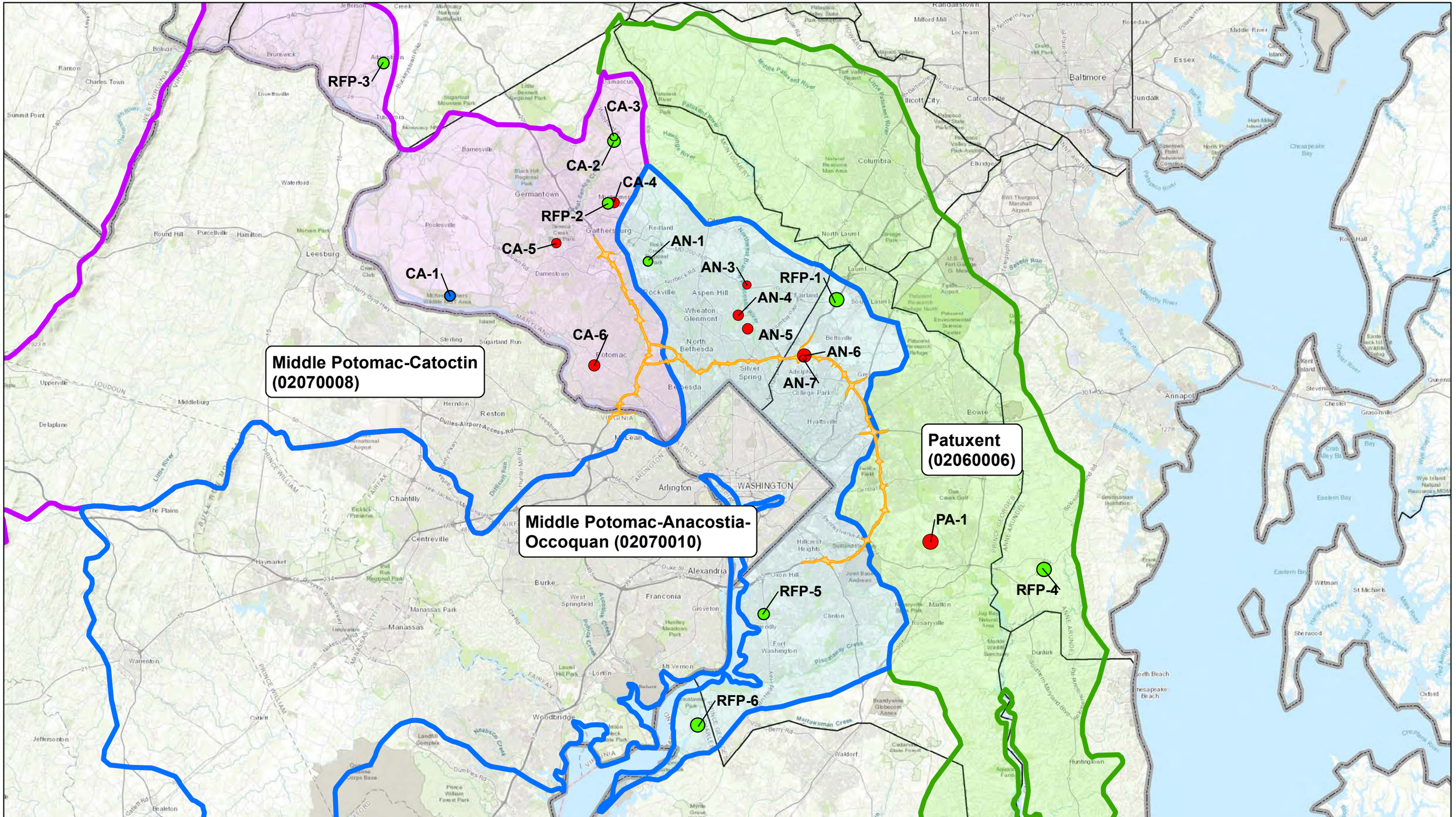
Action Items

- Matt noted that he would review the County's stream monitoring data for the site to get a better understanding of the existing stream conditions and potential for in-stream habitat improvements.
- Doug stated that he would update the proposed mitigation site list with M-NCPPC's latest recommendations based on their recent site visits.

Attendees:

Name	Agency	Email
Matthew Harper	M-NCPPC / Mo. County Parks	Matthew.harper@montgomeryparks.org
Douglas Stephens	M-NCPPC / Mo. County Parks	Douglas.stephens@montgomeryparks.org
Karl Hellmann	P3 / RK&K	Khellmann@rkk.com
Alex Nussbaum	P3 / RK&K	anussbaum@rkk.com

APPENDIX H: POTENTIAL MITIGATION SITE VICINITY MAP & LIST



Legend

State Boundary
MLS Corridor
County Boundary

Targeted HUC8 Watersheds

Middle Potomac-Anacostia-Occoquan
Middle Potomac-Catoctin
Patuxent

Stream Sites
Wetland Sites
Wetland/Stream Sites

N W E S

0 3 6 9 12 Miles

1 in = 6 Miles

Figure H-1. Potential Mitigation Sites Vicinity Map

270 495 MANAGED LANES STUDY

Table H-1: Potential Mitigation Site List

Middle Potomac-Anacostia-Occoquan											
Site ID	Site Name	Database ID	County	Owner	Lat/Long	Location	Potential Wetland Credit (AC)	Potential Stream Credit (LF)	Comments	Status	Field Score
AN-1	Crabbs Branch	MPAO0032 & MPAO0012	Montgomery	M-NCPPC	39.11553546 -77.14594816	Southeast of Redland Rd. Crabbs Branch Stream Valley Park	3.50	4,276	M-NCPPC Recommendation. Crabbs Branch. High potential for overall ecological uplift. Potential for wetland creation/enhancement, channel stabilization, instream habitat improvements, floodplain development and riparian buffer improvements. Downstream floodplain is dominated by reed canary grass with extensive wetlands and scattered trees (4,500 LF). Groundwater observed 3.5 feet below surface in non wetland areas in August. The stream is deeply incised with 3-8 foot tall severely eroded banks throughout site. Upstream end of the stream reach is forested (~3,200 LF). Potential access through adjacent Derwood Station HOA roads.	Selected for Phase I Mitigation. Upstream 3,381 LF removed due to limited functional uplift potential & site constraints.	71/71
AN-3	Pebblestone Dr. Tributary	MPAO0014	Montgomery	M-NCPPC & South Stonegate HOA	39.092946 -77.016077	South of Bonifant Rd. Northwest Branch SVU 5.	0.00	2,162	M-NCPPC recommendation. Northwest Branch tributary. 3-8 foot tall severely eroded banks throughout site. Incised channel surrounded by poor quality forest with extensive invasives. Potential for sediment reduction, floodplain development, fish passage, invasive treatment, and aquatic habitat improvements. Potential access through old access used for adjacent ICC stream restoration project (NW-4).	Selected for Phase I Mitigation	58
AN-4	Northwest Branch Glenallen Ave. Tributary	SSS-150023	Montgomery	M-NCPPC & MCDOT	39.061106 -77.028795	South of Glenallan Ave. Wheaton Regional Park.	0.00	3,069	Northwest Branch tributary. High priority M-NCPPC site. Moderate bank erosion along 4 foot tall banks throughout most of site. Some localized severe bank erosion areas. Site surrounded by forest. Potential for sediment reduction, geomorphic stability, and instream habitat improvements. Potential access from adjacent road would require minimal tree clearing.	Removed due to limited functional uplift potential and site constraints	52
AN-5	Northwest Branch Lamberton Dr. Tributary	MPAO0021	Montgomery	M-NCPPC & MCDOT	39.065186 -77.028844	North of Lamberton Dr. Northwest Branch SVU 4.	0.00	1,784	M-NCPPC recommendation. Northwest Branch trib. Greater than 50% of reach with moderate to severe bank erosion. Channel surrounded by mature forest and steep valley slopes limiting floodplain development. Potential for lateral migration, geomorphic stability, aquatic habitat, and bedform diversity improvements. Several potential access routes exist through adjacent trails requiring some tree clearing.	Removed due to limited functional uplift potential	54
AN-6	Paint Branch Fish Passage	MPAO0033	Prince George's	BARC & SHA	39.021027 -76.945642	I-495/I-95 Interchange	0.00	5,258	Paint Branch Fish Passage Site provided by SHA EPD - 1,544 LF. Proposed removal of two fish blockages along the Paint Branch mainstem to fully re-establish fish access to 0.64 miles of upstream habitat, and partially re-establish upstream access to 26 miles of high quality fish habitat. The two blockages consist of quadruple-cell 10'W x 14' H box culverts that have both created a one foot vertical drop in water surface elevation.	Selected for Phase I Mitigation	40
AN-7	Paint Branch South Farm Tributaries	MPAO0001 & MPAO0003	Prince George's	BARC & SHA	39.018526 -76.949208 39.012977 -76.945156	East of I-95/I-495 Park & Ride. North of Marlbrough Way.	0.00	1,401	BARC recommendations. Paint Branch tributaries. MPAO0001 - Upstream section is concrete lined and natural channel that is highly unstable with severe bank erosion and exposed sewer line. Middle section is incised but stabilized by tree roots. Downstream section has moderate localized bank erosion. MPAO0003 - Section downstream of culvert is unstable with two culverts (1 failure) creating fish blockages. Both sites surrounded by active agricultural fields and forest. Potential for sediment reduction, fish blockage removal, invasive treatment, and instream habitat improvements. Access from adjacent agriculture fields.	Selected for Phase I Mitigation	52/44

Site selected for Phase I Mitigation

Table H-1: Potential Mitigation Site List

Site ID	Site Name	Database ID	County	Owner	Lat/Long	Location	Potential Wetland Credit (AC)	Potential Stream Credit (LF)	Comments		Field Score
Middle Potomac-Anacostia-Occoquan											
RFP-1	Indian Creek and Tributaries at Konterra	NA	Prince George's	Private	39.075833 -76.905555	East of I-95 from Konterra Dr. south to Ammendale Rd & west of I-95 from MD-198 south to Aitcheson Rd.	31.00	26,475	Indian Creek & headwater tributaries. Site consists of a former sand and gravel mine where most of the natural geomorphic conditions and materials have been altered or removed. The streams on the site are highly degraded with steep, actively eroding banks and degraded riparian buffers. The wetland mitigation area contains four abandoned settling ponds from past mining activities that are dominated by invasive species. Potential improvements include floodplain reconnection, bank stabilization, treatment and replacement of invasive species with native species, soil amendments, and establishment of hydraulic connection between wetland cells.	Selected for Phase I Mitigation	NA
RFP-5	Henson Creek	NA	Prince George's	Private	38.765172 -76.99663	West of Livingston Rd intersection.	5.85	1,091	Site consists of a former golf driving range located in the Henson Creek floodplain. The floodplain was filled when the property was developed and a spoil levee was constructed along portions of the left bank of Henson Creek. A small channelized stream flows along the southern border of the driving range that drains into Henson Creek. Improvements include removing portions of the levee, floodplain excavation, and realigning the small channel through the floodplain to create a fully integrated stream and wetland system.	Selected for Phase I Mitigation	NA
RFP-6	Mill Swamp Creek	NA	Charles	Private	38.655722 -77.081643	Intersection of Marshall Hall Rd. and Fenwick Rd.	10.35	1,554	Swamp Mill Creek and tributaries. Site consists of former farm property previously used for livestock ranching and traditional row crop production. The main channel of Mill Swamp Creek has been straightened and channelized. Potential stream restoration includes creation of bankfull benches, stream realignment, and introduction of woody materials, as well as the removal and relocation of existing corrugated metal pipe culverts. Wetland creation and enhancement is proposed by excavating the existing floodplain to target wetland elevations to create a fully integrated stream and wetland system.	Selected for Phase I Mitigation	NA
Middle Potomac-Catoctin											
CA-1	McKee Beshers	MPOC0001	Montgomery	DNR	39.079584 -77.392588	South of Hunting Quarter Rd. McKee Beshers Wildlife Management Area.	7.34	0	DNR recommendation. Site consists of active farm field with open water areas located in Potomac River floodplain. Groundwater observed 14" below ground surface in unsaturated areas in March. No hydric soil indicators observed, likely due to annual tilling. High potential for overall ecological uplift. Existing gravel road provides direct access to site with no tree impacts. Wetlands of Special State Concern north of site. No utilities observed within site.	Removed. Wetland mitigation credit needs met in watershed.	95
CA-2	Lower Magruder Branch	WSS-150147A & MO_00013A	Montgomery	M-NCPPC	39.232782 -77.188321	South of Watkins Rd. Great Seneca SVU 4.	7.98	2,934	Lower Magruder Branch. High potential for overall ecological uplift, including wetland creation/enhancement, channel stabilization, instream habitat improvements, floodplain development and riparian buffer improvements. Floodplain dominated by reed canary grass with scattered trees. Two large PEM wetlands in western floodplain dominated by cattail and reed canary grass. No wetlands observed in eastern floodplain. Groundwater observed 2.5 feet below surface in non wetland areas in November. No utilities observed within site. The stream has 3-4 foot tall banks with moderate to severe erosion throughout, and several torturous meanders. Potential Access from Watkins Rd. Site located just downstream of CA-3.	Selected for Phase I Mitigation	85/61
CA-3	Upper Magruder Branch	WSS-150147B & MO_00013B	Montgomery	M-NCPPC	39.235212 -77.187785	North of Watkins Rd. Magruder SVU 1.	2.27	1,053	Upper Magruder Branch. High potential for overall ecological uplift, including wetland creation/enhancement, channel stabilization, instream habitat improvements, floodplain development and riparian buffer improvements. Floodplain dominated by reed canary grass with scattered trees. Large reed canary wetland in western floodplain. Groundwater observed 2-3 feet below surface in non wetland areas. High quality PSS wetland just east of site. No utilities observed within site. The stream has 2-4 foot tall banks with moderate erosion throughout most of site. Potential access from Watkins Rd. Located just upstream of CA-2.	Selected for Phase I Mitigation	85/66

Site selected for Phase I Mitigation

Table H-1: Potential Mitigation Site List

Middle Potomac-Catoctin											
Site ID	Site Name	Database ID	County	Owner	Lat/Long	Location	Potential Wetland Credit (AC)	Potential Stream Credit (LF)	Comments		Field Score
CA-4	Cabin Branch	MPOC0009	Montgomery	M-NCPPC & MCDOT	39.171692 -77.186706	East of Goshen Rd. Cabin Branch SVP.	0.00	3,457	M-NCPPC Recommendation. Cabin Branch. 3-6 foot tall banks with severe erosion throughout most of site. Majority of site surrounded by forest. Upland meadow along downstream reach. Potential for sediment reduction, floodplain development, aquatic habitat improvements, wetland creation, and riparian buffer plantings. Potential access throughout downstream section through upland meadow. Upstream section would require forest impacts.	Removed due to limited functional uplift potential and site constraints	53
CA-5	Seneca Creek Tributary	MO_00064	Montgomery	M-NCPPC	39.130300 -77.256461	East of Riffle Ford Rd. Seneca Creek State Park.	0.00	2,649	Seneca Creek trib. 3-6 foot tall banks with moderate to severe erosion throughout site. Several sewer line crossings and torturous meanders within site. Site surrounded by mid-successional forest in narrow/steep valley. Opportunities for ecological uplift include erosion reduction, and instream habitat improvements. Potential access along sewer line clearing.	Selected for Phase I Mitigation	53
CA-6	Rock Run	MO_00018	Montgomery	M-NCPPC & MCDOT	39.011277 -77.210914	South of Falls Rd. Heritage Farm NP.	0.00	3,723	Rock Run. 1-5 foot tall banks with minor to moderate erosion throughout site. Site surrounded by mid-successional forest with several scattered wetlands. Old sewer line clearing runs parallel to stream in eastern floodplain that could be used as potential access. Opportunities for ecological lift include sediment reduction, floodplain development, aquatic habitat improvements and fish passage.	Removed due to limited functional uplift potential and site constraints	43
RFP-2	Cabin Branch	NA	Montgomery	Private	39.1792 -77.2093	East and west of Montgomery Village Ave.	4.81	6,680	Cabin Branch and tributaries. Site consists of an incised channel located within the fairway of a former golf course. Existing stream conditions exhibit incised banks, disconnection to the floodplain, and bank erosion. The floodplain surrounding the channel was altered in the past to create fairways, ponds, and other golf course features. Potential improvements include relocating the stream channel into a more functional floodplain, adjustments to the stream channel dimensions to reduce hydraulic stress, increasing channel sinuosity, removal of non-native material from the stream channel, restoring ponds into hydraulically active floodplain wetlands, daylighting tributaries routed through pipes, and establishing and enhancing the riparian buffer.	Selected for Phase I Mitigation	NA
RFP-3	Tuscarora Creek	NA	Frederick	Private	39.3094 -77.4829	Southwest of Mountville Rd.	5.11	5,096	Tuscarora Creek. The site consists of an actively eroding channel with several torturous meanders and abandoned oxbows surrounded by a narrow forested buffer that was planted with trees over the last 10 years. The land surrounding the buffer consists of active agricultural fields. Potential improvements include a combination of lowering the floodplain and maintaining the invert in some sections, while keeping the channel in place and establishing a floodplain in other sections through the use of bankfull benches, bank grading, and other practices. Restoring floodplain access will promote the presence of floodplain wetlands in the form of ephemeral wetlands (oxbow features) and other active riparian floodplain conveyance/storage features.	Selected for Phase I Mitigation	NA

Site selected for Phase I Mitigation

Table H-1: Potential Mitigation Site List

Patuxent											
Site ID	Site Name	Database ID	County	Owner	Lat/Long	Location	Potential Wetland Credit (AC)	Potential Stream Credit (LF)	Comments		Field Score
PA-1	Back Branch	PG_00160	Prince George's	Board of Education, PG County DoE, PG County & Private	38.837228 -76786687	North of Brooke Ln. Dr. Henry A. Wise Jr. High School.	0.00	6,742	Back Branch. 3-5 foot tall banks with moderate to severe bank erosion throughout most of site. Site surrounded by mid-successional forest. Potential for reducing erosion, instream habitat improvements and floodplain development. Access would require impacts to surrounding forest.	Selected for Phase I Mitigation	44
RFP-4	Cabin Branch	NA	Anne Arundel	Private	38.804391 -76.640356	North and South of Greenock Rd.	9.18	11,971	Cabin Branch and Wilson Owens Branch. The site consists of several deeply incised channels surrounded by mid-successional forests. The channels are disconnected from their surrounding floodplains and have lowered the seasonal high groundwater table in adjacent wetlands. Potential stream improvements include raising the bed elevations to restore floodplain connection, laying banks back to a stable angle of repose, creating bankfull benches and installing instream structures for grade control and in-stream habitat purposes. Reconnection to the historic floodplain will restore overbank flows to both existing and proposed wetlands as a source of wetland hydrology. Wetland creation areas adjacent to the stream channel will be excavated down to targeted elevations that will be in contact with the seasonal high groundwater table.	Selected for Phase I Mitigation	NA

Site selected for Phase I Mitigation

APPENDIX I: AGENCY MEETING MINUTES

DAY 1
RFP-1: INDIAN CREEK & TRIBUTARIES AT KONTERRA

Indian Creek and Tributaries at Konterra
Wetland and Stream Mitigation
Pre-Application - Meeting Minutes
November 1, 2019

Date: November 1, 2019
Time: 9:00 AM – 3:00 PM
Location: 14401 Sweitzer Lane, Laurel, MD 20707

1. Attendees

Name	Company/Agency	Email	Phone
Troy Anderson	EIP	troy@ecosystempartners.com	608-212-6607
Susan Lindstrom	WSP	susan.lindstrom2@wsp.com	201-783-3600
Scott Petrey	WSSI	spetrey@wetlands.com	703-679-5653
Kelly Petrey	WSSI	kpetrey@wetlands.com	703-679-5658
Justin Reel	RK&K	jreel@rkk.com	410-468-9348
Karl Hellman	RK&K	khellman@rkk.com	410-462-9263
Maddy Sigrist	RK&K	msigrist@rkk.com	410-462-9125
Justin Bates	McCormick Taylor	Jhbates@mccormicktaylor.com	410-802-4850
Steve Hurt	McCormick Taylor	steve.hurt1@maryland.gov	410-336-1528
Mike Klebasko	WSSI	mklebasko@wetlands.com	410-672-5990
Collin Sumpter	Konterra	collin@aggmgt.com	443-835-7255
Jack Dinne	USACE	john.j.dinne@usace.army.mil	410-962-6005

2. Welcome and Project Purpose.

The meeting kicked off with attendees and project introductions. Maryland State Highway Administration (SHA) representative, Justin Reel, explained this proposed mitigation project will be one of many submitted as part of their draft Joint Permit Application (JPA) for the I-495 & I-270 Managed Lanes Study currently scheduled for a winter 2020 submission. This is the largest mitigation site currently proposed. Troy Anderson of Ecosystem Investment Partners (EIP) explained they have mitigation banks and performance-based projects nation-wide with over 11 miles of stream currently being restored in Cecil County. The Konterra mitigation project proposes over 27,000 linear feet of stream and 30 acres of wetland mitigation.

The goal of the pre-application site meeting was to walk portions of the proposed mitigation site that are representative of the entire mitigation package. Areas visited were Area 3 – Contee Dam, Area 2 – Indian Creek, the upstream portions of Area 4, Area 5, and Area 1 – Fashion Place as identified on the Overall Exhibit Map (attached). The site tour was led by Kelly Petrey, Wetland Studies and Solutions, Inc.'s (WSSI) project manager. Also included with the minutes are 11x17 aerial map exhibits of each area.

3. Site Visit #1 (Area 3 – Contee Dam)

First stop on the tour was at Contee Dam where approximately 30 acres of wetland mitigation and 4,000 linear feet of stream mitigation are proposed (refer Area 3 on Overall Map). The specific portions of this area that were visited included Contee Dam, the large cell upstream of the dam, the braided stream/wetland system downstream of the dam, and the southwest cell.

WSSI explained that this site contained former sand/gravel borrow pits, which later served as a depository for washings from excavated materials. The cells are comprised of poor quality, monotypic wetlands dominated by the invasive *Phragmites australis* and the surrounding buffer areas are dominated by upland pioneer/invasive species (i.e. black locust, bradford pear, porcelain berry, Japanese honeysuckle, poison ivy, blackberry, multiflora rose). WSSI is currently collecting existing condition data. From current data and review of historic information, groundwater varies 2 - 10' below surface and may perch after rain events. Drainage area is over 700 acres split between a culvert under the ICC (refer to Overall Map for locations). WSSI has taken both 12' and 3' hand-augured soil borings. Results show typically within cells there is a thin organic/silty sandy layer containing a vegetation mat and a deeper underlying soil layer comprised of very soft clayey silt with some gravel lenses. Dryer portions of cells do have tight, dry clays.

Proposed wetland mitigation will be a surface driven, tiered palustrine forested wetland system with some emergent and open water areas. Hydraulic connection between existing cells will be established by breaches in the existing berms. Rock weirs may be installed to adaptively manage water level to create the desire wetland community as wetland system evolves. The wetland cell upstream of Contee Dam will also have an overbank flow component to tie in the stream from the culvert.

Maryland Department of the Environment (MDE) representative, Steve Hurt, inquired about proposed management of the widespread phragmites. WSSI confirmed control will be through a combination of chemical control and flooding is anticipated to take multiple years and would start prior to construction. EIP confirmed they have experience with successfully eradicating phragmites in similar large wetland systems.

Excavation of existing soil and addition of amendments is anticipated and will described in the Phase II plan.

The degraded stream system located downstream will be restored using natural channel design including floodplain reconnection and re-establishing a stable plan, profile, and cross section. The Aitchesen Bog (a wetland of state concern) is located adjacent to this stream. WSSI scientists have identified potential bog areas at the toe of slope seeps. The stream restoration efforts will minimize any impacts to this area and may work to enhance/expand these areas.

4. Site Visit #2 (Area 2 – Indian Run)

Second stop was Area 2, specifically the only portion of the Indian Creek mainstem proposed for restoration. It is also the only FEMA-mapped floodplain associated with the mitigation sites. The existing stream has raw, vertical banks and is disconnected from the adjacent floodplain in many areas. Side channels within floodplain were also incised with similar vertical banks. Water in channel was elevated during the site visit as a result of rain the previous day. MDE representatives remarked that a culvert downstream is known to have log jams and cause backwater. The forest in this area was noted to be young with few to no specimen trees allowing additional flexibility for floodplain reconnection, re-establishment of stable planform, and construction access and staging.

WSSI explained the proposed restoration will be natural channel design priorities 1 or 2. Geomorphic structures will include both wood and rock and there will be in-stream habitat structures. Reinforced riffles will used to provide additional stability and bedform diversity. A diverse mix of native riparian and stream side plants will be incorporated into the proposed design. Functional uplift is anticipated in in Level 2 - Hydraulics, Level 3 - Geomorphology, Level 4 - Physiochemical, and limited uplift in Level 5 – Biology.

5. Site Visit #3 (Areas 4 and 5)

After lunch, the next stop included both Areas 4 and 5 with access from Konterra Drive. This stream network is typical of the headwater systems proposed for mitigation. As a former sand/gravel mine site, the geomorphic features are highly altered with channel relocated and straightened. The Area 4 stream system included in-line

dam and remnant ponds. Downstream of the existing berm was a series of headcuts migrating through the channel. The water in this area was opaque black. The forest was similar to the previous site with few to no specimen trees. Phragmites dominated the historic pond that has been filled in with eroded sediment from upstream. Depending on site hydrology, the headwater area (upstream of the large culvert/embankment) may support a wetland system or a wetland/stream.

The Area 5 stream system was straightened with a very small wetland/stream complex within 500' of Konterra Drive. The channel has been straightened within the non-forested area and altered by berms and in-line ponds in the forested area. The proposed buffer here is over 100' wide, which is typical of all the mitigation areas.

6. Site Visit #4 (Area 1 – Fashion Place)

The final stop was to Area 1 – Fashion Place, a proposed stream mitigation for the stream that runs parallel with Konterra Drive and flows though large culvert under Fashion Place. This is a small stream network that was previously straightened and altered. There is a stormwater pond and overhead utility line to the north. Proposed mitigation would tie into existing infrastructure while restoring floodplain connection, adding instream habitat features, and improving riparian buffer.

7. Additional Information

WSSI confirmed for this site that trilogy coordination with the Maryland Department of the Environment (DNR), US Fish and Wildlife Service (USFWS), and Maryland Historical Trust (MHT) has been initiated. DNR listed two endangered species low rough aster (*Eurybia radula*) and long-stalk greenbrier (*Smiilax pseudochina*) in the northwest edge of Area 5 at the upstream portion of the restoration reach. During the meeting, it was confirmed both species were identified in the stream network north of ICC in Area 1. WSSI explained the conditions are likely not suitable for both species in the proposed restoration site in Area 5. DNR also identified the Aitcheson bog (piedmont seepage fen) in Area 3 downstream of Contee dam. Restoration is proposed within this area and continued coordination with DNR is anticipated. MHT confirmed there are no adverse effect on historic properties within the proposed restoration areas.

8. Conclusion

At the conclusion of the day, SHA representatives reviewed the overall project schedule, including additional site visits and anticipated submissions. MDE and USACE recommended DNR and USFWS be invited to future site visits. SHA explained they will submit the draft JPA in the winter of 2020, and that it will include all proposed private and public mitigation Phase I reports and will include extra mitigation to compensate for sites that may not be advanced.

It was also reiterated that the Indian Creek and Tributaries at Konterra Wetland and Stream Mitigation site will provide significant functional uplift to wetlands and stream, and that the site is in very close proximity to the proposed impacts.

Site visit concluded at 2:00 pm.

Exhibits provided:
Overall Project Map (8.5x11)
Project Map by Area (11x17)

DAY 2
AN-4: NORTHWEST BRANCH GLENALLEN AVE. TRIBUTARY
AN-5: NORTHWEST BRANCH LAMBERTON DR. TRIBUTARY
CA-5: SENECA CREEK TRIBUTARY

I-495 & I-270 Managed Lanes Study
Mitigation Agency Field Review – Day 2
November 7, 2019 @ 9:00am

Handouts:

Stream Site Vicinity Maps
AN-4 Phase I Mitigation Design Plan
AN-5 Phase I Mitigation Design Plan
CA-5 Phase I Mitigation Design Plan

A field review meeting was conducted on November 7, 2019 with representatives of several agencies and stakeholders including M-NCPPC, DNR, USFWS, USACE, and MDE to discuss potential stream mitigation sites located on M-NCPPC Montgomery County properties for the I-495 & I-270 Managed Lanes Study. A summary of the topics discussed at the meeting follows.

Introductions

All participants met at the Brookside Nature Center. The meeting began with introductions, followed by a general summary of the private and public mitigation process by Justin Reel. Mitigation opportunities were targeted within the three federal HUC-8 watersheds being impacted, including the Potomac-Anacostia-Occoquan, Middle Potomac-Catoctin, and Patuxent. The first step in pursuing mitigation began with identifying potential on-site mitigation for streams that would fully or partially retain their function and value following construction completion (i.e. channel relocations or channels to remain). Once on-site mitigation was determined, off-site mitigation was pursued by state and watershed, beginning with mitigation banking and in-lieu fee programs, and followed by permittee-responsible mitigation. A two-tiered approach was used to identify potential permittee-responsible mitigation that included a traditional mitigation site search on public lands and a Request for Proposals (RFP) on private lands. Public sites with the greatest mitigation potential that received preliminary approval from landowners and private sites that met MDOT SHA's financial, technical, and administrative qualifications were chosen as potential mitigation sites for the agency field review.

It was discussed that once the agencies gave their preliminary approval on sites, the group will need to rate each site based on more detailed parameters, such as geomorphology, hydrology, etc. Justin explained that the potential mitigation for the project exceeds the mitigation requirement by a site or two (and sometimes more) in each watershed, with the exception of wetland mitigation in the Patuxent. He estimated that the potential mitigation may be 30-50% over the total mitigation requirement. Justin explained that MDOT SHA's standard conservation easement language was provided to the RFP respondents. Steve Hurt (MDE) stressed that it will be important to discuss the language for certain sites that will require future stormwater management outfalls for surrounding developments.

Mitigation Opportunities

AN-4 – Glenallan Ave Tributary to Northwest Branch

Matt Drennan briefly introduced the site prior to the site walk. Matt explained that one of the main reasons that the site was considered for restoration was that it could provide educational opportunities to the Nature Center and the stream is largely protected by the surrounding park. M-NCPPC stated that they have a stream restoration project along the Glenallan Tributary, upstream of AN-4. The section of Northwest Branch downstream of the potential restoration site is Use IV and stocked with trout, which should not impact the viability of the restoration site but should be taken into consideration when developing the site design.

M-NCPPC also mentioned that if restoration were to occur, the preference would be for the restoration to extend upstream of the extents shown in the Phase I Design Plan to the confluence of the two tributaries, upstream of the entrance to the Brookside Nature Center parking lot. M-NCPPC stated that they were open to the idea of removing the in-stream pond control device and the possibility of altering the elevations of the bridges for the Nature Center access road.

The existing stream channel in the potential restoration site exhibits issues with bank erosion, geomorphic instability, overwidening, and fine sediment deposition. The channel and its floodplain are highly-confined by the adjacent Glenallan Avenue.

After concluding the site walk, the group was asked to make any final comments on the potential restoration site. Jack Dinne (USACE) stated that for the restoration to be successful, the design would have to provide floodplain access. Steve Hurt agreed that the site had potential, but the success of the restoration would depend on how much of a blank slate the property owner (M-NCPPC) would allow. The site has potential but would require forest impacts that may not be deemed acceptable by M-NCPPC. M-NCPPC stated that this is not a location where they would want to do a wholesale restoration project, because they would want to keep the forested feel of the park. M-NCPPC stated that the quality of the forest makes a wholesale project difficult to accept due to the required impacts to the adjacent resources. M-NCPPC stated that the goal should be to strike a balance between tree impacts and stream uplift.

M-NCPPC stated that they would like to wait to make a decision on the restoration site until they have seen the rest of the potential mitigation sites on M-NCPPC property. M-NCPPC proposed that a debriefing meeting be scheduled with the designers and M-NCPPC after all of the potential sites on M-NCPPC land have been reviewed, to discuss the proposed restoration techniques on each of the sites in more detail.

AN-5 – Lamberton Drive Tributary to Northwest Branch

The length of the potential mitigation site from Lovejoy Street downstream to the confluence of Northwest Branch was significantly reduced prior to the meeting due to the majority of the reach being listed as a high priority site on the USACE's Anacostia Watershed Restoration Program. M-NCPPC noted that the site was a DEP project more than 20 years ago. Most of the stream channel was heavily armored and banks without armor were experiencing localized scour. Steve Hurt expressed that there was limited potential for habitat enhancement and that the site has greater potential as a sediment control or TMDL project. M-NCPPC expressed interest in using the site to

create more capacity for stormwater storage and retention. Jack Dinne stated that the site should not be pursued unless the mitigation team was desperate.

CA-5 - Bradbury Dr. Tributary to Great Seneca Creek

Karl Hellmann gave a brief summary on the existing conditions of the CA-5 site. The original restoration reach extended downstream onto DNR property to the confluence with Great Seneca Creek, however this section was removed due to DNR's concerns with impacts to trees and the adjacent disc golf course. The stream consists of a deeply incised channel located in a narrow valley, with a small abandoned farm pond at the downstream end of the site. M-NCPPC stated that they supported the removal of the farm pond. MDE suggested using the abandoned farm pond to dispose of cut material for stream work and raise the pond bed to create a wetland. M-NCPPC would like the proposed design to lower the water level in the pond to create a wetland. M-NCPPC stated that the desire would be to remove part of the pond embankment near the existing outlet and leave the rest of the embankment to avoid tree impacts. It was proposed that depending on the depth of the pond, the most practical approach may be to lower the water level enough to create wetlands around the fringe and leave the deeper section open water. It was discussed that this might be achieved by extending the existing breach and adding a 20-foot opening on the upstream side of the pond. M-NCPPC suggested taking the restoration slightly upstream (~20-feet) of the pedestrian bridge to stabilize the bridge. Overall the agencies agreed that the site has potential for stream mitigation purposes.

Attendees:

Name	Agency	Email
Justin Reel	P3 / RK&K	jreel@rkk.com
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Erin McArdle	M-NCPPC / Mo. County	Erin.McArdle@montgomerypark.org

DAY 3
AN-1: CRABBS BRANCH
AN-3: PEBBLESTONE DR. TRIBUTARY

I-495 & I-270 Managed Lanes Study
Mitigation Agency Field Review – Day 3
November 8, 2019 @ 9:00am

Handouts:

AN-1 Phase I Mitigation Design Plan & Site Vicinity Map
AN-3 Phase I Mitigation Design Plan & Site Vicinity Map

A field review meeting was conducted on November 8, 2019 with representatives of several agencies and stakeholders including M-NCPPC, USFWS, USACE, DNR and MDE to discuss potential stream mitigation sites located on M-NCPPC Montgomery County properties for the I-495 & I-270 Managed Lanes Study. A summary of the topics discussed at the meeting follows.

Introductions

All participants met at the Crabbs Branch site off Redland Road. The meeting began with introductions.

Mitigation Opportunities

AN-1 – Crabbs Branch, Tributary to Rock Creek

Karl Hellmann briefly summarized the existing conditions of the site, noting that the entire area surrounding the stream was agricultural fields in the 1950s, at which time the stream banks were bare. Karl explained that the site was recommended by M-NCPPC and includes a 7,700 linear foot of potential stream restoration, as well as wetland enhancement and wetland restoration areas. The stream is highly incised with tortuous meanders and severely eroded banks. The upper reach is surrounded by a mid-successional forest and there is an open, reed canary meadow in the lower reach. The restoration objectives would be to stabilize the stream bed and bank; improve floodplain connection; improve in-stream habitat; conduct invasive species control; and create and enhance wetlands.

The site originates just downstream of a large culvert under Redland Road that receives drainage from the Crabbs Branch Regional Stormwater Pond. It was apparent that some in-stream work was done previously in the upper forested reach and scattered tree planting were observed in the floodplain within the site. The upstream reach is accessible through a young riparian forest in the southern floodplain and the downstream reach is accessible through open meadows that connect to an HOA easement. The floodplain to the north of the upper reach consists of a mid-successional forest with several specimen trees that would be avoided during construction. There were several woodcock sightings in the upper forested reach during the site walk. Several shallow utility crossings were observed within the site that may pose a challenge to project. There are several exposed sewer lines and one exposed gas line at the downstream end of the lower reach that require attention. There is a high-quality seep wetland in the northwestern corner of the lower reach that would be avoided.

Steve Hurt (MDE) asked why a floodplain restoration design is not proposed in the lower reach, considering the majority of the floodplain is open meadow that would require minimal tree impacts. David Black responded that there were some concerns with the amount of material that would be

required to be transported off-site through the adjacent residential community. The site will be further investigated to determine the amount of material required for removal off-site or placed on site for a potential floodplain restoration design. There was discussion on the most effective way to remove the invasive reed canary grass and it was thought that a combination of herbicide, excavation, and shading with large tree plantings might be effective. M-NCPPC indicated that they would consider the possibility of careful application of herbicides to control invasive species in the floodplain. Matt Harper mentioned that the project would need to be mindful of where to plant trees in order to maintain open habitat for particular bird species.

David Black indicated that boring samples will be collected to determine whether the restored stream bed should be proposed at the gravel layer. The hydrology in the floodplain wetlands appears perched on top of a 3-foot clay layer above the gravel layer. The fine clay sediments likely washed into the floodplain from the surrounding landscape in the past when the area was predominantly used for agriculture. Installation of groundwater wells and a collection of geoprobe samples will be necessary to understand the valley hydrology. There is a distinct slope change between the valley slope and the channel slope. Top soil and organic matter would need to be placed on top of the clay in the proposed wetland restoration areas to successfully establish vegetation. Dry reed canary areas in the floodplain could be excavated to create new wetland areas.

The agencies agreed that the site had good potential for restoration. Ray Li noted that there is good connectivity to wildlife habitat below the site. Gwen Gibson suggested that it might be nice to have wet meadow in parts of the lower section of the site. Matt Harper indicated that the bird species that currently inhabit the area should be a design consideration and may limit the amount of trees that can be planted on the site.

AN-3 –Pebblestone Drive Tributary to Northwest Branch

Karl introduced AN-3, a stream restoration site located along an unnamed tributary to Northwest Branch, just east of Pebblestone Drive. The site was recommended by M-NCPPC and includes approximately 2,200 linear feet of potential stream restoration. The channel appears to have been straightened in some areas and is deeply incised, with severe bank erosion and extensive deposition bars. The forest surrounding the site is in poor condition with several dead green ash trees and extensive invasives in the herbaceous layer. A small section of the upstream reach is located within an HOA forest conservation easement. There is a 1-2 foot tall fish blockage at the upstream end of the site, just south of Bonifant Road. Just downstream of the site the channel reconnects to the Northwest Branch floodplain and transitions into a braided system surrounded by extensive PFO wetlands. There is a previous ICC stream restoration project (NW-4) within the same stream valley that runs parallel to the downstream section of the site. Matt mentioned that the land north of Bonifant Road is also parkland and this area may also be a good candidate for stream restoration. The group agreed to review this stream section as well following the AN-3 site walk.

Jason Coleman explained that the design would propose to lower the stream banks closer to the floodplain. Other restoration objectives would include bed and bank stabilization, instream and riparian habitat improvement, and a fish blockage removal at the culvert under Bonifant Road.

It was agreed that both sites have restoration potential, however the section upstream of AN-3 is more confined, with fewer design options. It was suggested that the upstream site could potentially

be considered for stormwater quality improvement and the downstream site for 404 mitigation. M-NCPPC stressed that if the project is working in this system, the upstream section should be analyzed as well. M-NCPPC would prefer to address both areas at once, rather than just the downstream section, but indicated that the forested character of the upstream section would have to remain intact. M-NCPPC was amenable to the idea of restoring the upstream reach for stormwater credit and said that there is excitement for stormwater work in the Anacostia Watershed.

Attendees:

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DAY 4
CA-2: LOWER MAGRUDER BRANCH
CA-3: UPPER MAGRUDER BRANCH
CA-4: CABIN BRANCH

I-495 & I-270 Managed Lanes Study
Mitigation Agency Field Review – Day 4
November 14, 2019 @ 9:00am

Handouts:
CA-2 Phase I Mitigation Design Plan & Site Vicinity Map
CA-3 Phase I Mitigation Design Plan & Site Vicinity Map
CA-4 Phase I Mitigation Design Plan & Site Vicinity Map

A field review meeting was conducted on November 14, 2019 with representatives of several agencies and stakeholders including M-NCPPC, USFWS, USACE, EPA, DNR and MDE to discuss three potential stream mitigation sites located on M-NCPPC Montgomery County properties for the I-495 & I-270 Managed Lanes Study. A summary of the topics discussed at the meeting follows.

Introductions
All participants met at the M-NCPPC parking lot at the Magruder Branch trailhead at 23591 Log House Rd. Gaithersburg, MD 20872. The meeting began with introductions, followed by a general summary of the private and public mitigation process by Justin Reel. The group then consolidated into vehicles before driving to Sites CA-2 and CA-3.

Mitigation Opportunities

CA-3 – Upper Magruder Branch, Tributary to Great Seneca Creek

Karl Hellmann summarized the existing conditions of CA-2 and CA-3, which consist of combine stream/wetland restoration sites along Magruder Branch that are separated by Watkins Road. CA-2 was identified in MDOT SHA's database and CA-3 was added as a potential site during the windshield survey. CA-3 consists of approximately 1,000 linear feet of potential stream restoration, as well as wetland creation and enhancement areas. The stream is unstable with tortuous meanders and moderately eroded banks. The floodplain is dominated by invasive reed canary grass with scattered trees and PEM wetlands. There is a high-quality scrub-shrub wetland in the eastern floodplain, just north of Watkins Rd. The western floodplain is dominated by reed-canary grass and drains under Watkins Road through two 21-inch corrugated metal pipes and through a ditch that drains to Magruder Branch within the downstream CA-2 site. The restoration objectives include stabilizing the stream bed and bank, improving the floodplain connection and instream habitat, treating invasive species, reforesting the floodplain and creating and enhancing wetlands.

Drew Altland discussed the preliminary concept design that includes restoring the site by reconnecting the floodplain to the groundwater aquifer. The floodplain would be excavated and leveled in open areas, and sections of the channel would be relocated to a more centralized location in the valley and tied into the groundwater aquifer. The proposed design would redistribute flows across the valley that would restore the floodplain as an interconnected stream and wetland system.

Ray Li (USFWS) noted that the wet pockets within the existing old meadow along with the forested hillside provide good wildlife habitat. Fox, deer and birds were observed during the site visit.

The group reviewed a small reed canary grass wetland at the northern end of the site that is proposed for wetland enhancement. Steve Hurt (MDE) noted the area may not be worth pursuing due to the small size of the wetland and low credit potential. Karl noted that the meadow surrounding the reed canary wetland was removed from wetland enhancement consideration due to its habitat value as an old field with a diverse mix of wet and dry vegetation.

Gwen Gibson (DNR) noted that there is a Sensitive Species Project Review Area (SSPRA) that contains two listed plant species in the open canopy wetland near the stream crossing at Watkins Road. The designers mentioned that the restoration project could be designed to enhance/create wetland habitat conditions where these sensitive species are found.

All parties were in general agreement with the design approach. Additional information on the sediment supply, and more specific issues would need to be addressed.

Barbara Rudnick (EPA) asked how the mitigation sites were selected in terms of their proximity to the project impacts. It was discussed that potential mitigation sites were targeted within the three HUC-8 watersheds that are being impacted by the project. Many of the sites that were investigated in close proximity to the impacts had low potential for functional uplift or construction feasibility concerns. Sites were not removed based on their distance from the project impacts and some of the selected sites included recommendations from the public landowners. At the time of the meeting, a total of 19 potential mitigation sites were under consideration (13 public and 6 private).

CA-2 – Lower Magruder Branch, Tributary to Great Seneca Creek

Karl introduced CA-2, a stream/wetland restoration site located along Magruder Branch, just south of site CA-3. The site includes approximately 2,900 linear feet of potential stream restoration, as well as wetland creation and wetland enhancement areas. The stream is highly unstable with tortuous meanders and moderate to severely eroded banks. There is a one foot tall fish blockage at the upstream end of the site where Magruder Branch flows under Watkins Road. The upper stream reach is surrounded by a broad floodplain dominated by reed canary grass and the lower stream reach floodplain consists of a sparse forest dominated by black walnut. The upper western floodplain has two large PEM wetlands, dominated by cattail and reed canary grass, while the eastern floodplain is mostly dry reed canary grass meadow. The restoration objectives include stabilizing the stream bed and banks, improving floodplain connection, providing fish passage and in-stream habitat improvements, treating invasive species, reforesting the floodplain, and creating and enhancing wetlands.

The culvert that drains Magruder Branch under Watkins Road is undersized and outfalls near the toe of the valley slope where there is a one-foot tall fish blockage. It was noted that the downstream channel would have to be raised by three feet to backwater the culvert and remove the fish blockage. Debris wracks are evident along the roadway guardrail, indicating that the stream overtops the roadway during heavy rain events. The group discussed the possibility of relocating the culvert to a more central location in the valley to reduce flood flows over Watkins Road and remove the fish blockage. It was noted that Watkins Road is within the county road right-of-way and therefore the culvert relocation would need to be discussed with the Montgomery County Department of Transportation (MC DOT). Ray Li (USFWS) asked if it was possible to remove the roadway in this section and add a bridge to span the valley.

The wetlands within CA-2 are located near the toe of the valley slopes, which allows for room to work adjacent to the channel. The majority of the wetlands are poor quality and dominated by reed canary grass or cattail. Drew stated that the design would be similar to the upstream CA-3 site in that the modern floodplain sediments would be removed to reconnect the stream to the groundwater aquifer. The stream restoration would ideally be tied into the confluence with Seneca Creek using a hydraulically stable method. The proposed floodplain would be approximately 150-feet wide and the transition into Seneca Creek would be approximately 150-feet wide by 150-feet long.

Steve remarked that the new culvert would still be somewhat of a pinch point and would encourage sediments to fall out there. Drew replied that they would size the culvert to County designation for the 25-year storm or 50-year storm condition. The bed load would be encouraged to drop out at the top of the site and enhance sediment drop out in this area. This would protect the downstream section of the road from flood overflow.

Matt noted that there was flexibility with the site due to its open conditions, and that nothing should stop the restoration approach, but M-NCPPC may need to negotiate the width of the connection with the mainstem. Both the mainstem of Seneca Creek and Magruder Branch would benefit from making the connection.

The agencies agreed with the design approach and that the site had good potential for mitigation purposes. DNR deferred to M-NCPPC for tree protection. Matt said that there needs to be some acceptable tolerance as the majority of the site is not forested, with the exception of the downstream section. M-NCPPC will discuss the downstream forest conditions and impacts with their forest ecologist.

Karl noted that the site has great potential for uplift and sustainability due the expansive floodplain dominated by invasive reed canary grass and the lack of utilities.

There was further discussion about the habitat requirements that could be maintained. Drew said that at the upper end of the project there could be an intermixing of dry meadow/pollinator meadow with wetland pockets.

CA-4 – Cabin Branch, Tributary to Great Seneca Creek

Karl introduced CA-4, a stream restoration site on the Cabin Branch, just east of Goshen Rd. The site was recommended by M-NCPPC and includes a 3,500 linear feet of potential stream restoration. The stream is highly unstable with tortuous meanders and severely eroded banks. The site is surrounded by a mid-successional forest in the upper reach and a dry meadow with scattered trees in the downstream reach. The whole area is located within forest conservation easements. There is a small, deeply incised tributary to Cabin Branch in the upper reach. There is a house at the end of Poinsetta Court that is within the 100-year FEMA floodplain that would likely limit the restoration approach so that there is not an increase of flooding in that location. Access is fairly open to the downstream reach, while tree clearing would be required to access the upstream reach. The restoration objectives would be to stabilize the stream bed and bank; improve floodplain connection; riparian habitat improvements and fish and benthic habitat improvements.

Approximately 2,000 linear feet downstream of CA-4 there is an abandoned golf course that is a proposed MLS stream/wetland mitigation site (RFP-2) that will be donated to M-NCPPC as parkland after mitigation work is completed by RES. Upstream of CA-4 is a road widening project that will include some stream restoration. The land upstream is not owned by M-NCPPC.

The group discussed the existing conditions of the site and potential design approaches. A floodplain restoration design approach would not be proposed at CA-4 due to the narrow valley that is highly confined by adjacent residential communities. There appears to be a large amount of sediments moving through the system. Grade controls could be used to minimize the amount of sediment moving downstream. Matt talked about potentially using natural channel design techniques to lift sections of the channel where there are less constraints. M-NCPPC did not have reservations about finding reasonable construction access. The upstream drainage area is quite large (2.91 square miles) for such a narrow floodplain. M-NCPPC noted that there would be value in addressing the outfalls draining to the site. M-NCPPC recommended not proposing any work on the upstream end of the small tributary due to the stability of the channel. There is County monitoring data for the stream that can be shared.

Jack said he was unsure about the site considering the design challenges and that it would need to be studied further to determine goals. A full scale restoration would also likely be expensive. Steve mentioned that the site is somewhat far from the impacts and that access could be a challenge.

Justin noted that there will be an over-selection of potential Phase I sites so that there are enough remaining when sites are removed later due to “fatal flaws”. CA-4 will be retained as a mitigation possibility but may not be selected as a site to move forward with if other sites are presented that have greater accessibility and uplift potential.

Steve recommended that a narrative be included in the Compensatory Mitigation Plan on how the process of site selection would work and how sites selected would move forward or drop-out.

There was a proposal for a smaller meeting that would be entirely focused on how sites are ranked for selection. There was general agreement with this approach.

Attendees:

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DAY 5
RFP-2: CABIN BRANCH
RFP-3: TUSCARORA CREEK

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Memorandum

for your use ☒ for your approval ☐ as requested ☐ for your review ☐ attached ☐ under separate cover ☐

date: December 18, 2019

to:

from:

cc: Attendees;

subject: MDSHA Cabin Branch

we are sending you: Regulatory Field Review Meeting Milestone Report and Sign-In Sheet

# of copies 1

On Friday, November 15, 2019 at 9:00 AM, RES staff met with representatives from USACE, MDE, EPA, FWS, DNR, WSP and RK&K to discuss the existing conditions and proposed design of the MDSHA Cabin Branch stream & wetland mitigation project. This project is being implemented to satisfy compensatory mitigation requirements for the I-495 & I-270 Managed Lanes Study. Prior to walking the site attendees met near the front of the property and a sign in sheet and copies of the site map were distributed.

The following were in attendance:

Susan Lindstrom	WSP	susan.lindstrom2@wsp.com
Maddy Sigrist	RK&K	msigrist@rkk.com
Karl Hellmann	RK&K	khellmann@rkk.com
Justin Reel	RK&K	jreel@rkk.com
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Reid Cook	RES	rcook@res.us

After all parties had arrived, Reid Cook gave an introduction of the site and described overall project objectives. Major goals outlined were improved floodplain connectivity, increase bedform diversity, elimination of stream bank erosion, multi-category functional uplift, and creation of

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wetlands within existing amenity ponds. Impacts associated with existing dam currently located in the Pepco easement would also be alleviated regardless of mitigation credit. Another aspect of the project discussed includes daylighting water courses that are currently piped. These various aspects of the project allows the rare opportunity to undo historic alterations in an urban stream channel and create an intact wetland/stream complex.

Mr. Cook gave an overview of existing stream conditions that the group would see during the site visit as well as some background information. The site was previously a golf course and has various course infrastructure remaining on the property that will be removed. In addition, there are several broken cement crossings in the stream that have created significant flow impediments and channel instability.

Sections of the existing channel have little to no planform or bedform diversity and much of the channel upstream is incised and heavily armored. Upstream design strategies discussed included channel relocation, when necessary, and modification of bed elevations to decrease bank height ratio, increase entrenchment ratios, and increase floodplain connectivity. Another point of discussion was good construction access which will minimize the number of trees removed during restoration.

Questions were discussed during this portion of the site visit and included what legal entity would take ownership of the conservation easement after the Cabin Branch project's completion. Mr. Cook explained that according to the RFP, the conservation easement will be transferred to the State of Maryland after the project but there could be an alternate option to have MNCPPC (Maryland National Capital Park and Planning Commission) take on that role instead.

Another participant asked if the project site is going to get transferred to MNCPPC (Maryland National Capital Park and Planning Commission) after the project's completion. Portions of the project are will be transferred to MNCPPC after completion of the development project. Areas within the stream project easement are still being discussed.

A participant asked the size of the watershed of the project. Data was not available at the time of the site visit, but for clarification the watershed area to the downstream portion of the site is approximately 4.4 square miles.

Project Location near Pond 4

The site walked started upstream of Montgomery Village Avenue six large culverts under the road were discussed. Old cart path culverts enable increased floodplain drains and enable more efficient flood events through the road embankment. RES staff described the lower portion of the stream has the best bank height ratio and less riprap than other sections. However due to the lack of historic armoring, lateral channel migration is also prevalent. Proposed design strategies discussed included raising the channel as much as possible without altering the FEMA/County floodplain limits. Other channel impairments noted were lack of bedform diversity and subsequent decreased ecological habitat. Interaction with a proposed floodplain wetland was also discussed and will enable greater ecologic uplift and stream/riparian interaction.

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Project Location Tributary 2

The group continued upstream to confluence of the main channel and Tributary 2. Mr. Cook discussed relocation of Tributary 2 to maximize floodplain connectivity and interactions with proposed wetlands. Within Cabin Branch areas that had not been armored are exhibiting significant bank erosion and lateral channel migration. Due to high bank height ratios large storm events are still contained within the channel and creating significant shear stress and channel instability. One participant asked what is the bankfull of the stream. Reid said, off the top of his head, that its around 30 feet.

Project Location Pond 3/Tributary 1

By Pond 3, the group examined the floodplain and discussed the existing ponds. The existing ponds are failing and one has undergone dam/drainage failure. Mr. Cook discussed the intact floodplain and ability to work with existing ponds in the floodplain to create large wetland/stream complexes.

Project Location Pond 2 & 1

The group participants continued to the furthest upstream area of the project, where pond 2 and pond 1 are located. The channel is very incised here and is attempting to interact with the floodplain. Cabin Branch floodplain connectivity and wetland creation were discussed.

Project Location Tributary 3

Tributary 2 exhibits channel instability and is undergoing significant later migration in the lower sections. Channel relocation was discussed to mitigate the current channel issues.

Project Location Pepco Easement

The group stopped by the dam located in the section of the stream within the Pepco easement. Mr. Cook discussed with the group that the discussions about the dam between RES and Pepco have been positive. However, if RES does not end up getting credit for restoring this section of stream, they are still committed to fixing the dam reach to ensure overall the continuity of the stream restoration. One participant asked what exactly would be done to the dam during construction. Mr. Cook clarified that the concrete dam may not be actually removed but the stream would be altered to alleviate the dams impact to the channel. Planting issues within the Pepco easement were also discussed and further coordination will be required to determine what will be permissible.

Lower Cabin Branch/Ponds #6 and #7

The group continued downstream and examined the remaining portions of Cabin Branch and Ponds 6/7. Numerous issues were noted along this portion of Cabin Branch and included historic concrete outfall from Pond #6, crossings remaining in the channel, and significant bank erosion/channel migration in the lower reaches before exiting the project site.

Summary Discussion

After completion of the site tour, participants met for a closing discussions related to design strategies and comments regarding the site. Three general design approaches, benefits, and limitations of each were discussed with the thought that final design will probably incorporate some portion of all three.

1) Leaving the existing channel in place and trying the raise the bed elevation.
2) Relocation of the channel generally within the existing footprint.
3) Relocation of the channel to a new position within the floodplain.

Post Discussion Summary

- Site presents a good opportunity and may be best that design is not currently finalized. (USACE).
- Additional needs for upcoming road projects were discussed and the possibility of maximizing mitigation credits at this site to accommodate current/future needs.
- Good construction access and not removing significant numbers of trees just to do the project was discussed as a site benefit. (DNR).
- Channel relocation in the lower section and limited impacts to 100-year floodplain was discussed and noted as a project benefit. (MDE)
- Need for additional information regarding corridors and factors influencing site uplift (FWS)

Action Items

No action items were identified

If you have any corrections, additions, or any other comments regarding the above meeting summary please contact Reid Cook at (540) 905-4504, or at rcook@res.us.

Mill No. 1
3000 Falls Road, Suite 300A
Baltimore, MD 21211

Corporate Headquarters
6575 West Loop South, Suite 300
Bellaire, TX 77401
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Memorandum

for your use ☒ for your approval ☐ as requested ☐ for your review ☐ attached ☐ under separate cover ☐

date: December 18, 2019

cc: Attendees

subject: MDSHA Tuscarora Creek

we are sending you: Regulatory Field Review Meeting Milestone Report and Sign-In Sheet

# of copies 1

A regulatory field review meeting at Tuscarora Creek (5515 Mountville Road, Adamstown, MD 21710) was conducted to kick-off the SHA Tuscarora Creek Stream & Wetland Mitigation Project in Frederick County, MD. This project is being implemented to satisfy compensatory mitigation requirements for the I-495 & I-270 Managed Lanes Study. This meeting occurred around 12:30 pm on November 15, 2019 with RES and Stantec as well as regulatory agencies. A summary of the project goals and proposed design was discussed, and a stream walk conducted with the agencies (see attached sign-in sheet and meeting notes). The consensus was that Tuscarora Creek is a great site with lots of potential. However, there were some general concerns described by the agencies which include; the distance from the impact site, the current buffer of established trees, existing burrows in stream banks, future development around the site, and the existing easements. Stantec plans to begin research to address the questions and concerns, working closely with RES, for the next phase of design.

The following were in attendance:

Susan Lindstrom	WSP	susan.lindstrom2@wsp.com
Maddy Sigrist	RK&K	msigrist@rkk.com
Karl Hellmann	RK&K	khellmann@rkk.com
Justin Reel	RK&K	jreel@rkk.com
Steve Hurt	MDE	steve.hurt1@maryland.gov
Jack Dinne	USACE	john.j.dinne@usace.army.mil
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Bailey Wilfong	RES	bwilfong@res.us
Reid Cook	RES	rcook@res.us
Roger Windschitl	Stantec	roger.windschitl@stantec.com
Rich Pfingsten	Stantec	Richard.pfingsten@stantec.com

Graham Boardman Stantec graham.boardman@stantec.com
Maddie Berg Stantec madeline.berg@stantec.com

Minutes

1) Conversation with Landowner
    a. Ms. Hope Green stated that she was very concerned that the water currently conveyed by the stream does not fit under the bridge and into the pipe during storm events.
    b. Flooding impacts her cattle pastures.
    c. Would like to see more wetlands included along the stream (more added to upper area by driveway).
2) Project Purpose
    a. Generate stream and wetland compensatory mitigation credits while addressing landowner concerns
    b. Primary Goal → functional uplift
        i. Reducing sediment loads
            1. Restoring access to floodplain and corresponding riparian function
        ii. Improving geomorphic functions and stability
    c. Specific Project Objective → restore degraded hydraulic functions
    d. Expected that both riparian and aquatic enhancements will occur
3) Exiting Conditions
    a. Drainage Area: 8.48 square miles
    b. 15% impervious surfaces in watershed
    c. Degrading C4 channel flowing southwesterly until confluence with Tuscarora Creek
    d. Class I-P (Water Contact Recreation, Protection of Aquatic Life, and Public Water Supply)
    e. Soil
        i. Linside Silt Loam (LsA) → Kfactor: 0.37 and hydric
    f. No cultural or historic resources identified along stream
        i. Archeological assessment as part of scope
    g. Agricultural area with some smaller home plots established adjacent to project area
    h. In last 10-15 years planting efforts have occurred for buffer areas within agricultural easement (protection and enhancement of the buffer is a priority of the project)
    i. Livestock might have had access to stream in past but are now fenced off
    j. Upper reaches (starting at private driveway)
        i. Reach is overly straightened and lacks natural bed diversity
        ii. Riffles embedded in several locations
        iii. Pools commonly have large woody debris → debris jams
        iv. Evidence of historic channel meandering → abandoned oxbows
        v. Seeps in floodplain → encourage wetlands on both banks
    k. Middle reaches
        i. Large and tortuous meander bends
        ii. Active erosion on outside of bends → compromising adjacent trees
        iii. Instream concrete debris → not seen in historic imagery
    l. Downstream reaches
        i. Increased evidence of manipulation → straightening
        ii. Along CSX railroad bed → channel flows against toe of slope
    m. Sediment transport disequilibrium throughout reaches

4) Proposed Conditions
    a. Conventional NCD and threshold channel design
    b. Priority II/III Restoration:
        i. Priority I – not feasible due to FEMA floodplain and developing buffer
        ii. Priority II – not feasible in all areas due to impacts to developing buffer
        iii. Priority III – will serve to meet uplift goals of project and avoid negative impacts to existing floodplain area
        iv. Channel realignment is proposed in areas with tortuous meander bends but goal is to work with current alignment as much as possible
        v. If left untreated, erosion would continue and negatively impact newly planted buffer
    c. Existing Channel Abandoned by Creating New Channel, Floodplain Depressions, and Wetlands:
        i. Avoid impacting existing wetlands and supplement if needed
        ii. Placement of clay plugs to shift back to former alignment
        iii. Existing areas remain to provide habitat
        iv. Planting of native grasses, shrubs, and trees
    d. Bank Stabilization:
        i. Treatments:
            1. Type I (lighter touch) → works long term
                a. Soil preparation / incidental grading
                b. Seed / straw
                c. Fiber matting
                d. Live stake planting to bankfull and above bankfull to floodplain elevation
            2. Type II (more aggressive) → when shear stress along bank is higher than optimal – combined with Type I
                a. Bench grading
                b. Soil lifts
                c. Log vanes
                d. Toe wood → from onsite wood
    e. Instream Habitat Structures:
        i. Ex: toe wood, J-hook, log vane
            1. Address bank erosion
            2. Enable bed stabilization
            3. Provide bedform diversity
            4. Provide corresponding hydraulic, geomorphic, and habitat uplift
        ii. Series of stone riffles with woody debris and boulder clusters where appropriate

Functional Uplift Summary

a. Hydrology
    a. Functioning at risk → no plans to change
b. Hydraulics
    a. Channel bed will be raised to restore floodplain function and connectivity
    b. Instream structures to help with vertical stability
    c. Floodplain → designed as tiered to dissipate energy and process nutrients
    d. Currently functioning at risk proposed to change to functioning
c. Geomorphology
    a. Stone / log riffles, log vanes, and pools → increase bedform diversity
        i. Works to create stable sediment transport and dissipate energy
        ii. Impacts water quality → reducing sediment loads

iii. Varying substrate → habitat diversity
iv. Not functioning currently proposed to be functioning

d. Physiochemical
    a. Other restoration efforts may indirectly effect
    b. Buffer helps filter out sediment, provide shade, and provide detritus to stream (habitat)
    c. Will remain functioning at risk
e. Biology
    a. Expected to increase due to the other components being addressed
    b. Will remain functioning at risk

Mitigation Credits – Concept Plan

a. Stream: 4,465 LF
b. Wetland: 1.03 acres

Planned Modifications to Floodplains, Buffers, and Access

a. No plans to increase FEMA
b. Landowner understands benefits of increasing floodplain accessibility and importance of buffer
c. Access will be provided directly along stream throughout much of the site
    a. Clearing will be required (limited as much as possible)
    b. Stockpile and staging areas will be placed to avoid impacts to trees and wetlands (as much as possible)
d. Temporary Access
    a. Through property via a temporary construction easement
e. Permanent Access
    a. Provided through landowner negotiated routes

Stream Walk Discussions

a. General Notes:
    a. No formal wetland delineation completed yet
    b. Phase 1 delivery schedule is expected to be delayed to account for the since-resolved protest and a general slow-down in the overall road project. SHA is working through that independently (i.e. we do not need to request an extension, and SHA will let us know once it's approved)
    c. Monitoring well present on site (Map 1) – no MDE number shown on the well
    d. Plan to mimic current tree selection in landscape plan
    e. Poor habitat and uniform bed features that just need light touches
    f. Want to preserve trees to extent possible
        i. Attempt to traverse through trees with equipment
    g. Would classify stream as a degraded C4 moving towards a G channel
    h. Still working with RES on construction access
        i. Beginning along north side near driveway where we parked
        ii. Beginning on south side along fields abutting railroad tracks (EPA preference)
b. Upper Reach Above Existing Driveway:
    a. Not currently included in the concept mapping but might include
        i. Will not be impacting the bridge structure
    b. Meander bends exist with erosion potential that could benefit from improvements
        i. Try to stabilize in place instead of move when feasible
    c. PFO in wetland and some open water
c. Driveway Crossing:
    a. Realigning stream to better line up with bridge
    b. Grade structures to tie in with upstream
    c. Want to enhance the current abandoned channels
d. First Proposed Wetland:
    a. Could be legacy sediment issue
    b. Will be realigning
    c. Try to find reference reaches for comparison
    d. Have the potential to expand beyond the 1 acre of wetland (due to site and landowner willingness)
e. Downstream end of Map 1:
    a. Riffles transporting (small material) – want to fix
    b. Gravel lens layer is present (higher than bed bottom) – shows change in elevation historically
    c. Evidence of this system being active
f. Map 2
    a. Torturous meander sequence (nested channel approach)
    b. Major floodplain existing but could be improved
g. Map 3
    a. Proposed wetland area with oxbows
h. Map 4
    a. Oxbow areas due to channel movement
    b. Stream is very straight but will try to add some complexity with space that is available
i. Map 5
    a. Stream is close to CSX railroad toe of slope
        i. Fewer trees so more flexibility on right bank for channel realignment to better align stream with culvert under CSX bridge

Questions/Additional Comments at Conclusion of Walk

a. Need to finalize length of stream and size of wetlands for credit
b. Size of culvert at upper reach
    a. Was not included in original concept design but will be added
c. Try to find out if drain tiles have been used on this property? Fields along stream with sink holes
d. Stantec: May not touch every foot of stream – How does that impact credits that we receive?
e. Want to hear more about CREP plantings (DNR)
f. Want to hear more about landscape level easements in the upstream watershed (USFW)
g. Find out more about ponding downstream of site and CSX bridge off the property (i.e., will help justify uplift) (MDE)
h. Interested in status of conservation easements (SHA)

DAY 6
RFP-4: CABIN BRANCH

AZ0485172-A Cabin Branch Stream & Wetland Mitigation Project
Pre-Application Meeting Minutes

Time: Friday December 6, 2019 9:00 am
Location: 5500 Greenock Rd, Lothian, MD 20711.
Google lat. Long.: 38.810642, -76.645949
https://goo.gl/maps/tCjmps4JVEFZs2yf9

See attached Attendance Sheet and Mapping

Intro to project and MDOT SHA (MDOT SHA/RKK):

- MDOT SHA is currently working with 23 prospective mitigation sites being considered to provide compensation for anticipated wetland/stream impacts associated with the I-495 & I-270 Managed Lanes Study.
    - MDOT SHA likely will not need all of the prospective sites (public and private) to meet anticipated mitigation requirements. However, it is also assumed that some of the 23 sites will be eliminated from consideration during consultation with the agencies.
    - Impacts associated with the I-495 & I-270 Managed Lanes Study are still being assessed/discussed so final mitigation obligation has not yet been definitively determined.
    - The purpose of the site visits is for MDOT SHA and the Resource Agencies to confirm that the sites are good candidates for restoration/mitigation. It is anticipated that the first round of sites visits under the MDOT SHA Full Delivery (FD) Program will be completed by Dec 19, 2019.
    - Determination of each site's specific suitability to provide mitigation for the I-495 & I-270 Managed Lanes Study will be determined by the Agencies sometime in January.
    - Sites deemed to be suitable to generate compensatory mitigation will be advanced through the Phase II Mitigation Plan (MDOT SHA contract Phase I) process.

Intro to GreenVest Team

The GV approach to development of ecological assets is about creating ecological uplift through restoration of as much of the watershed as possible, not just about the economics of credit generation. For the Cabin Branch Project, GV assessed the entire watershed to first identify sources of impairment and then proposed a holistic restoration of the entire shallow groundwater ecosystem (stream, wetland, and floodplain forest). The proposed restoration techniques were then used to estimate functional uplift and generate preliminary mitigation yields using the Stream Quantification Tool (SQT) and the Evaluation for Planned Wetlands (EPW).

GreenVest's intent was to include all the streams in the entire Wilson Owen and upper Cabin Branch watersheds in the mitigation project. However, some stream sections that could and should be restored had to be left out of the proposal due to the additional time needed to navigate approvals for use of properties with existing conservation and floodplain easements. However, GV has maintained a relationship with these willing landowners with the goal of finding a mechanism to bring these sites forward and provide additional mitigation credits.

For the Regulatory Field Meeting, GV's objective was to ascertain from the resource agencies (USFWS, USACE, USEPA, DNR, and MDE); 1) Recognition of existing site/system impairment as the basis for restorability, 2) the site's need for restoration and thus suitability as a mitigation site.

Site Tour (see attached mapping for stop locations)
General Site Introduction, Impairments and Proposed Restoration Approaches (GV)

- Primary landowner reached out to adjacent property owners to build consensus. All landowners are receptive and supportive of the project and conservation/restoration in general.
- Streams throughout the project area are incised, provide little to no habitat, are disconnected from their floodplains, and are lowering the local groundwater table, draining floodplain wetlands.
- Proposed restoration. Wherever appropriate, use of woody log jam structures to bring up stream and reconnect stream to floodplain and restore historic groundwater elevations within adjacent floodplain wetland areas. Restoration/enhancement of historic wetlands and preservation of existing wetlands will increase the width of the buffer between adjacent land use and restored systems.

- **Stop 1 Wilson Owens Branch**
  - Crossing needs to be replaced.
  - Channel is incised, banks need to be stabilized, invasive species need to be controlled.
  - Proposed restoration:
    - Stabilize stream banks and remove dredge spoil levee to reintegrate the stream channel with its floodplain and floodplain wetlands.
    - Hydrologic enhancement of floodplain wetlands.
    - Invasive species control.
    - Wetland creation adjacent downstream left bank (facing downstream).
    - Wetland preservation elements flanking both the downstream right and downstream left banks. The preservation elements will serve to provide additional buffer and habitat to the restored stream segments.
- **Stop 2 Downstream portion of Cabin Branch Mainstem and southern tributary**
  - Southern Tributary (Reach B MS DS Trib).
    - Discussed the use of logjam structures to increase local groundwater levels in the floodplain and riparian areas.
    - Increasing local groundwater levels will rehydrate remnant hydric soils, creating opportunities for mitigation credit through hydrologic enhancement or restoration (pending results of wetland delineation).
    - Agency representatives were generally supportive of this approach recognizing that the water table in the adjacent wetlands has been lowered and raising it will restore historic wetland hydroperiod and thus dramatically increase associated wetland functions, provided that the functional uplift can be quantified.
  - Main channel of Cabin Branch between Southern Tributary (B MS DS Trib on attached mapping) and failed pond embankment.
    - The area consists of many vertical banks, unstable slopes, large trees tearing loose from banks and falling into stream, unvegetated banks contributing to mass wasting and sediment transport in these reaches.

- Discussed that the GreenVest Team (GVT) discovered the mainstem between the failed pond embankment and B MS DS Trib had migrated to the left onto County-Owned Property. Since it was on County Property, it could not be included in the proposal but GV believes that this reach is in need of restoration and the regulatory agencies agreed.
- The Southern Tributary (B MS DS Trib) and B MS US upstream of the failed pond embankment can be restored independently of any restoration on the mainstem in this location. However, the County is in support of restoring the mainstem in this location and has given their permission for GV and ultimately MDOT SHA to access this reach should MDOT SHA want to add this segment of restoration to this project. This segment of the mainstem provides an additional 1,200 lf of restoration potential capable of yielding 1,200 stream mitigation units at the 1:1 ratio included in the proposal.

- Area behind failed pond embankment.
  - Discussed options for restoration of the pond footprint. Restoration options and potential credit category will be based on what the delineation indicates is there now. Options for restoration include:
    - Harvest of existing wood material for use in construction and replacing with regionally appropriate floodplain wetland species,
    - Excavation of legacy sediment,
    - Use of structures downstream to bring up groundwater level and re-hydrate existing soils, or
    - Some combination of these/other techniques.
- Main Channel of Cabin Branch upstream of failed pond embankment.
  - Similar to mainstem on County-Owned Property downstream, this area consists of many vertical banks, unstable slopes, large trees tearing loose from banks and falling into stream, unvegetated banks contributing to mass wasting and sediment transport in these reaches.
  - Remnant hydric soil profiles are visible on upper stream banks. Current riparian vegetation community is dryer than the presence of hydric soils indicates was there historically.
  - Preferred restoration approach is use of logjam structures to bring the stream channel back up and reintegrate the stream with its floodplain wetlands and rehydrate remnant wetland soils.
- The following areas were also observed and discussed:
  - Headcuts encroaching into fields.
  - Headcuts and incised channels draining historic floodplain wetlands.

- **Stop 3 Culvert at top of Trib B3 Pond Trib.**
  - Stopped to give visual on depth of incision and separation of stream from floodplain.
  - Stream banks are deeply incised and V-shaped in cross section.
  - Banks subject to groundwater discharge leading to erosion and failure.
  - Little to no instream habitat (few shallow pools, little to no woody debris, etc.).
  - Preferred restoration is a combination of installation of logjam structures to bring stream bed up and grading to create small floodplain within existing alignment.
- **Stop 4 Mid way up Trib B1**
  - Headcut into field. Landowner attempted to arrest headcut with strawbales

- Portions of channel appear to be stable with formation of small floodplain bench down in the channel but these areas are few compared to remainder of channel with raw, vertical, failing banks, groundwater can be seen discharging from the banks above the channel in many spots leading to additional bank failure and loss of riparian hydrology.
- Proposed restoration. Raising stream up to top of bank may not be feasible. Overall goal for this Reach is to stabilize bed and bank and address current level of active incision, bank erosion, head cutting, and create more habitat diversity and ecological/functional uplift. Preservation of forested wetland pockets surrounding confluence of B1-LF and B1 RF also proposed to increase width of protective stream buffer.

- **Stop 5 Trib B2 Brooks Woods Property**
  - Streams similar to the other upper reaches visited, deeply incised, disconnected from floodplain, lowering local groundwater, and eroding banks.
  - Proposed restoration. Wherever appropriate, use of woody log jam structures to bring up stream and reconnect stream to floodplain and riparian groundwater. As in other reaches where wetland preservation is proposed, reintegrating the stream to the floodplain and increasing the groundwater elevation to rehydrate remnant wetland soils will expand the width and function of the buffer between the adjacent land use and the restored system components.
  - Regulatory Agencies mentioned support for GV's holistic approach and including the entire watershed within the restoration wherever possible. This includes the headwater of Brooks Woods Reach upstream of the current project limits. We explained to MDOT SHA that at the time we were preparing the proposal, the ability to include this reach was uncertain due to an existing AA County Forest and Ag easement, which may have created a barrier to using this site for compensatory mitigation. However, after submitting the proposal, GV met with both DNR and AA County to build consensus that:
    1. the upstream reach is in need of restoration, and
    2. the restoration objectives, means/methods are consistent with the purpose of the Forest and Ag Easement.

    DNR has since developed and issued a checklist and approval process for stream restoration projects proposed on properties with these types of easements. Both AA County and DNR now support the restoration of this reach. GV has an agreement in place with the landowner for this site complete with an executed Attachment Q. This reach can provide an additional 1,570 lf of restoration potential yielding and anticipated 1,570 stream mitigation units at the proposed 1:1 credit ratio.

Summary Conversation

GV asked each agency representative if:

1) They recognize the current level of impairment identified for each reach and the overall project, including the wetland elements (creation, enhancement and preservation),
2) This project suitable for restoration?

- USEPA, USFWS, MDE and DNR all agreed that the site is impaired and is in need of restoration. They also agreed that the restoration is feasible and thus the site is suitable for mitigation. Independent determination regarding specific applicably to compensate for proposed stream and wetland impacts associated with the I-495 & I-270 Managed Lanes Study is pending.

- US ACOE: Functional uplift is going to be difficult to determine, guidance coming out but probably won't get a straight 1:1, especially on the smaller, headwater areas.
    - GV uses the SQT for streams and EPW for Wetlands to quantify uplift and support requested mitigation ratios and yields.
    - US ACOE and EPA agreed with that approach.
    - GV stated that the Chesapeake Bay is giving highest credit for the smaller streams since impairment there has effects throughout the rest of the system.
    - US ACOE and EPA want to see ecological uplift, which GV agreed was the whole point of our approach.
- MDE: only approves preservation under certain conditions.
    - GV stated that preservation is a viable wetland mitigation option per COMAR and that GV has successfully secured preservation credit from MDE and USACE on several mitigation sites where it was deemed appropriate as part of an overall restoration/mitigation project and strategy. In this case, preservation is appropriate to add buffer around proposed restoration elements increasing several functions including water quality and wildlife habitat. The proposed preservation elements will also serve to add buffered/preserved acreage thus ensuring a higher level of sustainability in the future. In each case, preservation would be sought in conjunction with other restoration/enhancement activities. Additional justification will be provided both the Phase I and Phase II mitigation proposals.
- DNR stated that they are concerned with tree protection and want to minimize impacts to vegetation when proposing restoration projects.
    - GV responded by stating that this site already possesses an established trail network and was selected due to ease of access, which will inherently result in minimal impacts to existing forested resources.
- DNR noted that fish passage will be a concern and should be considered in the design approach.
    - GV stated that the proposed restoration approach would consider fish passage with a goal to improve, not impede, passage.
- DNR suggested a tree inventory and documentation of the change in vegetative community composition, which would be done as part of the FCA compliance.
- MDE and US ACOE were very much in favor of the holistic approach taken to corridor-wide restoration and that:
    - 1) Cabin Branch is a good candidate site for restoration and
    - 2) The issuing authorities would like to see all reaches restored in the manner proposed, with the inclusion of the headwaters of B2 and Mainstem reaches, if possible.

Mitigation Options

- Discussed inclusion of B2 headwater and mainstem of Cabin Branch within AA County property (per discussion above).
- HH enhancement credit in the streamside wetlands where exact location and extent will be determined during the design and engineering phase.
    - GV will be requesting a higher ratio than preservation, which according to the latest IRT guidance receives a 10:1. The final ratio requested will be supported with both a qualitative and quantitative documentation of proposed functional uplift.
- Resource agencies asked questions regarding design approach involving log jam, post-assisted log structures and post/wattle structures. GV stated that the design evolved as we continued to collect data, run HH and other modeling, and progressed through the engineering elements of

the project. Our intent is to use, where feasible, self-organizing means/methods that involve the use of wood sourced from the project corridor similar to GV's current Bacon Ridge Branch Restoration project. These means/methods may or may not be appropriate for the upper 0 and 1st order reaches at the top of the project.

- GV proposed an impromptu trip to GV's active construction site to observe these construction techniques and associated functional uplift. The visit to Bacon Ridge was attended by MDOT SHA, USEPA, DNR, USACE, and MDE representatives

Visit to Bacon Ridge (Elks)

- Walked from upper main stem to confluence with main tributary, and up the main tributary to upstream terminus at Chesterfield Road.
- Observed in-stream structures where Joe Berg provided context and design intent information on the engineered log jams.
- Overall informative discussion, strong support and interest from all agency representatives in attendance as to the pre-existing and now-restored conditions including the associated uplift in the adjacent floodplain wetlands and finally the applicability/suitability of this technique on sections of the Cabin Branch project.

AZ0485172-A Cabin Branch Stream & Wetland Mitigation Project
Pre-Application Meeting Sign In Sheet

Time: Friday December 6, 2019 9:00 am
Location: 5500 Greenock Rd, Lothian, MD 20711.
Google lat. Long.: 38.810642, -76.645949
https://goo.gl/maps/tCjmps4JVEFZs2yf9

Present	Name	Affiliation	Email Address
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	Amanda Sigillito	MDE	amanda.sigillito@maryland.gov
	Amanda Wagoner	GV/KCI	Amanda.Wagoner@kci.com
	Barbara Rudnick	EPA	Rudnick.Barbara@epa.gov
X	Brett Berkley	GreenVest	Brett@greenvestus.com
	Caryn Brookman	MDOT	CBrookman@mdot.maryland.gov
X	David Merkey	GreenVest	David@greenvestus.com
X	Gabby Myers	GV/KCI	Gabrielle.Myers@kci.com
x	Gillian Rines	MDE/McCormick Taylor	glrines@mccormicktaylor.com
X	Gwen Gibson	MD DNR	gwendolyn.gibson@maryland.gov
X	Jack Dinne	US ACOE	john.j.dinne@nab02.usace.army.mil
X	Jack Turner	GreenVest	jack@greenvestus.com
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X	Susan Lindstrom	MDOT/WSP	Susan.Lindstrom2@wsp.com
X	Tim Witman	EPA	witman.timothy@epa.gov
X	Trevor Clark	FWS	trevor_clark@fws.gov;

DAY 7
RFP-5: HENSON CREEK

AZ0485172-D Henson Creek Stream & Wetland Mitigation Project
Pre-Application Meeting Minutes

Time: Tuesday December 10, 2019 9:00 am
Location: 9013 Livingston Rd, Fort Washington, MD 20744
Google lat. Long.: 38.764864, -76.995269
https://goo.gl/maps/z95paJYYTGvSHJCY8

See attached Attendance Sheet and Mapping

Intro to Site and Restoration Approach
Within the Henson Creek watershed, much of the bottomland is already protected by easement to or owned by the Maryland-National Capitol Park and Planning Commission (M-NCPPC) of Prince George's County. GV assessed the Henson Creek Corridor to identify potential gaps in the string of properties currently under M-NCPPC control. The assessment identified the proposed Henson Creek Project Site.

The site was historically a forested floodplain wetland, hydrologically connected to Henson Creek but was subsequently filled with 3-4 feet of fill and converted for use as a driving range (see EX-01). Despite the fill, the entire site is still located within the 100-year floodplain. Other than M-NCPPC property on the opposite bank of Henson Creek, adjacent land use is highly urbanized. The core of the site consists of mown grass for the driving range. A parking lot is located along the eastern border, along Livingston Road. Small wooded areas are present on the northern and southern edges of the property but these are of poor quality, species diversity is low and consists primarily of scrubby boxelder and invasive species. An incised stormwater conveyance crosses the southern portion of the site. A few larger oaks and sycamores dot the perimeter of the site. In its current condition, the site provides little to no water quality or habitat function.

The property owner has committed to providing an easement to GV to use the site as compensatory mitigation. The current parking area, which serves the historic Hovermale Ice Cream stand and the driving range, will remain. The other developed portions of the site adjacent to Livingston Road have been excluded from the mitigation site easement (see SP-01).

Proposed restoration. GV's intent is to return historic forested floodplain wetland functions to the site and complete this section of the Henson Creek forested floodplain corridor. Proposed restoration methods include:

- Excavation of previously placed fill used to create the driving range;
- Excavate and dispose of C/D rubble and other fill historically placed in upland and wetland sections of the proposed restoration area;
- Reconnection of Henson Creek to the floodplain wetland by removal of berm along the creek edge;
- Creation of additional stream length by restoring and redirecting an existing ditch (Henson Tributary) that currently bypasses the site, bringing it in to meander through the proposed wetland area;
- Eradication/Control of invasive species within existing forested wetland areas;
- Plant native vegetation throughout all enhancement, restoration, and creation areas plus the wetland buffer; and, if deemed feasible,

- Removing C/D rubble and restoring forested areas was alluded to by the regulators as being beneficial and would yield a greater number of wetland credits than identified in our original proposal to MDOT SHA. If MDOT SHA wishes to generate and acquire these additional credits (+2.14), the design can be augmented to include this element.

Proposed restoration techniques will be used to estimate functional uplift and generate preliminary mitigation yields using the Stream Quantification Tool (SQT) and the Evaluation for Planned Wetlands (EPW).

Currently, no activities are planned for the western bank and floodplain forest of Henson Creek. Additional properties along the western bank of Henson Creek that are contiguous with the site also contain forested wetlands and may be secured to provide additional buffer and compensatory mitigation through preservation.

For the Regulatory Field Meeting, GV's objective was to ascertain from the resource agencies (USFWS, USACE, USEPA, DNR, and MDE); 1) Recognition of existing site/system impairment as the basis for restorability, 2) the site's need for restoration and thus suitability as a mitigation site.

Site Tour (See attached mapping)

- **Stop 1**
  - Channel is steeply incised and runs immediately adjacent a WSSC easement. Although the banks are stable, the channel offers few habitat or water quality functions.
  - Proposed restoration: Remove the culvert on Henson Tributary and relocate the channel on a new alignment away from the WSSC easement. The new channel would be regraded to meander through the proposed wetland restoration area providing an additional source of hydrology and habitat. The new channel will tie back into the existing outlet along the south side of the parcel.
- **Stop 2**
  - The forest around the tie in point will be assessed for quality and health. Invasive species are also common and will be controlled. Pending results of the Forest Stand Delineation and quality assessment, supplemental plantings with native woody species may also be advantageous.
- **Stop 3**
  - Henson Creek. Berm/Levee along the creek bank prevents floodplain access.
  - Proposed restoration. Selective removal of the berm along Henson Creek. Large trees along the bank would be saved wherever practicable. The goal of removing the berm will be to balance saving trees with controlling velocity and carrying capacity of floodwaters as they enter the site. While floodwater and fine sediments are desired within the floodplain wetland, large cobble and gravel deposits carried by high energy, erosive flows are not.
  - Other than removal of the berm, no other work is proposed within the Henson Creek channel.
- **Stop 4**
  - Forest along eastern bank is growing mostly on concrete rubble and fill. No large trees, little species or vertical diversity or habitat value.
  - Proposed restoration. Within our original proposal to MDOT SHA, existing forested areas would be preserved as buffer. Invasive species would be controlled and the forest community supplemented with native floodplain forest tree and shrub species. GV will continue to assess forest/tree quality and explore the potential to remove rubble/fill if desired by MDOT to acquire additional wetland credits.

- **Stop 5**
  - Forested floodplain wetland on western bank.
  - Proposed for preservation credit and additional buffer adjacent to the proposed stream restoration along Henson Creek in this reach.
  - Additional parcels are available between current site and Livingston Road for additional preservation credit.
- **Stop 6. Summary Conversation**
  - GV asked each agency representative if:
    - They recognize the current level of impairment identified for each reach and the overall project, including the wetland elements (creation, enhancement and preservation),
    - This project suitable for restoration?
  - MDE, US ACOE, DNR, FWS, representatives all agreed that the site is impaired and is in need of restoration. They also agreed that the restoration is feasible and thus the site is suitable for mitigation. Independent determination regarding specific applicably to compensate for proposed stream and wetland impacts associated with I-270/495 is pending.
  - All agency representatives agreed that the fill material in the core of the driving range should be excavated to recreate a functioning forested floodplain wetland system.
  - All agency representatives agreed that realignment of the stormwater conveyance (Henson Creek Tributary) would improve the habitat and water quality functions of the system and augment the sources of hydrology.
  - All agency representatives agreed that removal of the berm along Henson Creek to allow floodwater to access the site would restore floodplain connection and integrate the stream and wetland restoration elements. Exact location of areas to be removed and target elevations will be determined during the design process. Large trees will be saved where possible.
  - All agency representatives agreed that an integrated stream and wetland restoration at this location would be valuable and is technically feasible.
  - All agencies agreed that this site is an excellent candidate for restoration including the restoration of a fully integrated stream and floodplain wetland system.

AZ0485172-D Henson Creek Stream & Wetland Mitigation Project
Pre-Application Meeting Sign In Sheet

Time: Tuesday December 10, 2019 9:00 am
Location: 9013 Livingston Rd, Fort Washington, MD 20744
Google lat. Long.: 38.764864, -76.995269
https://goo.gl/maps/z95paJYYTGvSHJCY8

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DAY 8
CA-1: MCKEE BESHERS
CA-6: ROCK RUN

I-495 & I-270 Managed Lanes Study
Mitigation Agency Field Review – Day 8
December 11, 2019 @ 9:00am

Handouts:
CA-1 Phase I Mitigation Design Plan & Site Vicinity Map
CA-6 Phase I Mitigation Design Plan & Site Vicinity Map

A field review meeting was conducted on December 11, 2019 with representatives of several agencies and stakeholders including M-NCPPC, USFWS, USACE, EPA, DNR, and MDE to discuss a potential wetland mitigation site on DNR parkland and a potential stream mitigation site on M-NCPPC Montgomery County parkland. A summary of the topics discussed at the meeting follows.

Introductions
All participants, with the exception of M-NCPPC, met at the DNR parking lot on Hunting Quarter Road, Poolesville, MD 20837. The meeting began with introductions, followed by a brief summary of the CA-1 site by Karl Hellmann and Jim Bennett.

Mitigation Opportunities

CA-1 – McKee Beshers Wildlife Management Area

The CA-1 site consists of approximately 7.3 acres of potential wetland restoration located in DNR's McKee Beshers Wildlife Management Area (WMA). The site was recommended by DNR and consists of an open field that is leased to farmers year-round for agricultural purposes. The topography of the site is flat with low areas at the western and south-eastern ends that had standing water during field investigations in March 2019. The remainder of the site consists of dry areas with remnant soy beans, with a groundwater table observed at 14 inches below the ground surface in the spring. According to DNR, the site ponds regularly and cannot be planted during years with heavy rainfall. The southeastern corner of the site abuts a PFO wetland just south of the site. There is direct existing access to the site from a gravel road that connects to Hunting Quarter Road, which is surrounded mostly by forested wetlands of special state concern. Although the site is within the Potomac River floodplain, there has been no evidence of flooding in the site. Restoration objectives include wetland restoration, wildlife habitat improvements, and restoration of groundwater connection, hydric soils, and vegetative structure.

The preliminary concept design includes excavating to targeted elevations in the dry agricultural field to restore the groundwater connection to promote hydric soil development. The site would be regraded and planted/seeded with shrubs and herbaceous species to create a mosaic of palustrine scrub-shrub/emergent wetland and open water habitat types. Microtopography grading and woody debris placement would promote diversity in the landscape and create additional wildlife habitat.

At the meeting, it was discussed that the acreage of each of these habitat types will depend on the site hydrology and groundwater wells would need to be installed.

Jim Bennett noted that the wetland restoration would align with DNR's overall interests in wildlife management on the site. An outfall is not proposed or needed due to the site's flat topography and

seasonal hydrology.
DNR's waterfowl staff will be heavily involved in the design. There is a lot of emergent and scrub-shrub wetlands near the site that no longer contain open water areas that are the preferred habitat for certain types of waterfowl.

Steve Hurt (MDE) asked if the excavated material for the project would be hauled off-site or relocated on-site. DNR indicated that there should be enough space to relocate all of the material to other areas within the McKee Beshers WMA.

Karl Hellmann (RK&K) said that there was a stand of non-native sawtooth oak (*Quercus acutissima*) at the northeastern corner of the site and asked if the trees could be removed and incorporated into the site as woody debris habitat. Jim responded that DNR would want the stand to remain due to the wildlife habitat the trees provide, and DNR does not consider the species invasive.

Jim noted that the site had been investigated by consultants in the past as a potential mitigation project, however he was unsure why the site did not move forward. Steve stated that he would check with Kelly Neff (MDE) to find out why the site was removed from consideration under previous SHA projects. The site may have been dropped because DNR did not have a policy in place to use these areas for mitigation at the time of the project.

Ray Li (USFWS) asked if there were any concerns that the site did not have an associated stream restoration component. It was noted that the habitat type objectives do not require a stream component and the group came to a consensus that this would not be an issue.

Jack Dinne (USACE) noted that he liked the idea of a scrub-shrub wetland mitigation site, however one drawback of the site could be its distance from the proposed project impacts. Karl noted that one of the challenges with the wetland mitigation sites is that there are less options and higher constraints the closer you get to the roadway alignment. Overall, all of the agencies agreed that the site had good potential for wetland mitigation.

The timeframe to determine whether this site would move forward would be during Phase II in 2021. Construction would be after this point. It was noted that groundwater wells should be installed at the site soon to collect data on the Spring hydrology.

After reviewing the CA-1 site, the group then drove east to the CA-6 site (Rock Run), located on M-NCPPC Montgomery County property.

CA-6 – Rock Run

Karl introduced CA-6, a stream restoration site located along Rock Run, just south of Falls Road. The site includes approximately 3,700 linear feet of potential stream restoration along an unstable channel surrounded by a narrow, forested valley with several forested wetlands in the eastern floodplain. The majority of the stream has one to five-foot tall banks with minor to moderate erosion that increases at the upstream end of the site. Some areas of the stream appear to still be connected to the floodplain based on evidence of out-of-bank flows. There is a three-foot tall fish blockage and an exposed sewer line at the upstream end of the site, just south of the culvert that flows under Falls Road. There is potential access along an old sewer line clearing in the eastern floodplain. The

restoration objectives include: improving floodplain connection, in-stream habitat improvements, bed and bank stabilization, and fish blockage removal.

The preliminary concept design includes the installation of instream structures to reduce incision of the channel and improve the fish and benthic habitat. The vertical banks would be graded and vegetated to reduce erosion and instream sedimentation. The floodplain connection would be improved by raising the stream bed and/or creating benches in the floodplain to provide more frequent floodplain access. Fish passage through the culvert could be improved by raising the downstream bed to allow access to upstream habitat.

The group walked the site from downstream to upstream starting at Logan Drive. Several severely eroded banks were observed at the very downstream and upstream ends of the site. An exposed sewer and water line were observed just downstream of Falls Road.

M-NCPPC stated that the upstream section of the site appears to be more unstable and should be the primary focus of the restoration. Steve Hurt said that he thought some of the worst banks were in the downstream section of the site.

After walking the entire site, the agencies agreed that the site had some mitigation potential, but was a lower priority compared to some other sites that had been reviewed. Some sections within the site appeared to be somewhat stable where there was evidence of out-of-bank flows. Localized areas in the lower section require stabilization, but when compared to the overall forest impacts, the site may not be worthwhile in the sense that it would not have the uplift potential that is needed. The site is located in a relatively narrow strip of mid-successional forest that is surrounded by residential homes. Access and construction would likely require forest clearing and large tree removals within close proximity to the homes.

Matt Harper asked if parts of the site could be considered for stormwater management mitigation for the MLS, as water quality is likely an issue. Justin Reel responded that after further coordination it was determined that stream stabilization is not a high-priority for meeting stormwater mitigation for this particular project, but still may be considered. He was not sure how many sites could be leveraged for this purpose.

Attendees:

Name	Agency	Email
Justin Reel	P3/RK&K	jreel@rkk.com
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DAY 9
AN-6: PAINT BRANCH FISH PASSAGE
AN-7: PAINT BRANCH SOUTH FARM TRIBUTARIES

I-495 & I-270 Managed Lanes Study
Mitigation Agency Field Review – Day 9
December 12, 2019 @ 9:00am

Handouts:

AN-6 Phase I Mitigation Design Plan
AN-7 Phase I Mitigation Design Plan & Fish Passage Credits Map

A field review meeting was conducted on December 12, 2019 with representatives of several agencies and stakeholders including USDA BARC, USFWS, USACE, EPA, DNR and MDE to discuss a potential fish passage site and stream restoration site located on the United States Department of Agriculture's Beltsville Agricultural Research Center property for the I-495 & I-270 Managed Lanes Study. A summary of the topics discussed at the meeting follows.

Introductions

All participants met at the Beltsville Agricultural Research Center, 10300 Baltimore Ave., Building 003, Beltsville, MD 20705. The meeting began with introductions, followed by a summary of the Beltsville Agricultural Research Center's (BARC) facilities and goals by Dana Jackson. The group then consolidated into vehicles and drove to BARC's South Farm parcel, located just southeast of the I-95/I-495 Interchange.

On the way to the mitigation sites, the group stopped at a couple drainage areas within the South Farm parcel that BARC would like to have repaired. At the first stop, Dana showed the group an unstable outfall from I-495 that is causing erosion issues on the South Farm parcel. Stabilization of the outfall and downslope gully was originally included as a stewardship effort as a part of the Paint Branch Fish Passage Site that was originally proposed for the Greenbelt Metro Access Project. The group then stopped to look an area between one of BARC's farm fields and Paint Branch that has ponded with water due to a failure in the drainage tile system. The group then proceeded to the AN-6 Paint Branch Fish Passage site.

Mitigation Opportunities

AN-6 – Paint Branch Fish Passage

Justin Reel gave an overview of the proposed roadway work where Paint Branch flows under the I-495/I-95 Interchange. The work entails constructing new bridges over Paint Branch to carry the managed lanes between the inner and outer loops of the I-495. Karl Hellmann (RK&K) provided history on the Paint Branch Fish Passage Site. The site was originally investigated and designed to 90% for the Greenbelt Metro Access Project, before the project was canceled in 2017. MDOT SHA's Environmental Programs Division (EPD) offered the site to the NEPA team during a mitigation meeting. The site consists of two quadruple cell box culverts under I-495 that have created one-foot tall fish blockages. Fish ladders were installed just downstream of the culverts in the 1990's, but have failed since. During preliminary investigations, a debris jam was observed at the upstream culvert that has created another 14-inch-tall blockage. Removing these blockages would allow complete upstream access to 0.45 miles of high-quality habitat below a partial blockage at I-95 northbound ramp culvert, and partial upstream access to an additional 13.84 miles of Paint Branch and its tributaries (2nd order and greater).

The site design entails incrementally raising the stream elevation through a series of constructed riffles placed downstream of the culverts. The riffles would backwater both culverts to allow passage, while maintaining hydraulic capacity of the culverts during high flow events. The work also includes removing the failed fish passages and the upstream debris jam.

A map was provided to the group that displays the credits that were originally proposed for the fish passage site. The proposed credit ratios include the following:

- 1:1 – Restored reach (e.g. 100 LF of instream work would receive 100 LF of credit)
- 10:1 – Full blockage removal (e.g. 100 LF of full upstream blockage removal would receive 10 LF of credit)
- 20:1 – Partial blockage removal not including 1st order streams (e.g. 100 LF of partial upstream blockage removal would receive 5 LF of credit)

Based on the above credit ratios, 1,544 linear feet of credit is proposed for full restoration, 97 linear feet of credit is proposed for full blockage removal, and 3,617 linear feet of credit is proposed for partial blockage removal, resulting in a total of 5,258 linear feet of proposed credit.

Ray Li (USFWS) noted that the project has great potential due to its connection upstream to the Upper Paint Branch Special Protection Area (SPA) that consists of the high-quality headwaters of Paint Branch that are under special protection from land development.

The group observed two sewer crossing approximately 300 feet and 2,000 feet downstream of AN-6 that could be causing fish blockages. Steve Hurt (MDE) asked that the crossings be investigated to determine if they were creating fish blockages, which could affect the decision on the upstream AN-6 site. Gwen Gibson (DNR) said that she would discuss the downstream sewer crossings with Jim Thompson (DNR), who is familiar with the Paint Branch Fish Passage project.

Nick Ozburn (USACE) noted that the USACE has a system set up to determine fish passage credits. He thought that the 5,258 linear feet of proposed credit for the site seemed high considering that the proposed instream work is 1,544 linear feet.

Overall the group agreed that the site had potential for mitigation, however the downstream blockages need to be investigated and the fish passage credits re-negotiated. The group then proceeded to the nearby AN-7 site.

AN-7 – Paint Branch South Farm Tributaries

Karl introduced AN-7, a stream restoration site located along two headwater streams that drain to Paint Branch, just southeast of the I-495/I-95 interchange. The two stream segments were recommended by BARC and consist of deeply incised channels surrounded by forest and agricultural fields. The northern tributary is approximately 1,200 linear feet and consists of a concrete lined channel and highly unstable natural channel that flows into a moderately stabilized section with localized erosion areas. There is a two-foot-tall fish blockage and exposed water line just downstream of where the concrete lined channel ends. The southern tributary is approximately 200 linear feet and consists of a small incised channel with a failed culvert and culvert outfall that are creating fish blockages to an upstream reach that appears stable.

David Black discussed design options for the northern tributary. The preferred option would be to relocate the channel into the northern farm field with surrounding wetland benches and tie the channel into Paint Branch near the confluence with the original channel. The tie-in to Paint Branch would be proposed near the existing channel to avoid the possibility of excavating in unstable material in the man-made berm that parallels Paint Branch.

Dana Jackson (USDA) said that there had been some discussions with the NEPA team regarding using the entire field for stream and wetland mitigation. He said the field is actively used for research purposes and that BARC did not want the entire field to be used for mitigation. BARC however would allow the channel to be relocated within closer proximity to its existing location under the condition that the restoration work stayed within approximately 60 feet of the existing channel.

David said that groundwater wells would need to be installed and geoprobe soil samples collected to help determine the design for the site. The site may have utility constraints depending on the depths and locations of water and sewer lines that could also affect the design.

Another design option for the northern tributary would be to keep the channel it's its existing location and stabilize the banks in place using natural channel design. Steve Hurt said that MDE's preference would be to relocate the channel into the field considering sections of the existing channel appear to have already healed.

The group then proceeded to the southern tributary that consists of a small headwater channel just upstream of Paint Branch where a culvert failure and culvert outfall have created fish blockages. The site design includes removal of the failed culvert near Paint Branch and raising the stream elevation through a series of riffles to provide fish passage at the upstream culvert. The site is primarily for fish passage, however credits upstream of the culvert to remain are not proposed due to the small size of the channel. The agencies agreed that the small fish passage site had potential under the condition that it was pursued with the northern tributary.

The group discussed the conservation easements that would be required for AN-7. Nick Ozburn (USACE) noted that there would be a 30 - 35 foot minimum buffer required surrounding the stream sites.

Overall the agencies agreed that AN-7 has potential for mitigation, however the site may be challenging due to design constraints. USFWS noted that the site is attractive due its location in the Paint Branch watershed and its upstream connection to high quality waterways. Gwen Gibson said she would coordinate with DNR fisheries to determine if there was potential for trout habitat improvements at the site.

Other Opportunities

The group proceeded south to look at a severely eroded bank along Paint Branch that BARC would like to have repaired. The severely eroded bank is approximately 12 feet tall and located along a section of Paint Branch that has eroded into the adjacent man-made berm. This section of Paint Branch was reviewed during the MLS walkthrough survey and it was determined that the site had

limited potential for ecological lift due to the majority of the reach being stable, with the exception of a few localized severely eroded banks.

The group then drove to the North Farm parcel located northeast of the I-495/I-95 Interchange to review an area that BARC recommended as a drainage repair. The site consists of a grass swale that drains into a roadway embankment that has caused backwatering and a small PEM wetland to form. Justin Reel noted that the site does not have potential for mitigation due the existing wetlands and isolated position in the landscape, however the site could be a potential candidate for off-site stormwater management for the MLS project. Following the field meeting the site will be coordinated with the stormwater management group to determine its potential for off-site stormwater management credits.

Attendees:

Name	Agency	Email
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DAY 10
PA:1 BACK BRANCH

I-495 & I-270 Managed Lanes Study
Mitigation Agency Field Review – Day 10
December 19, 2019 @ 9:00am

Handouts:

PA-1 Phase I Mitigation Design Plan

A field review meeting was conducted on December 19, 2019 with representatives of several agencies and stakeholders including the Prince George's County Board of Education (BOE) and Department of the Environment (DOE), USFWS, USACE, DNR and MDE to discuss a potential stream mitigation site located on Prince George's County BOE, DOE, and several private properties. A summary of the topics discussed at the meeting follows.

Introductions

All participants met at the Brown Station Sanitary Landfill parking lot at 3500 Brown Station Rd., Upper Marlboro, MD 20774. The meeting began with introductions, followed by a summary of the project and mitigation site selection process by Justin Reel (RK&K). A two-tiered approach was used to identify potential permittee-responsible mitigation that included a traditional mitigation site search on public lands and a Request for Proposals (RFP) on private lands. Public sites with the greatest mitigation potential that received preliminary approval from landowners and private sites that met MDOT SHA's financial, technical, and administrative qualifications were chosen to be presented to the agencies as potential mitigation sites.

Mitigation Opportunities

PA-1 – Back Branch

Karl Hellmann (RK&K) summarized the existing conditions of the PA-1 site that includes approximately 6,700 linear feet of potential stream restoration along a section of Back Branch located on several public and private properties. The site drains to Cabin Branch, which is located in the Patuxent watershed. The stream consists of an incised channel with several torturous meanders surrounded by a mid-successional upland forest. Portions of the northern floodplain had been cleared and filled in the past for landfill operations. A sewer line runs parallel to the stream in the floodplain and an old remnant railroad bed spans the center of the site. There is a large wetland mitigation site just north of PA-1 that receives flood flows from Back Branch through a man-made ditch.

The preliminary concept design includes improving the floodplain connection by raising the stream bed and/or creating floodplain benches to provide more-frequent floodplain access to mitigate damage from erosive flood flows. The design also entails grading and vegetating banks to reduce erosion and instream sedimentation, installing instream structures to reduce channel incision and improve in-stream habitat, and improving the plan and profile of the stream to enhance stream functions. Following the summary, the group consolidated vehicles and drove over to the site.

Frank Golisa (DOE) mentioned that the DOE has their own stream restoration sites for their CIP Program and that there may be other good potential stream site candidates in Prince George's County. He recommended that any other sites pursued on County property be coordinated with the

DOE. Frank noted that there are several parcels on the eastern side of PA-1 that are owned by Prince George's County; however, the land is not managed by the DOE.

Nick Ozburn (USACE) asked what the purpose of the gage near the stream and old railroad bed served. DOE responded that it was likely a groundwater gage for the landfill, however they weren't sure what kind of data it was collecting. Nick noted that if the gage was collecting water quality data, the information could be used to compare pre and post construction conditions for functional uplift purposes.

The entire group, with the exception of DOE, proceeded to walk the upstream section of the site, just west of the old railroad bed. Karl noted that based on historic aerial photos it appeared that the majority of the forest north of the site was cleared up to the edge of the channel in the late 1980's. The preferred construction access to the site would be from the DOE property considering the young age of the forest north of the site and the existing access roads throughout the landfill. It was also noted that the majority of the DNR/NWI wetlands displayed on the PA-1 map handout are inaccurate and that most of the site consists of upland forest.

Gwen Gibson (DNR) asked about the design approach for the site. Drew Altland (RK&K) responded that the design would be a floodplain restoration, however the degree of work and design approach would depend on the agencies and landowner comfort level with impacts to the surrounding forest. The approach could entail floodplain excavation, filling in the channel, or a combination of the two to improve floodplain access and stability of the site. An extensive floodplain excavation would likely provide more benefits to the stream, but require greater forest impacts; while minor floodplain grading would likely provide fewer benefits to the stream, but require less forest impacts.

Steve Hurt (MDE) asked what the source was for the extensive deposition in the stream channel. At this time the deposition source is unknown and will be further investigated during design. Steve also noted that the channel meanders/breakthroughs and oxbow features observed at the site were natural stream processes.

The group walked downstream of the remnant railroad bed where the southern stream bank is located on two private properties. Severe bank erosion was observed along the toe of a steep valley slope on the private properties. Karl noted that the private property boundaries appear to roughly follow the stream boundaries in this area. Nick mentioned that depending on the deed language, the private property boundaries may follow the stream boundaries or be set in place from the original stream boundaries. Karl said that coordination with the private landowners is currently pending and will depend on if the site is selected as a part of the Draft/Phase I mitigation package.

Drew pointed out the original floodplain hydric soil layer that was evident in several sections of eroded bank in the downstream reach. The preferred design approach for the site would include excavating down to this original floodplain layer where possible.

Upon completion of the site walk, each member of the group provided their input on the site conditions and potential for mitigation. Karl noted that the site is located in the Patuxent watershed in Prince George's County, which has been a difficult area to find good potential mitigation sites due to extensive land developments. Only two mitigation sites with potential have been identified in the Patuxent watershed, which include PA-1 and the Cabin Branch site located on private property (RFP-

4).
Nick stated that county boundaries are not a limiting factor for the USACE when choosing mitigation sites and that the USACE's main focus would be staying within the impacted watersheds. Steve mentioned that county boundaries are not a concern for MDE, however MDE does take into consideration the proximity of the mitigation site to the proposed impacts.

Nick thought that while sections of the site appear to be healing, there does seem to be some potential for instream habitat improvements and possibly water quality improvements depending on the existing conditions.

Steve said that the site does not have as much mitigation potential as some of the other sites that have been reviewed, however the group may want to keep the site at this time considering options in the Patuxent are limited.

Gwen stated that DNR would prefer a design approach that minimizes impacts to the surrounding forest such as raising the channel as opposed to excavating out the entire floodplain. She mentioned that some of the bank erosion appeared to be old and healing, and questioned if drainage from the school or landfill had been altered in the past that could have already relieved the source of the erosion problem. It was noted that the site is within a Sensitive Species Project Review Area (SSPRA). Gwen said she would coordinate with DNR's Wildlife and Heritage Service to confirm the RTE species.

The USFWS and Prince George's BOE did not have any concerns with the site. Ray Li (USFWS) thought the site had potential due to its connection to adjacent wildlife corridors, and Ron Skyles (BOE) was overall in agreement with the site due to its remote location in the woods behind the school.

Attendees:

Name	Agency	Email
Justin Reel	P3 / RK&K	jreel@rkk.com
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Drew Altland	RK&K	daltland@rkk.com
Susan Lindstrom	P3 / WSP	Susan.lindstrom2@wsp.com
Ray Li	USFWS	ray_li@fws.gov
Nick Ozburn	USACE	Nicholas.R.Ozburn@usace.army.mil
Josh Gaimaro	USACE	Josh.Gaimaro@usace.army.mil
Steve Hurt	MDE	SHurt@mccormicktaylor.com
Gillian Rines	MDE	glrines@mccormicktaylor.com
Gwen Gibson	DNR – MES	Gwendolyn.gibson@maryland.gov
Ron Skyles	Pg. County BOE	Ronald.skyles@pgcps.org
Frank Galosi	Pg. County DOE	Flgalosi@co.pg.md.us
Darryl Flick	Pg. County DOE	dlflick@co.pg.md.us

USACE & MDE MITIGATION SITE REVIEW MEETING

I-495 & I-270 Managed Lanes Study
MDE & USACE Permitting and Mitigation Coordination Meeting
700 East Pratt Street, Suite 500. Baltimore, Maryland 21202
January 10, 2020 @ 9:00 am

Handouts: Permit Process Schedule Detail, Proposed Public Hearing Schedule, M-NCPPC Parks Mitigation Site Recommendations, Potential Mitigation Sites Table & Vicinity Map

* Indicates action items

A meeting was conducted on January 10, 2020 with the US Army Corps of Engineers (USACE) and Maryland Department of the Environment (MDE) to discuss permitting requirements and potential stream and wetland mitigation sites that will be included in the draft/phase I mitigation package. A summary of the topics discussed at the meeting follows.

Introductions, Implications in DEIS, and Revised Permit Schedule
The meeting began with introductions. The group then proceeded to discuss the implications of no recommended preferred alternative being identified within the Draft Environmental Impact Statement (DEIS). The group discussed the possibility of including the most impactful alternative, Alternative 10, in the initial draft of the JPA for public comment and then revising the permit application once the Recommended Preferred Alternative is identified in the FEIS and prior to the Record of Decision (ROD). Jack Dinne, USACE, indicated that he would need to discuss this possibility with Joe DaVia and USACE counsel and requested that the project team schedule a larger meeting to discuss these implications further and to determine a path forward for the JPA. *

The group then discussed the detailed Permit Process Schedule. The NEPA team asked if Steve Hurt would check with Amanda Sigillito, MDE, to determine whether it will work to submit the JPA 30 days prior to the single property owner notification of both the permit application and the public hearing notice. Steve agreed to check with Amanda Sigillito and get back to the NEPA team with an answer.*

The group discussed the timing of the public hearing dates/times. Jack Dinne and Steve Hurt requested that the hearing schedule be sent directly to Amanda Sigillito (MDE) and Joe DaVia (USACE) for their confirmation of dates/times, since they will be the panelists at the public hearings.* Jack indicated that USACE would prefer that the hearing times be shortened to 4-5 hours per day and offered that public testimony periods exceeding 3 hours are challenging. He suggested that additional days be added to the schedule if the project team feels it needs to receive more testimony than 3 hours per day. It was determined that the NEPA Team needs to coordinate further with Amanda Sigillito, MDE, and Joe DaVia, USACE, to finalize the public hearing schedule.* The agencies also recommended the NEPA Team complete the analysis of the new hybrid alternative prior to the public hearings and to make it clear in the public hearings whether the hybrid alternative is a viable alternative.

Mitigation Opportunities
The group proceeded to discuss the potential mitigation sites that were reviewed in the field by the agencies in November and December. Justin Reel and Karl Hellmann detailed the site selection process including the public and private mitigation approaches as well as the anticipated impacts and

mitigation requirements for the project. Each member of the group was given a list and map of the potential mitigation sites. The group then discussed the mitigation potential of each site on a watershed by watershed basis to confirm acceptance or rejection of the sites. Proposed credits were tracked during the discussion to determine if mitigation requirements were being met in each watershed. Results of the discussion follows:

RFP Sites:

- Include 4 of proposed RFP sites in the draft/phase 1 mitigation package; RFP-1, RFP-2, RFP-4, and RFP-5
- Further coordination is required on RFP-3 (Tuscarora Creek) prior to including the site in the draft/phase I mitigation package due to design concerns. *Note: Following the meeting, these concerns were discussed with the contractors and a new concept design has been developed and will be presented to the agencies in the near future.*
- RFP-1, Indian Creek and Tributaries at Konterra, assumed credits should be reduced. As presented the agencies are comfortable with 10.75 acres of wetlands, and ~13,000 linear feet of stream. Agencies suggested another meeting with all parties (MDE, USACE, the NEPA Team, and the RFP offeror) should be held. Discussion should focus on crediting, the size of stream buffers, and other creation opportunities.*

Public Sites:

- Include 8 of 14 proposed public sites in the draft/phase 1 package; PA-1, AN-1, AN-3, AN-6, AN-7, CA-2, CA-3, and CA-5
- Remove AN-3A, Northwest Branch Lamberton Dr. Trib. - M-NCPPC recommendation (upstream of site AN-3), due to limited functional uplift potential and site constraints
- Remove AN-4, Northwest Branch Glen Allen Ave. Trib., due to limited functional uplift potential and site constraints
- Remove AN-5, Northwest Branch Lamberton Dr. Trib., due to very limited functional uplift potential
- Remove CA-1, McKee Beshers, because additional wetland credits are not needed in Middle-Potomac-Catoctin watershed
- Remove CA-4, Cabin Branch, because of site constraints and limited restoration potential
- Remove CA-6, Rock Run, because of limited functional uplift potential and site constraints
- Reduce site size of AN-1, Crabbs Branch, to only include reed canary floodplain section (~4,276 LF)
- Reduce credit potential for AN-6, Paint Branch Fish Passage Site, to only include segment where in-stream work is proposed (~1,544 LF)

Based on the accepted sites and revised credits discussed above it was determined that the current mitigation package is deficient in the following watersheds and mitigation types:

- Middle-Potomac-Catoctin: ~900 feet short of stream mitigation credit. *Note: Following the meeting, the Tuscarora Creek site (RFP-3) was re-designed and included in the Phase I mitigation package, which removed the stream mitigation deficit in the Middle-Potomac-Catoctin Watershed.*
- Patuxent - ~3.5 acres short of wetland mitigation credit

Steve Hurt requested confirmation that the POWs listed in the mitigation table are ponds and that a note be added to the bottom of the table to clarify this. *
The deficiencies in credit led to a discussion of possible options to meet the required mitigation. The options discussed include:

1. Present the mitigation package "as is" and propose to make up shortfalls with surplus credits in the other watersheds and by expanding proposed sites in watersheds where possible.
2. Supplement the mitigation package with SHA umbrella bank credits from Aubaugh (wetland) and the proposed Woodfield Bank (ICC site SC-19, stream).
3. Present the package "as is" and propose site expansion/impact reduction for streams in Middle-Potomac-Catoctin and future bank credit/second RFP for shortfall in Patuxent since phasing places that section last.
4. Steve Hurt asked whether the contract indicated that the developer cannot create wetlands within the LOD to reduce impacts. He indicated that this had been attempted on previous projects in areas where timber matting had been placed and water had begun to pond. Steve suggested that onsite wetland mitigation be specifically addressed in the technical provisions.

Other Discussions

- Expanded Buffers
  Areas with highly-erodible soils and steep slopes of 15% or greater will be indicated on the Online Mapping Tool as part of the JPA package. 297 out of 331 wetlands within the Alternative 9 LOD are adjacent either to highly-erodible soils or steep slopes. The most common situation is that if an expanded buffer were applied, the buffer would extend into the adjacent roadway. Steve Hurt indicated that during the draft JPA review, MDE will review these instances to determine whether any of these wetlands are within larger natural areas and will require expanded buffers.

- Major Crossings and Targeted Areas for Impact Reduction are covered in the Avoidance, Minimization, and Impacts Report (AMR), which will be a component of the JPA package. The Natural Resources Team has excerpted the AMR section covering major crossings and targeted areas for impact reduction and will send this text along with the associated impact plates and tables to Jack and Steve following the meeting for their review and feedback.*

Action Items

- Action Item: The NEPA Team will schedule a meeting with the agencies to discuss the permitting implications of removing the Recommended Preferred Alternative from the DEIS. (complete)

- Action Item: Steve Hurt will discuss with Amanda Sigillito, MDE, about the timing of the JPA and certified mail letters and respond to the NEPA team.

- Action Item: The NEPA Team will send the public hearing schedule directly to Joe DaVia (USACE) and Amanda Sigillito (MDE) for comment.

- Action Item: The NEPA Team will further coordinate with Joe DaVia (USACE) and Amanda Sigillito (MDE) about dates and times of the public hearings.
- Action Item: The NEPA Team will clarify in the mitigation tables that the POWs listed are pond impacts.

- Action Item: The NEPA Team will investigate contractual obligations related to wetland creation within the LOD during construction activities.

- Action Item: The NEPA Team will coordinate another site visit to RFP-1, Indian Creek and Tributaries at Konterra, to discuss crediting, the size of riparian buffers, and other creation opportunities.

- Action Item: The NEPA Team will send major crossings and targeted areas of impact reduction text and associated impact plates and tables to Steve Hurt and Jack Dinne for review and feedback. (complete)

Attendees:

Name	Agency	Email
Jack Dinne	USACE	John.j.dinne@nab02.usace.army.mil
Steve Hurt	MDE	smhurt@mccormicktaylor.com
Karl Hellmann	P3/ RK&K	khellmann@rkk.com
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Alex Nussbaum	P3/ RK&K	anussbaum@rkk.com

APPENDIX J: PHASE I MITIGATION SITE VICINITY MAP

RFP-3
CA-3
CA-2
RFP-2
CA-5
AN-1
AN-3
RFP-1
AN-6
AN-7
RFP-5
RFP-6
PA-1
RFP-4

Middle Potomac-Catoctin (02070008)

Middle Potomac-Anacostia-Occoquan (02070010)

Patuxent (02060006)

Legend

Targeted HUC8 Watersheds

- State Boundary
- MLS Corridor
- County Boundary
- Middle Potomac-Anacostia-Occoquan
- Middle Potomac-Catoctin
- Patuxent
- Stream Sites
- Wetland/Stream Sites

N W E S

0 3 6 9 12 Miles

1 in = 6 Miles

Figure J-1. Phase I Mitigation Vicinity Map

270 495 MANAGED LANES STUDY

APPENDIX K: PUBLIC PHASE I MITIGATION DESIGN PLANS

AN-1: CRABBS BRANCH

I-495 & I-270 Managed Lanes Study
Wetland & Stream Mitigation - Crabbs Branch
Site AN-1

Existing Conditions Summary

Location Information

County:	Montgomery
Federal HUC-8 Watershed:	Middle-Potomac-Anacostia-Occoquan (02070010)
MDE 8-digit Watershed:	Rock Creek (02140206)
Coordinates:	39.115535, -77.145948
Location:	East of Redland Rd. & north of Oskaloosa Dr.
Property Ownership:	M-NCPPC

Site Conditions

Parcel Area:	98.5 Ac	**Park Name:** Crabbs Branch SVP
Drainage Area:	1.89 square miles	**Stream Use Class:** IV
Existing Land Use:	Forest	**Adjacent Land Use:** Residential
Mapped Soils:	Hatboro silt loam & Baile silt loam	
Constraints:	Sewer line in floodplain	

AN-1 is a stream and wetland restoration site located along Crabbs Branch, just east of the intersection of Redland Road and Crabbs Branch Way. The site was recommended by M-NCPPC and consists of an incised channel surrounded by a mid-successional forest in the upper reach and an open meadow with scattered trees in the lower reach. The stream is highly unstable with torturous meanders and severe erosion along 3-8 foot tall vertical banks. The hydrology and morphology of the site have been influenced by anthropogenic influences such as the upstream online Crabbs Branch Regional Stormwater Pond, residential development encroachment on the floodplain, and buried infrastructure that crosses the channel. The lower floodplain consists of wetlands dominated by invasive reed canary grass that is preventing forest regeneration. There is potential access at the upstream end of the site off of Crabbs Branch Way and through an HOA road off of Oskaloosa Drive at the downstream end of the site.

Summary of Opportunities

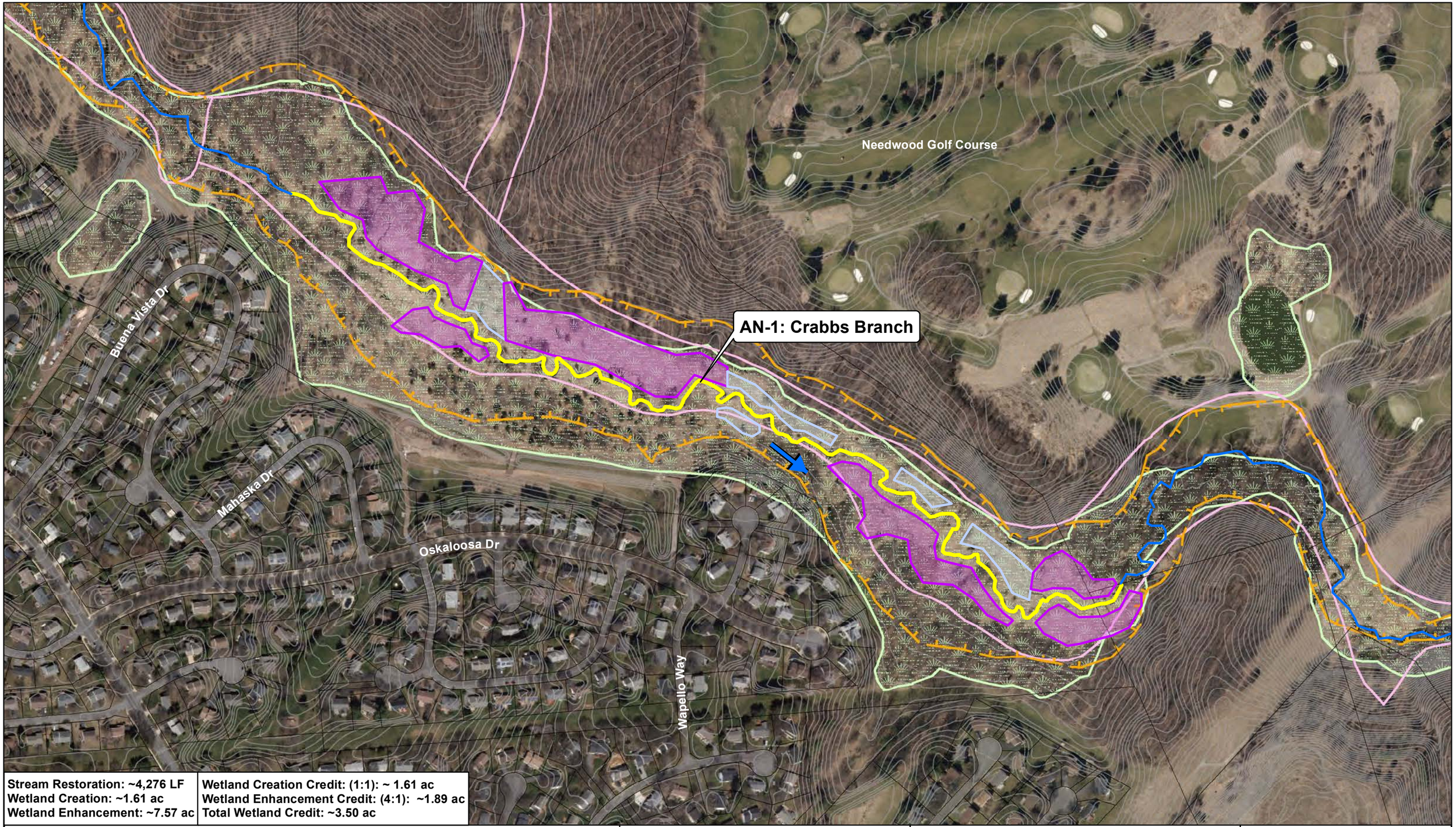
- Stream Restoration – Approximately 4,276 linear feet
- Wetland Restoration – Approximately 1.61 acres of Creation (~1.61 acres credit) & 7.57 acres of Enhancement (~1.89 acres credit)

Restoration Objectives

- Bed & bank stabilization
- Floodplain connection improvements
- In-stream habitat improvements
- Wetland creation & enhancement
- Floodplain reforestation
- Invasive species control

Restoration Concept

- Improve floodplain connection by lowering the floodplain in the downstream reach to provide more-frequent floodplain access to mitigate damage from erosive flood flows.
- Grade back and vegetate vertical banks to reduce erosion and instream sedimentation
- Installation of instream structures to provide channel stability and habitat diversity
- Minor floodplain grading to expand existing wetlands and restore groundwater hydrology
- Restore forested floodplain habitat by invasive species treatment and planting native trees and shrubs



Stream Restoration: ~4,276 LF
Wetland Creation: ~1.61 ac
Wetland Enhancement: ~7.57 ac

Wetland Creation Credit (1:1): ~ 1.61 ac
Wetland Enhancement Credit (4:1): ~1.89 ac
Total Wetland Credit: ~3.50 ac

- Stream Site
- Wetland Creation
- Wetland Enhancement
- Streams
- NWI/DNR Wetlands
- FEMA Floodplain
- Parcel Boundaries
- Hydric Soils
- 2' Contours

N W E S

0 150 300 450 600 Feet

1 inch = 300 feet

I-495 & I-270 Managed Lanes Study
Phase I Mitigation Design Plan
Wetland/Stream Site AN-1
Crabbs Branch

495 270 MANAGED LANES STUDY

AN-3: PEBBLESTONE DR. TRIBUTARY

I-495 & I-270 Managed Lanes Study
Stream Mitigation – Pebblestone Dr. Tributary
Site AN-3

Existing Conditions Summary

Location Information

County:	Montgomery
Federal HUC-8 Watershed:	Middle-Potomac-Anacostia-Occoquan (02070010)
MDE 8-digit Watershed:	Anacostia River (02140205)
Coordinates:	39.092946, -77.016077
Location:	South of Bonifant Rd. & east of Pebblestone Dr.
Property Ownership:	M-NCPPC & South Stonegate HOA

Site Conditions

Parcel Area:	28.7 Ac	**Park Name:**	Northwest Branch SVU 5
Drainage Area:	1.05 square miles	**Stream Use Class:**	IV
Existing Land Use:	Forest	**Adjacent Land Use:**	Medium density residential
Constraints:	Forest Conservation Easement & Sewer line in floodplain		

AN-3 is a stream restoration site located along an unnamed tributary to Northwest Branch, just east of Pebble Stone Drive. The site was recommended by M-NCPPC and consists of a deeply incised channel surrounded by a mid-successional forest with extensive herbaceous invasives. The majority of the reach is highly unstable with severe erosion along 3-8 foot tall vertical banks and extensive deposition bars within the channel. A 1-2 foot tall fish blockage over rip-rap and an exposed sewer line were observed at the upstream and downstream ends of the site. There is potential access, which would require minimal tree impacts, through open canopy areas dominated by invasives and along an old route that was used for a previous ICC stream restoration project (NW-4) located within the same stream valley.

Summary of Opportunities

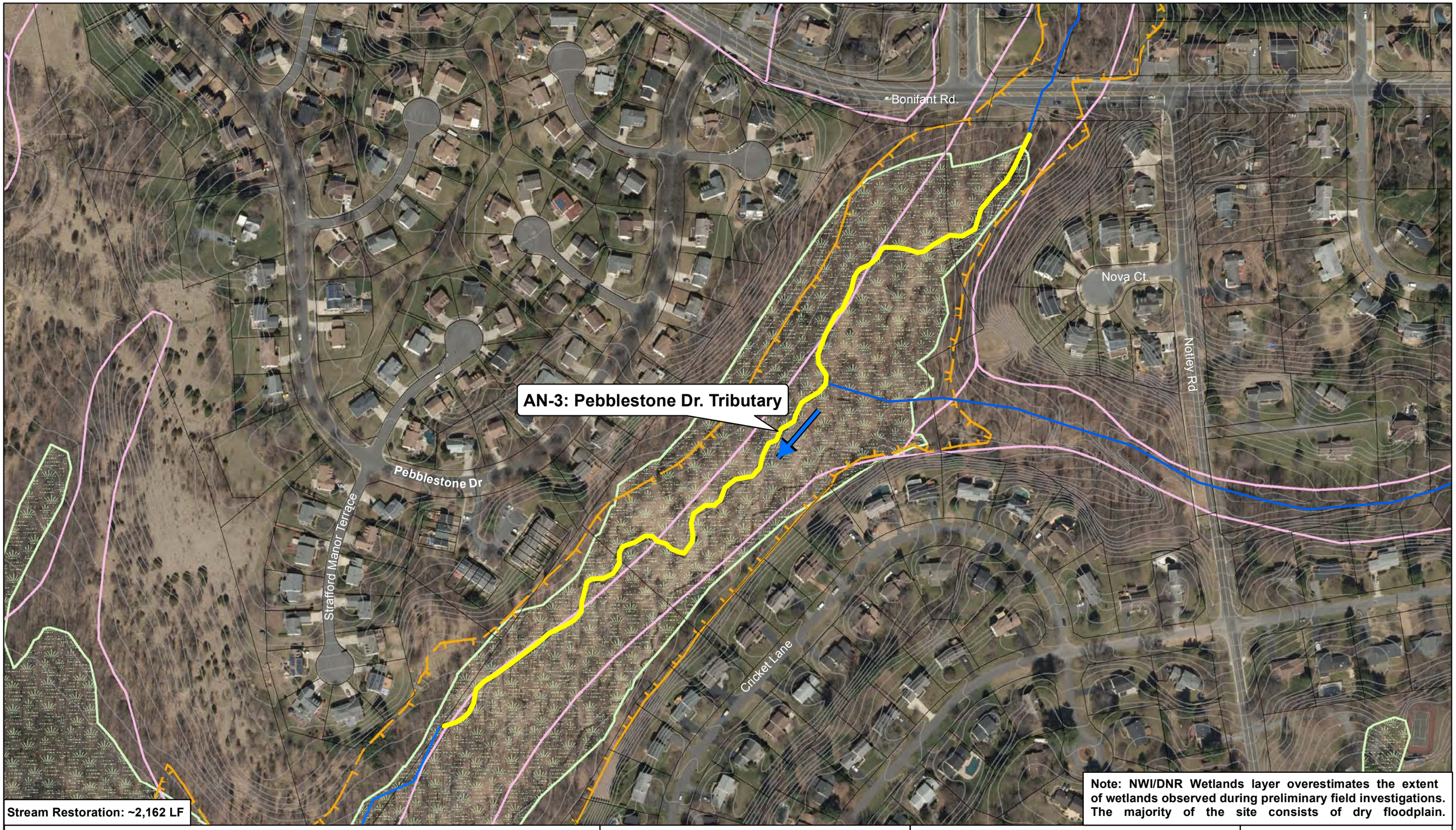
- Stream restoration – Approximately 2,162 linear feet

Restoration Objectives

- Bed & bank stabilization
- Floodplain connection improvements
- In-stream & riparian habitat improvements
- Fish blockage removal

Restoration Concept

- Grade and vegetate vertical banks to reduce erosion and instream sedimentation
- Install instream structures to reduce channel incision and improve fish and benthic habitat
- Improve floodplain connection by raising the stream bed and/or creating floodplain benches to provide more-frequent floodplain access to mitigate damage from erosive flood flows
- Provide fish passage over existing rip-rap by raising the stream bed to allow access to 0.59 miles of potential upstream habitat
- Installation of instream structures to protect exposed utilities
- Riparian habitat enhancements by invasive species treatment and seeding/planting native species
- Improve plan and profile of existing stream to enhance stream functions



Note: NWI/DNR Wetlands layer overestimates the extent of wetlands observed during preliminary field investigations. The majority of the site consists of dry floodplain.

Stream Site
Streams
NWI/DNR Wetlands
Hydric Soils
FEMA Floodplain
2' Contours
Parcel Boundaries

N W E S

0 100 200 300 400 Feet

1 inch = 200 feet

I-495 & I-270 Managed Lanes Study
Phase I Mitigation Design Plan
Stream Site AN-3
Pebblestone Dr. Tributary

270 495 MANAGED LANES STUDY

AN-6: PAINT BRANCH FISH PASSAGE

I-495 & I-270 Managed Lanes Study
Stream Mitigation – Paint Branch Fish Passage
Site AN-6

Existing Conditions Summary

Location Information

County:	Prince George's
Federal HUC-8 Watershed:	Middle-Potomac-Anacostia-Occoquan (02070010)
MDE 8-digit Watershed:	Anacostia River (02140205)
Coordinates:	39.021078, -76.945642
Location:	I-495/I-95 Interchange
Property Ownership:	USDA BARC & SHA

Site Conditions

Parcel Area:	362.0 Ac (BARC)	**Parcel Name:** South Farm
Drainage Area:	16.4 square miles	**Stream Use Class:** III
Existing Land Use:	Roadway & agriculture	**Adjacent Land Use:** Residential & forest
Constraints:	Sewer line in eastern floodplain	

AN-6 is a fish passage site located along Paint Branch, within the southeast portion of the I-495/I-95 Interchange. The site was originally investigated and designed to 90% for the Greenbelt Metro Access Project, before the project was canceled in 2017. The site consists of two quadruple cell box culverts (10' X 14') under I-495 that have created one-foot tall fish blockages. Fish ladders were installed just downstream of the culverts in the 1990's, but have failed since. During preliminary field investigations, a debris jam was observed at the upstream culvert that has created an additional 14-inch-tall temporary blockage. Removing these fish blockages would allow complete upstream access to 0.45 miles of high-quality habitat below a partial blockage at the I-95 northbound ramp culvert, and partial upstream access to an additional 13.84 miles of Paint Branch and its tributaries (2nd Order and greater). There is potential access to the site from the BARC property and SHA ROW that would require minimal tree impacts.

Summary of Opportunities

- Stream Restoration & Fish Blockage Removal – Approximately 1,544 linear feet (5,258 LF of potential credit)

Restoration Objectives

- Removal of three fish blockages
- Provide passage for a wide range of native fish and other aquatic organisms
- Avoid impacting the hydraulic function of the culverts

Restoration Concept

- Demolition of failed fish passages and removal of upstream debris jam
- Incrementally raise the stream elevation through a series of constructed riffles placed downstream of the culverts
- Backwater both culverts to allow passage, while maintaining hydraulic capacity of the culverts during high flow events
- Riparian habitat enhancements by planting native tree and shrub species

Stream Site
Streams
NWI/DNR Wetlands
Hydric Soils
FEMA Floodplain
2' Contours
Parcel Boundaries

N W E S

0 200 400 600 800 Feet

1 inch = 400 feet

I-495 & I-270 Managed Lanes Study
Phase I Mitigation Design Plan
Stream Site AN-6
Paint Branch Fish Passage

495 270 MANAGED LANES STUDY

I-495 & I-270 Managed Lanes Study
Phase I Fish Passage Credits
Stream Site AN-6
Paint Branch Fish Passage

Legend

The Nature Conservancy (TNC) Fish Blockages

- ● Full Blockage
- ◐ Partial Blockage
- ○ Removed after field assessment

Credit Ratio

- 20:1 Partial Blockage Removal
- 10:1 Full Blockage Removal
- 1:1 Full Restoration

Strahler Stream Order

- Not Assigned
- 1
- 2
- 3
- 4
- MDE-12 Digit Watershed

Note:
The enitre stream channel has not been assessed for fish blockages. Only blockages within the TNC source have been included.

0 0.25 0.5 1 Miles

N W E S

Full Restoration Length: 1,544 LF
Full Restoration Credit:1,544 LF

Full Blockage Removal Length: 969 LF
Full Blockage Removal Credit: 97 LF

Partial Blockage Removal Length: 72,340 LF
Partial Blockage Removal Credit: 3,617 LF

Total Credit: 5,258 LF

Briggs Chaney Rd
200
29
95
495
Project Site: Paint Branch Fish Blockages to be removed
MD iMAP, DoIT

AN-7: PAINT BRANCH SOUTH FARM TRIBUTARIES

I-495 & I-270 Managed Lanes Study
Stream Mitigation – Paint Branch South Farm Tributaries
Site AN-7

Existing Conditions Summary

Location Information

County:	Prince George's
Federal HUC-8 Watershed:	Middle-Potomac-Anacostia-Occoquan (02070010)
MDE 8-digit Watershed:	Anacostia River (02140205)
Coordinates:	39.018526 -76.949208 and 39.012977 -76.945156
Location:	Southeast of I-495/I-95 Interchange
Property Ownership:	USDA BARC & SHA

Site Conditions

Parcel Area:	361.9 Ac	**Parcel Name:**	South Farm
Drainage Area:	0.17 & 0.11 sq. mi.	**Stream Use Class:**	I
Existing Land Use:	Agriculture	**Adjacent Land Use:**	Roadway
Constraints:	Exposed sewer line, gas line in floodplain, adjacent ag. fields		

AN-7 is a stream restoration site located along two headwater streams that drain into Paint Branch, just southeast of the I-495/I-95 interchange. The site was recommended by BARC and consists of deeply incised channels surrounded by forest and agricultural fields. The northern tributary (Tributary 1) consists of a concrete lined channel and highly unstable natural channel that flows into a moderately stabilized section with localized erosion areas. There is a two-foot-tall fish blockage and exposed sewer line just downstream of where the concrete lined channel ends. The southern tributary (Tributary 2) is a small, incised channel with a failed culvert and culvert outfall channel that are creating fish blockages to an upstream reach that appears stable. There is direct access to the site from existing roads and fields, however access to the upstream end of Tributary 1 would require some forest impacts.

Summary of Opportunities

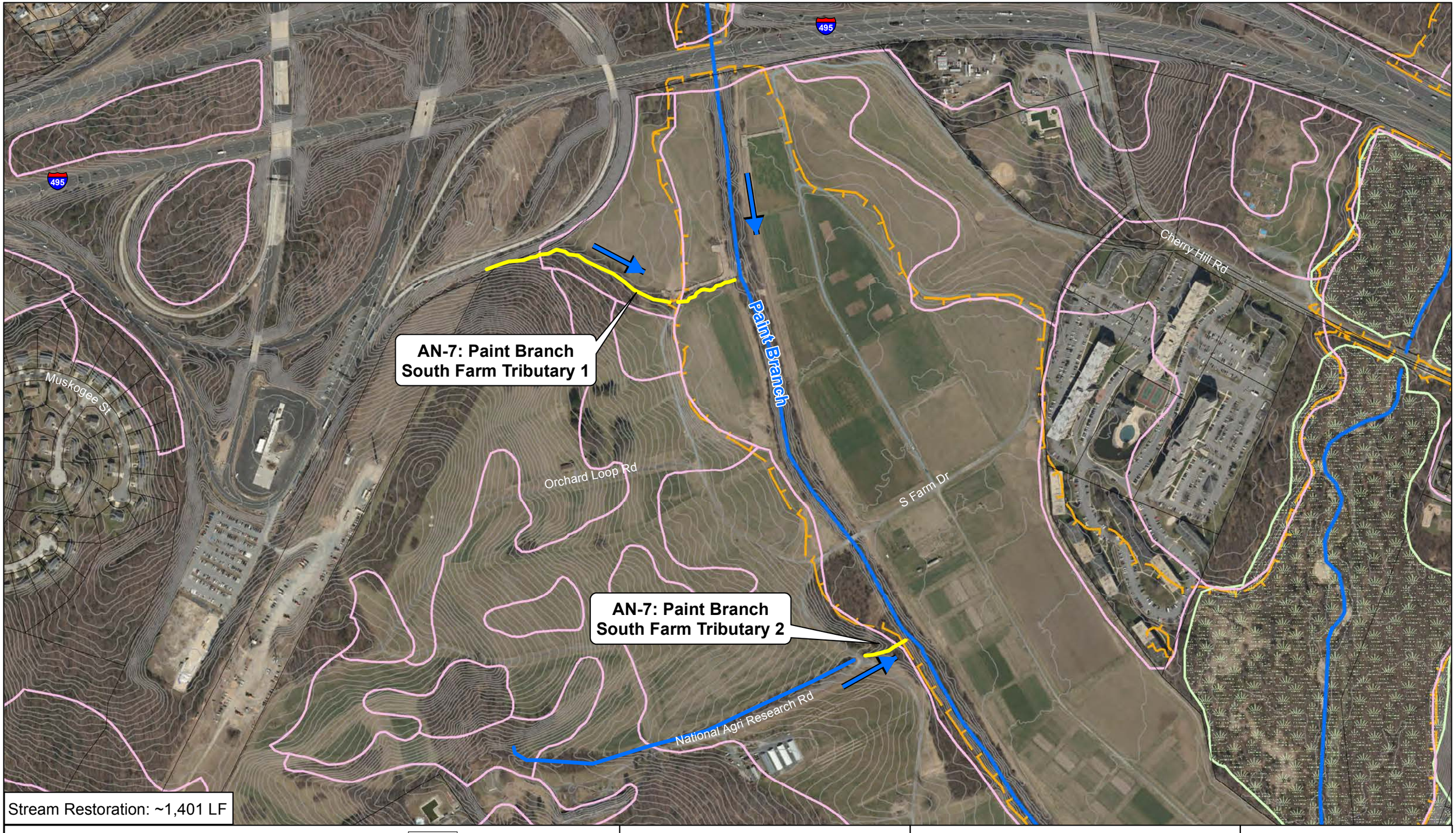
- Stream restoration & fish blockage removals – Approximately 1,401 linear feet

Restoration Objectives

- Bed & bank stabilization
- In-stream and riparian habitat improvements
- Fish blockage removals

Restoration Concept

- Install instream structures to stabilize the stream bed, protect exposed utilities, and improve fish and benthic habitat
- Grade and vegetate banks to reduce erosion and instream sedimentation
- Provide fish passage at three blockages by raising the stream bed and/or removing failed culverts
- Riparian habitat enhancements by planting native trees and shrubs



I-495 & I-270 Managed Lanes Study
Phase I Mitigation Design Plan
Stream Site AN-7
Paint Branch South Farm Tributaries

270 495 MANAGED LANES STUDY

CA-2: LOWER MAGRUDER BRANCH

I-495 & I-270 Managed Lanes Study
Wetland & Stream Mitigation Site – Lower Magruder Branch
Site – CA-2

Existing Conditions Summary

Location Information

County:	Montgomery
Federal HUC-8 Watershed:	Middle-Potomac-Catoctin (02070008)
MDE 8-digit Watershed:	Seneca Creek (02140208)
Coordinates:	39.232782, -77.188321
Location:	South of Watkins Road
Property Ownership:	M-NCPPC

Site Conditions

Parcel Area:	66.4 Ac	**Park Name:** Great Seneca SVU 4
Drainage Area:	3.48 square miles	**Stream Use Class:** I-P
Existing Land Use:	Agriculture	**Adjacent Land Use:** Barren land & Forest
Mapped Soils:	Hatboro silt loam	
Constraints:	None	

CA-2 is a stream and wetland restoration site located along Magruder Branch, just south of Watkins Road. The stream is highly unstable throughout the site with torturous meanders and moderate to severe erosion along 3-4 foot tall banks. There is a one foot tall fish blockage at the upstream end of the site where the stream flows under Watkins Road. The upper stream reach is surrounded by a broad floodplain dominated by invasive reed canary grass that is preventing forest regeneration, while the lower floodplain consists of sparse early successional forest dominated by black walnut. In the upper western floodplain, there are two large PEM wetlands dominated by cattail and reed canary grass, while the eastern floodplain is mostly dry reed canary meadow. Groundwater was observed in the eastern floodplain at 2.5 feet below the ground surface in November 2018. No utilities were observed in the floodplain during preliminary site investigations. There is potential access off of Watkins Road that would require minimal tree impacts.

Summary of Opportunities

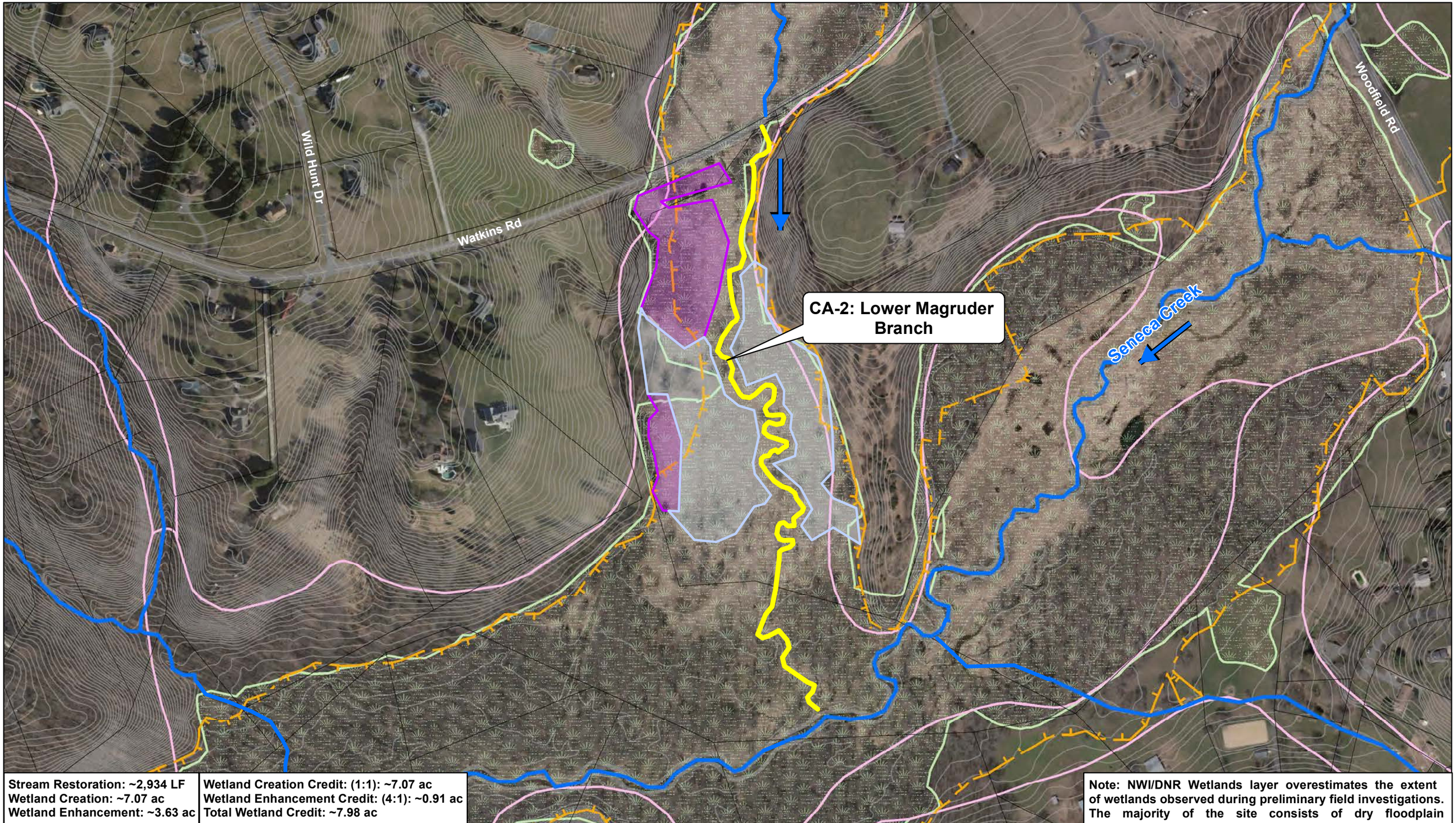
- Stream Restoration – Approximately 2,934 linear feet
- Wetland Creation – Approximately 7.07 acres (~7.07 acres credit)
- Wetland Enhancement – Approximately 3.63 acres (~0.91 acres credit)

Restoration Objectives

- Bed & bank stabilization
- Floodplain reconnection
- Fish passage & habitat improvements
- Wetland creation & enhancement
- Floodplain reforestation
- Invasive species treatment

Restoration Concept

- Restore floodplain connection by relocating the channel, raising the stream bed, and/or excavating floodplain sediment to provide more-frequent floodplain access to mitigate damage from erosive flood flows.
- Installation of instream structures to provide channel stability, fish passage and habitat diversity
- Floodplain grading to expand existing wetlands and restore groundwater hydrology
- Restore forested floodplain habitat by invasive species treatment and planting native trees and shrubs



Stream Restoration: ~2,934 LF
Wetland Creation: ~7.07 ac
Wetland Enhancement: ~3.63 ac

Wetland Creation Credit: (1:1): ~7.07 ac
Wetland Enhancement Credit: (4:1): ~0.91 ac
Total Wetland Credit: ~7.98 ac

Note: NWI/DNR Wetlands layer overestimates the extent of wetlands observed during preliminary field investigations. The majority of the site consists of dry floodplain

Stream Site
Wetland Creation
Wetland Enhancement
Streams
NWI/DNR Wetlands
FEMA Floodplain
Parcel Boundaries
Hydric Soils
2' Contours

N W E S

0 150 300 450 600 Feet

1 inch = 300 feet

I-495 & I-270 Managed Lanes Study
Phase I Mitigation Design Plan
Wetland/Stream Site CA-2
Lower Magruder Branch

270 495 MANAGED LANES STUDY

CA-3: UPPER MAGRUDER BRANCH

I-495 & I-270 Managed Lanes Study
Wetland & Stream Mitigation Site – Upper Magruder Branch
Site – CA-3

Existing Conditions Summary

Location Information

County:	Montgomery
Federal HUC-8 Watershed:	Middle-Potomac-Catoctin (02070008)
MDE 8-digit Watershed:	Seneca Creek (02140208)
Coordinates:	39.235212, -77.187785
Location:	North of Watkins Road
Property Ownership:	M-NCPPC

Site Conditions

Parcel Area:	41.0 Ac	**Park Name:**	Magruder Branch SVU 1
Existing Land Use:	Agriculture & Forest	**Adjacent Land Use:**	Low density residential
Drainage Area:	3.35 square miles	**Stream Use Class:**	I-P
Mapped Soils:	Hatboro silt loam		
Constraints:	None		

CA-3 is a stream and wetland restoration site located along Magruder Branch, just north of Watkins Road and Site CA-2. The stream is unstable throughout the site with torturous meanders and moderate erosion along 2-4 foot tall banks. The surrounding floodplain is dominated by invasive reed canary grass with scattered trees and several PEM wetlands. There is a high quality scrub-shrub wetland in the south-eastern floodplain dominated by button bush and smooth alder. The large reed canary wetland in the western floodplain drains under Watkins Road through two 21 inch corrugated metal pipes (CMPs), before flowing into Magruder Branch within the CA-2 site. Groundwater was observed in the dry reed canary floodplain areas of the site at 2-3 feet below the ground surface in November. No utilities were observed in the floodplain during preliminary site investigations. There is potential access off of Watkins Road that would require no tree impacts.

Summary of Opportunities

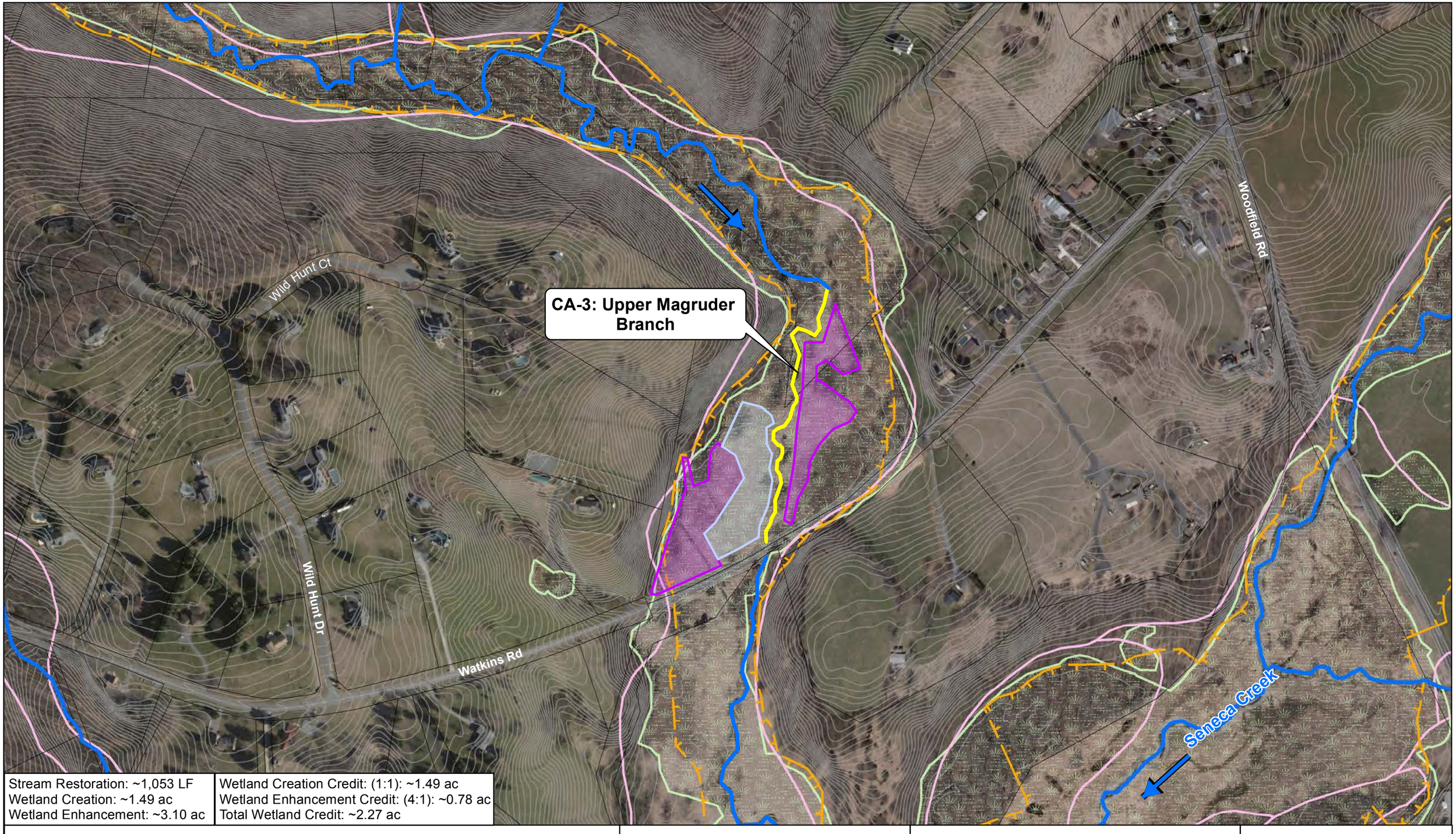
- Stream Restoration – Approximately 1,053 linear feet
- Wetland Creation – Approximately 1.49 acres (~1.49 acres credit)
- Wetland Enhancement – Approximately 3.10 acres (~ 0.78 acres credit)

Restoration Objectives

- Bed & bank stabilization
- Floodplain reconnection
- Instream habitat improvements
- Wetland creation & enhancement
- Floodplain reforestation
- Invasive species treatment

Restoration Concept

- Restore floodplain connection by relocating the channel, raising the stream bed, and/or excavating floodplain to provide more-frequent floodplain access to mitigate damage from erosive flood flows.
- Installation of instream structures to provide channel stability and in-stream habitat
- Floodplain grading to expand existing wetlands and restore groundwater hydrology
- Restore forested floodplain habitat by invasive species treatment and planting native trees and shrubs



Stream Restoration: ~1,053 LF
Wetland Creation: ~1.49 ac
Wetland Enhancement: ~3.10 ac

Wetland Creation Credit: (1:1): ~1.49 ac
Wetland Enhancement Credit: (4:1): ~0.78 ac
Total Wetland Credit: ~2.27 ac

Stream Site
Wetland Creation
Wetland Enhancement
Streams
NWI/DNR Wetlands
FEMA Floodplain
Parcel Boundaries
Hydric Soils
2' Contours

N W E S

0 150 300 450 600 Feet

1 inch = 300 feet

I-495 & I-270 Managed Lanes Study
Phase I Mitigation Design Plan
Wetland/Stream Site CA-3
Upper Magruder Branch

270 495 MANAGED LANES STUDY

CA-5: SENECA CREEK TRIBUTARY

I-495 & I-270 Managed Lanes Study
Stream Mitigation – Seneca Creek Tributary
Site CA-5

Existing Conditions Summary

Location Information

County:	Montgomery
Federal HUC-8 Watershed:	Middle Potomac-Catoctin (02070008)
MDE 8-digit Watershed:	Seneca Creek (02140208)
Coordinates:	39.13030063, --77.25646132
Location:	South of Bradbury Dr. & Suffolk Terrace
Property Ownership:	M-NCPPC

Site Conditions

Parcel Area:	2 parcels - 16.4 & 9.3 Ac
Drainage Area:	0.24 square miles **Stream Use Class:** I
Existing Land Use:	Forested
Adjacent Land Use:	Forested and residential
Constraints:	Sewer line runs parallel to stream and crosses the stream in a couple locations. Manhole observed in center of channel

CA-5 is a stream restoration site located along a tributary to Seneca Creek, south of Bradbury Drive & Suffolk Terrace. The stream corridor has steep valley walls and a narrow, forested floodplain with adjacent residential development. The reach contains a sewer line that runs parallel to stream and crosses the stream in a couple locations as well as a manhole observed in center of channel. There is a man-made pond along the left bank at the downstream end of the site. The stream is eroding the pond embankment and there are headcuts forming from the stream to the pond. The majority of the reach is highly unstable with 3-6 feet tall vertical eroded banks. There is potential access, requiring minimal tree impacts, along existing sewer line access throughout most of the site. May require clearing some smaller trees and stream crossings. Potential access for the upstream portion is located at Suffolk Terrace.

Summary of Opportunities

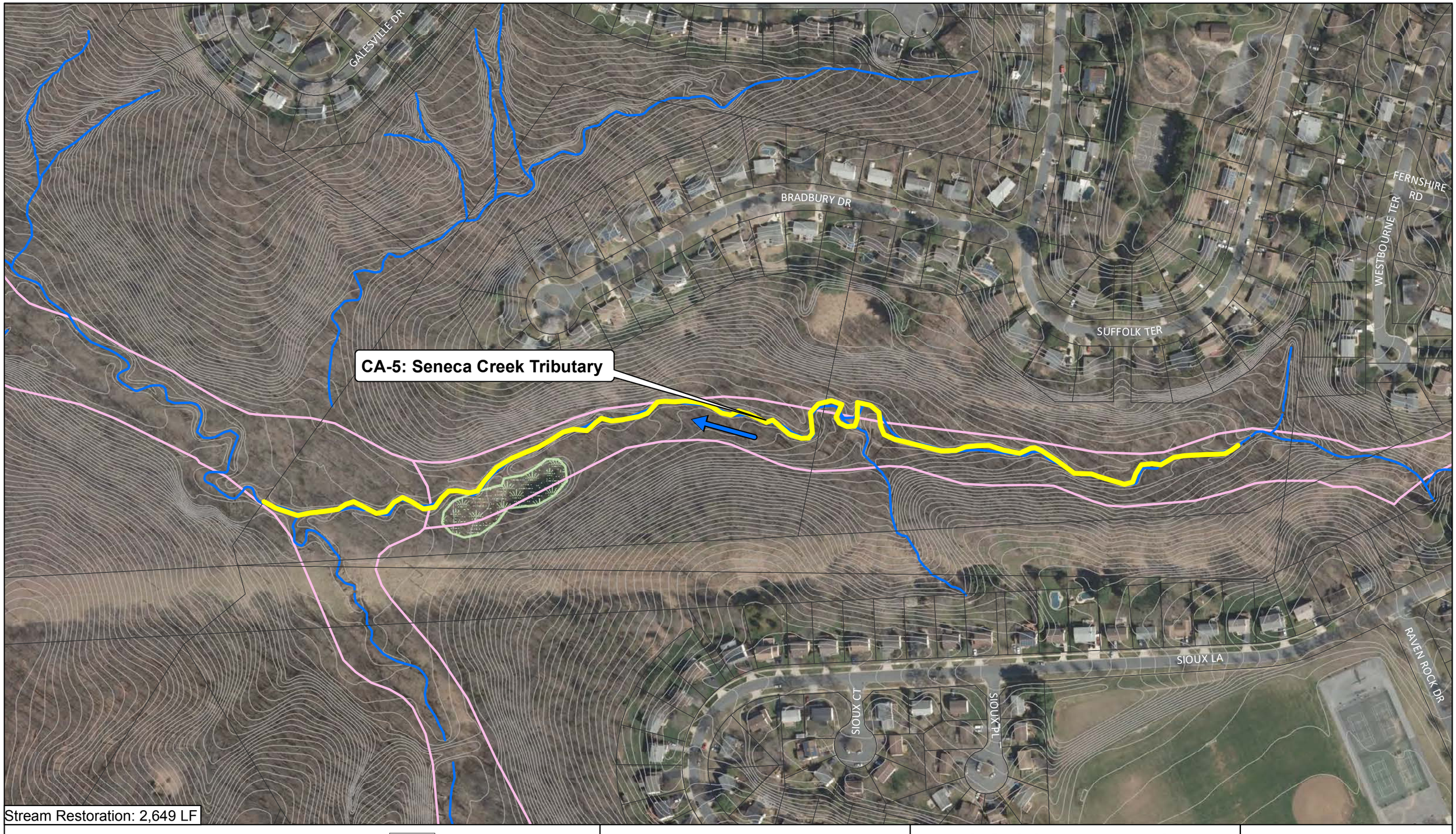
- Stream restoration – Approximately 2,649 linear feet

Restoration Objectives

- Bed & bank stabilization
- Floodplain connection improvements
- In-stream & riparian habitat improvements
- Protection of utilities

Restoration Concept

- Lay back and vegetate vertical banks to improve channel stability, reduce sediment loading, and provide floodplain connection where feasible.
- Install in-stream structures to provide grade control, protect exposed utilities, and enhance habitat
- Improve floodplain connection by raising the stream bed and/or creating floodplain benches to provide more-frequent floodplain access to mitigate damage from erosive flood flows
- Riparian habitat enhancements by invasive species treatment and seeding/planting native species
- Improve planform and profile of existing stream to enhance stream functions



Stream Site
Streams
NWI/DNR Wetlands
Hydric Soils
FEMA Floodplain
2' Contours
Parcel Boundaries

N
W
E
S

0 100 200 300 400 feet

1 inch = 200 feet

I-495 & I-270 Managed Lanes Study
Phase I Mitigation Design Plan
Stream Site CA-5
Seneca Creek Tributary

495 270 MANAGED LANES STUDY

PA-1: BACK BRANCH

I-495 & I-270 Managed Lanes Study
Stream Mitigation - Back Branch
Site PA-1

Existing Conditions Summary

Location Information

County:	Prince George's
Federal HUC-8 Watershed:	Patuxent (02060006)
MDE 8-digit Watershed:	Western Branch (02131103)
Coordinates:	38.837228, -76.786687
Location:	West of Brown Station Rd. & Brooke Ln. Intersection
Property Ownership:	PG County DOE, PG County BOE, 2 private landowners

Site Conditions

Parcel Area:	413.4 Ac	**Landfill Name:**	Brown Station Rd. Sanitary Landfill
Drainage Area:	2.67 square miles	**Stream Use Class:**	I
Existing Land Use:	Forest & very low density residential		
Adjacent Land Use:	Agriculture & educational		
Constraints:	Sewer line in floodplain & Forest Conservation Easements		

PA-1 is a stream restoration site located along Back Branch, just west of the intersection of Brown Station Road and Brooke Lane. The site consists of an incised channel surrounded by a mid-successional forest with several scattered forest conservation easements. The majority of the reach is highly unstable with torturous meanders and moderate to severe erosion along 3-5 foot tall vertical banks. Portions of the northern floodplain have been filled in the past by landfill operations. The stream appears to be disconnected from the floodplain with no evidence of out-of-bank flows and a sewer line runs parallel to the stream in the floodplain. There are potential access entry points from the adjacent landfill roads, however access through the floodplain and to the stream would require tree clearing.

Summary of Opportunities

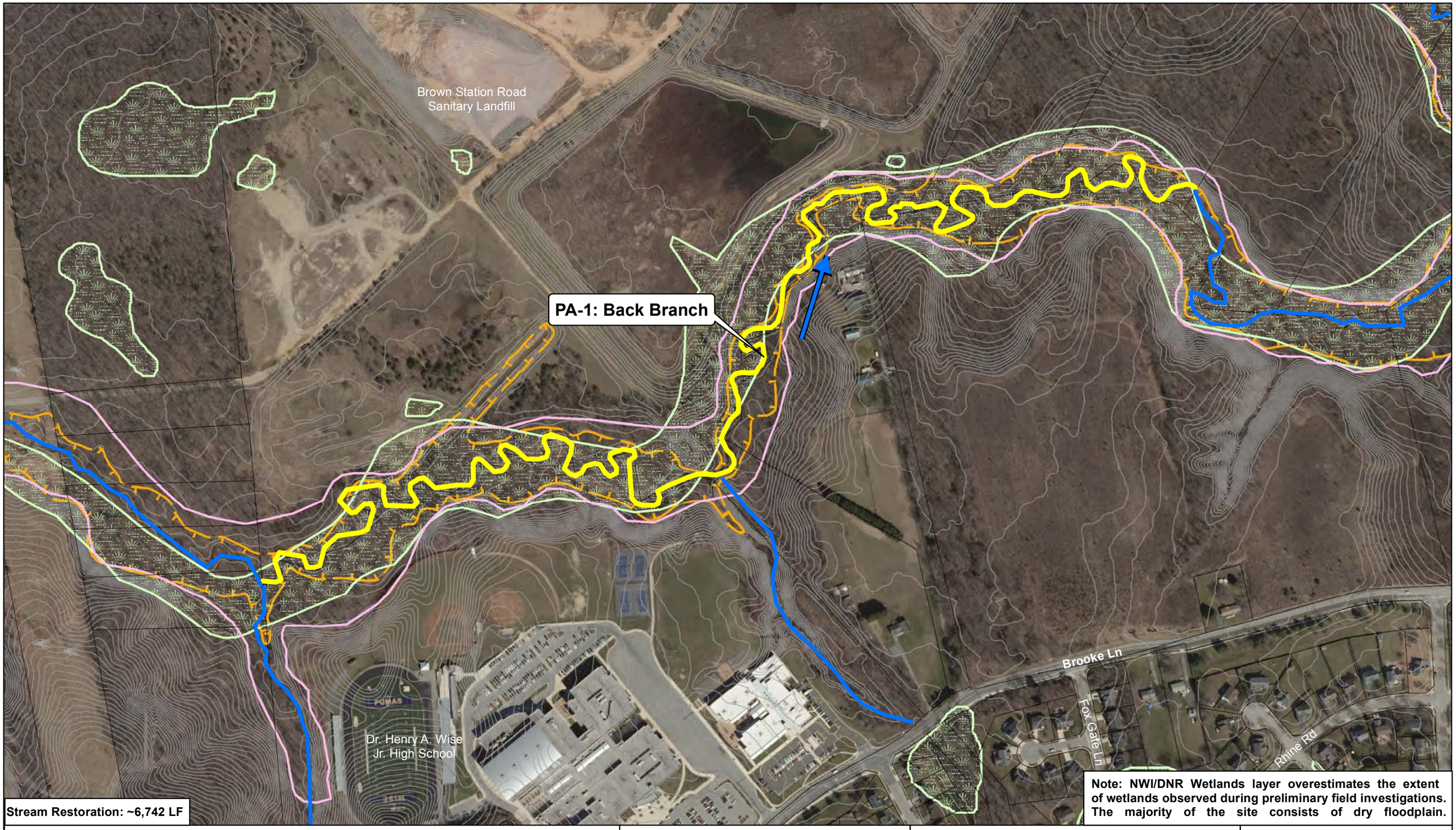
- Stream Restoration – Approximately 6,742 linear feet

Restoration Objectives

- Bed & bank stabilization
- Floodplain connection improvements
- Fish & benthic habitat improvements

Restoration Concept

- Improve floodplain connection by raising the stream bed and/or creating floodplain benches to provide more-frequent floodplain access to mitigate damage from erosive flood flows
- Grade and vegetate vertical banks to reduce erosion and instream sedimentation
- Install instream structures to reduce channel incision and improve fish and benthic habitat
- Improve plan and profile of existing stream to enhance stream functions



Stream Site
Streams
NWI/DNR Wetlands
Hydric Soils
FEMA Floodplain
2' Contours
Parcel Boundaries

N
W
E
S
0 150 300 450 600 Feet
1 inch = 300 feet

I-495 & I-270 Managed Lanes Study
Phase I Mitigation Design Plan
Stream Site PA-1
Back Branch

495 270 MANAGED LANES STUDY

APPENDIX L: PRIVATE PHASE I MITIGATION DESIGN PLANS

RFP-1: INDIAN CREEK & TRIBUTARIES AT KONTERRA

SUMMARY

Location Information

Project:	Indian Creek and Tributaries at Konterra Wetland and Stream Mitigation
County:	Prince George's
Federal HUC-8 Watershed:	Middle Potomac-Anacostia-Occoquan Watershed (02060010)
MDE 8-digit Watershed:	Anacostia River (02140205)
Coordinates:	39°5'5"N 76°54'37"W
Location:	Interstate 95 and Inter County Connector, Route 200 (ICC)
Property Ownership:	Konterra Associates, LLC

Site Conditions

Parcel Area:	1,419 acres
Stream Use Class:	I
Drainage Area:	1,155 acres
Existing Land Use:	Former sand and gravel mining
Adjacent Land Use:	Residential and Commercial

The Konterra site is a former sand and gravel mine located at the interchange of Interstate 95 and the Intercounty Connector (ICC). Most of the natural geomorphic conditions and materials have been altered or removed from the previous mining activities. The wetland mitigation will include extensive work to create and enhance an existing wetland network that has established within abandoned settling ponds. The stream restoration designs will establish a stable cross section, planform, and profile and re-establish a floodplain connection. Geomorphic structures will be utilized to provide grade control and energy dissipation. In addition, a robust native revegetation plan and incorporation of woody material will be developed and implemented to provide long-term vegetative stability and habitat enhancement for terrestrial and aquatic organisms.

Summary of Opportunities

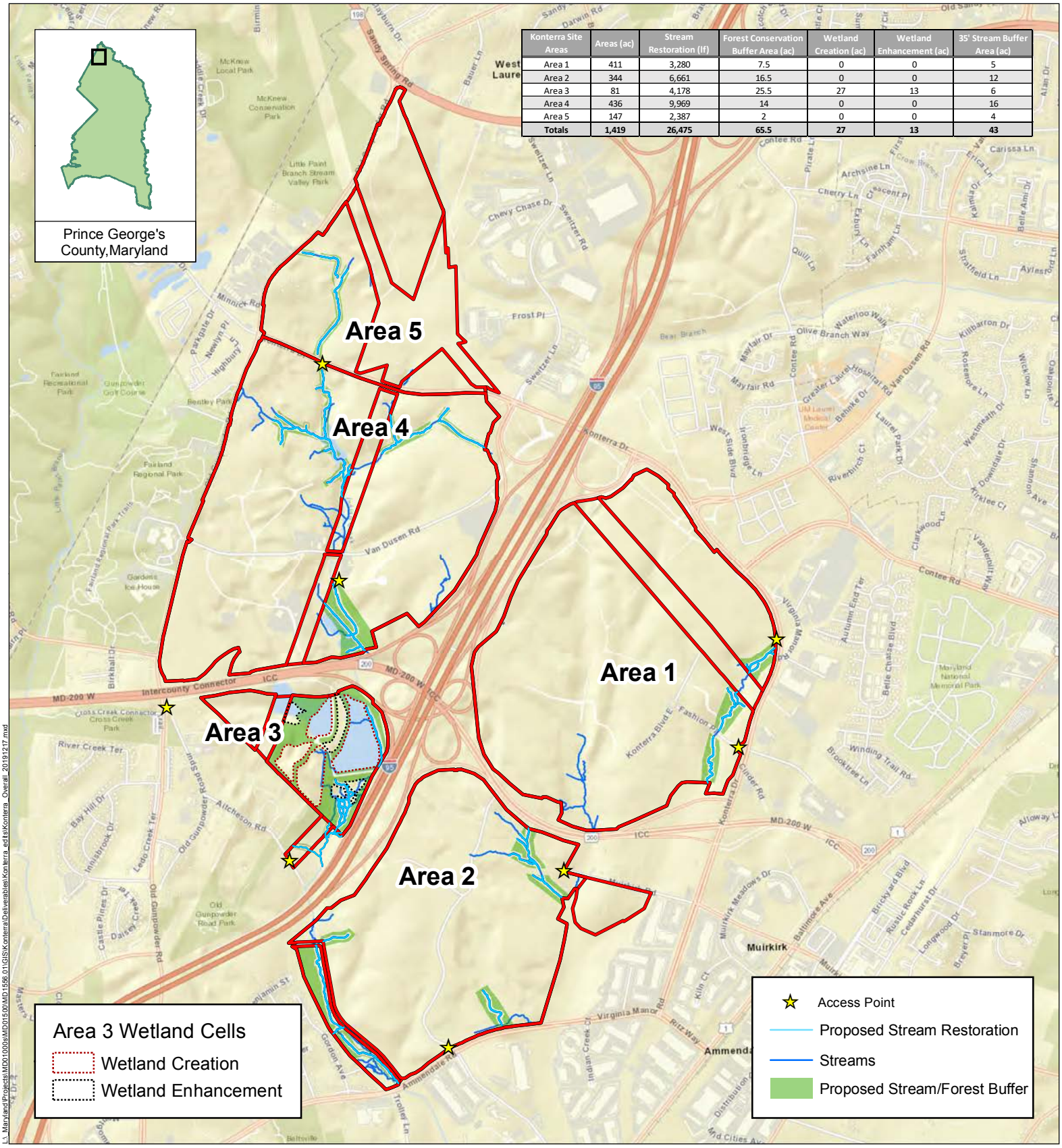
- Stream Restoration: 26,475 linear feet
- Wetland Restoration: 27 ac creation, 6.5 ac enhancement, and 10.5 ac buffer enhancement

Restoration Objectives

- Bed and bank stabilization
- Floodplain reconnection
- In-stream and riparian habitat improvements
- Invasive species control
- Improve hydrologic and ecologic function of wetlands

Restoration Concept

- Create and enhance wetlands with tiered wetland system connected by weirs and streams
- Improve floodplain reconnection raising the channel and creating floodplain benches
- Install instream structures to reduce erosion and create a stable cross section, pattern, and profile
- Establish a forested riparian buffer with invasive species control and seeding/planting native species



Konterra Site Areas	Areas (ac)	Stream Restoration (lf)	Forest Conservation Buffer Area (ac)	Wetland Creation (ac)	Wetland Enhancement (ac)	35' Stream Buffer Area (ac)
Area 1	411	3,280	7.5	0	0	5
Area 2	344	6,661	16.5	0	0	12
Area 3	81	4,178	25.5	27	13	6
Area 4	436	9,969	14	0	0	16
Area 5	147	2,387	2	0	0	4
Totals	**1,419**	**26,475**	**65.5**	**27**	**13**	**43**

Konterra Site: ± 1,419 acres

Project Overview Map
Indian Creek Tributaries at
Konterra Wetland and Stream Restoration

NORTH

0 2,000

Feet

Original Scale:
1 " = 2,000 '

Jurisdiction: Prince George's County, MD
MD Congressional District: 05, 04
*Area is based on GIS data, and does not reflect the legal acreage of the site.
Base Source: Prince George's County GIS, ESRI streetmap

Wetland Studies and Solutions, Inc.
a DAVEY company

Exhibit 3

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Project Overview Map
Indian Creek Tributaries at Konterra Wetland and Stream Restoration Area 1

NORTH

0 600

Feet

Original Scale: 1 " = 600 '

- Konterra Site: ± 411 acres
- Forest Conservation Buffer Area: ± 7.5 acres
- 35' Buffer Area: ± 5 acres
- Stream for Restoration: ± 3,280 linear feet
- Access Point

Wetland Studies and Solutions, Inc.
a DAVEY company

Data Source: Prince George's County Digital Data,
Photo Source: DoIT, MD iMAP, Spring 2017.

Exhibit 3a

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Project Overview Map
Indian Creek Tributaries at Konterra Wetland and Stream Restoration Area 2

NORTH

0 600

Feet

Original Scale: 1 " = 600 '

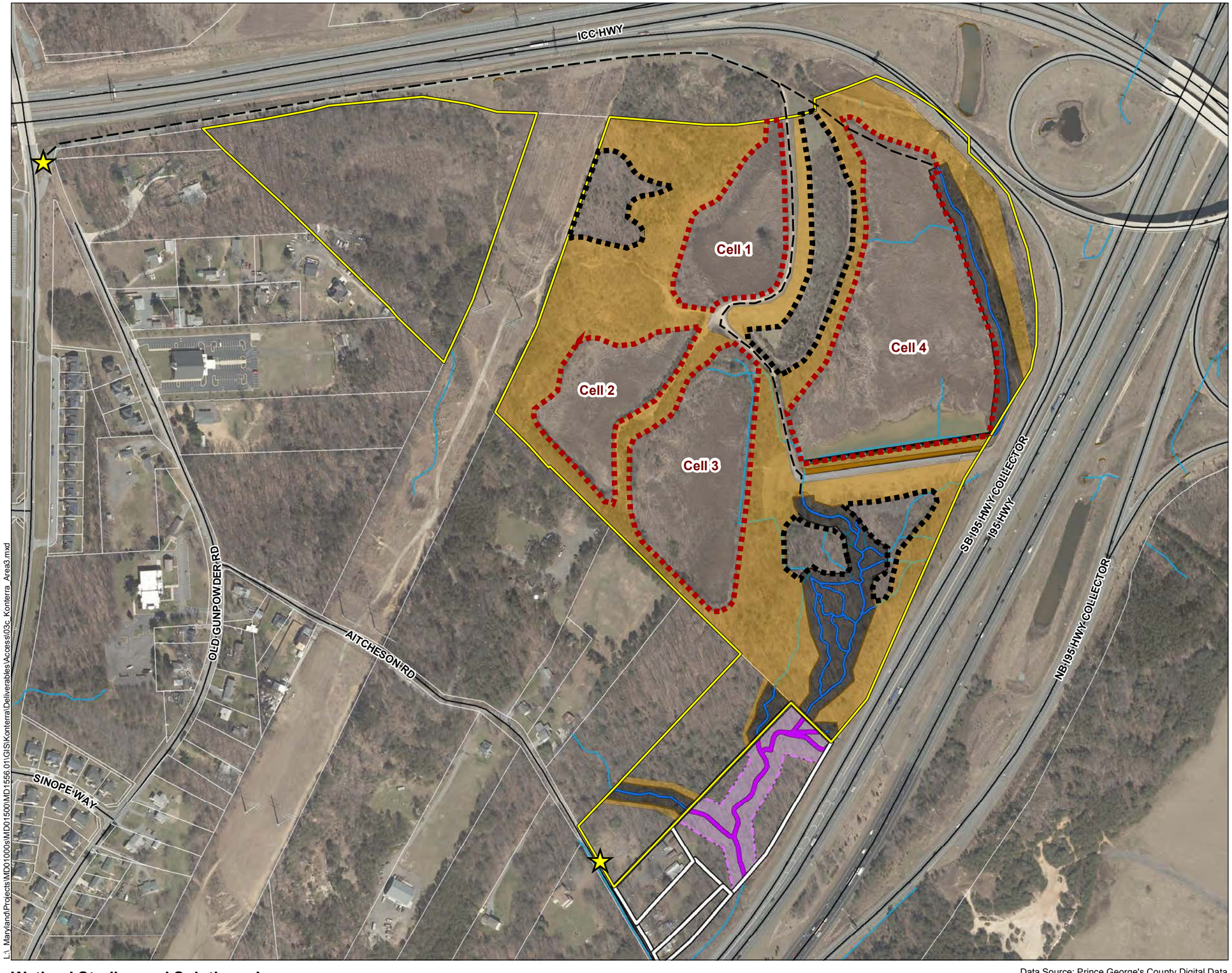
- Konterra Site: ± 344 acres
- Forest Conservation Buffer Area: ± 16.5 acres
- 35' Buffer Area: ± 12 acres
- Stream for Restoration: ± 6,661 linear feet
- SHA Easement Area
- Access Point
- Access Routes

Wetland Studies and Solutions, Inc.
a DAVEY company

Data Source: Prince George's County Digital Data,
Photo Source: DoIT, MD iMAP, Spring 2017.

Exhibit 3b

Project Overview Map
Indian Creek Tributaries at Konterra Wetland and Stream Restoration Area 3



NORTH

0 350

Feet

Original Scale: 1 " = 350 '

- Konterra Site: ± 81 acres
- Forest Conservation Buffer Area: ± 25.5 acres (*see note)
- 35' Buffer Area: ± 6 acres
- Wetland Creation: ± 27 ac.
- Wetland Enhancement: ± 6.5 ac.
- Stream for Restoration: ± 4,178 lf
- Potential Future Stream Restorations: ± 1,313 lf
- Potential Future Stream Restoration Buffer: ± 3 acres
- Downstream Parcels
- Dam
- Dam Removal for Stream Restoration: ± 674 lf
- Access Point
- Access Routes

*Note: Approximately, 10.5 acres of the Forest Conservation Buffer Area within Area 3 will be used for Wetland Buffer Enhancement Credit.

Wetland Studies and Solutions, Inc.
a DAVEY company

Data Source: Prince George's County Digital Data
Photo Source: DoIT, MD iMAP, Spring 2017.

Exhibit 3c

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Project Overview Map
Indian Creek Tributaries at Konterra Wetland and Stream Restoration Area 4

NORTH

0 600

Feet

Original Scale: 1 " = 600 '

- Konterra Site: ± 436 acres
- Forest Conservation Buffer Area: ± 14 acres
- 35' Buffer Area: ± 16 acres
- Stream for Restoration: ± 9,969 linear feet
- Access Point

Wetland Studies and Solutions, Inc.
a DAVEY company

Data Source: Prince George's County Digital Data
Photo Source: DoIT, MD iMAP, Spring 2017.

Exhibit 3d

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Project Overview Map
Indian Creek Tributaries at Konterra Wetland and Stream Restoration Area 5

NORTH

0 600

Feet

Original Scale: 1 " = 600 '

- Konterra Site: ± 147 acres
- Forest Conservation Buffer Area: ± 2 acres
- 35' Buffer Area: ± 4 acres
- Stream for Restoration: ± 2,387 linear feet
- Access Point

Wetland Studies and Solutions, Inc.
a DAVEY company

Data Source: Prince George's County Digital Data
Photo Source: DoIT, MD iMAP, Spring 2017.

Exhibit 3e

RFP-2: CABIN BRANCH

I-495 & I-270 Managed Lanes Study
Cabin Branch Stream and Wetland Mitigation
RES (HGS, LLC)

Existing Conditions Summary

Location Information
County: Montgomery
Federal HUC-8 Watershed: Middle Potomac-Catoctin (02070008)
MDE 8-digit Watershed: Seneca Creek (02140208)
Coordinates: 39.1789, -77.2042
Location: 19550 Montgomery Village Avenue, Montgomery Village, MD 20886
Property Ownership: Private

Site Conditions
Project Area: 36.3 acres
Drainage Area: 4.4 sq miles
Existing Land Use: Open/Historic Golf Course
Constraints: None
Stream Use Class: I-P
Adjacent Land Use: Residential/Open

The Cabin Branch restoration project will restore approximately 6,700 linear feet of Cabin Branch and associated tributaries. In addition, the project will create approximately 4.6 acres of floodplain wetland and associated wetland/stream buffer enhancement. The site is located on a former golf course located off Montgomery Village Avenue. The adjacent land use is primarily open and presents optimal site access with minimal tree impacts required to complete the proposed restoration.

Impacts associated with the historic golf course has directly led to channel modifications and impairments. The presence of channelization, unnatural historic floodplain grading, stream incision, bank armoring, channel blockages, and resultant stream/floodplain perturbation is evident throughout the proposed project area. These impairments are illustrated by multiple non-functioning ecological categories that will be restored or enhanced by the proposed project. Overall the project goals are to establish a functioning stream/wetland/riparian interaction in an urban setting by remediation of adjacent land use impacts and establishment of functioning floodplain connectivity.

Summary of Opportunities

- Stream Restoration: Approximately 6,680 Linear Feet
- Wetland Restoration: Approximately 4.61 Acres
- Wetland Buffer Enhancement: Approximately 3.01 Acres
- Stream Riparian Buffer Enhancement: Approximately 36.3 Acres

Restoration Objectives

- Bed and Bank Stabilization
- Floodplain Reconnection
- In-Stream Habitat (Habitat Structures and Bed Form Diversity)
- Ecological Uplift (4 Functional Categories)
- Wetland Creation

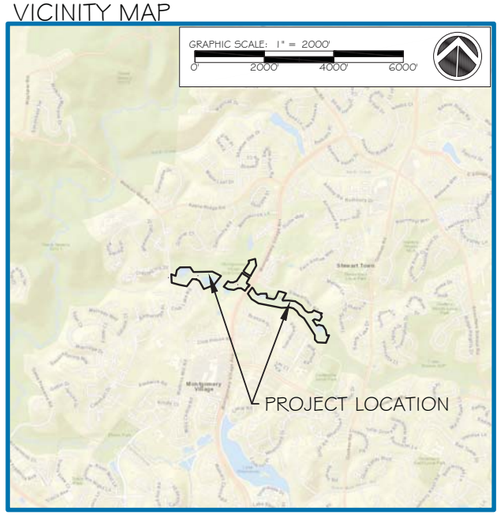
Restoration Concept

- Natural Channel Design and Wetland Restoration
- Combination of raising channel profile for restored floodplain connectivity and excavating banks to establish new floodplain function. Practical location of Priority II Restoration may include transitions to Priority I activities where Project constraints limit the application of Priority I.
- Enhance hydraulic functions (floodplain connectivity, hydraulic stability, and sediment transport) and improve geomorphic functions throughout the entire reach.
- Placement of various instream structures (i.e. Constructed Riffles, Toe Wood, J-Hooks, Log Vanes, Cross Vanes) to address bank erosion, provide vertical bed stabilization, increase bedform diversity and supplement corresponding hydraulic and habitat properties.
- Establishment of stable hydraulic geometry (dimension, pattern and profile) throughout the entire restoration reach.
- Wetland creation through conversion of existing amenity ponds to floodplain wetlands.

CABIN BRANCH PHASE I MITIGATION PLAN

MONTGOMERY COUNTY, MARYLAND

VICINITY MAP



LOCATION MAP

LATITUDE: N 39° 10' 43"
LONGITUDE: W 77° 12' 08"

PROJECT OVERVIEW

SHEET INDEX:

1 - COVER SHEET
2 - CABIN BRANCH, TRIB 1 & TRIB 2
3 - CABIN BRANCH & TRIB 3
4&5 - STANDARD DETAILS SHEET

FEMA FIRMETTE

REFERENCE FEMA MAP: 24031C0187D

JOB NUMBER: 0456

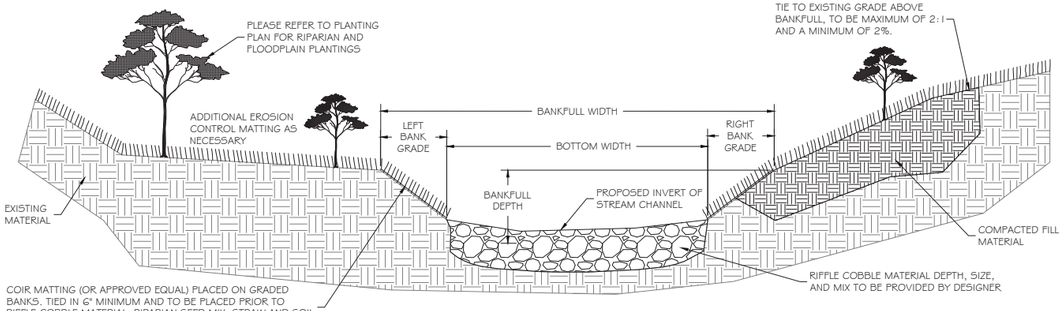
CABIN BRANCH PHASE I MITIGATION PLAN

PROJECT STATUS	
DATE	DESCRIPTION
7/15/2019	CONCEPT PLAN

CABIN BRANCH PHASE I MITIGATION PLAN

PROJECT MANAGER: RC	JOB NUMBER: 0456
DESIGNED: KH	DESIGN TYPE: STREAM PLAN
DRAWN: KH	INITIAL PLAN DATE: 7/15/2019

res
CORPORATE | 5367 TELEPHONE ROAD, WARRENTON, VIRGINIA 20187
P: 703.393.4844 | F: 703.393.2934
WWW.RES.US



RIFFLE CROSS SECTION ORIENTATION LOOKING DOWNSTREAM

NOT TO SCALE

GRAPHIC SCALE: 1" = 150'

0 150' 300' 450'

LEGEND:

- EX. PROPERTY LINE
- EX. PROPERTY ADJACENT
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. EDGE OF PAVEMENT
- EX. ROAD CENTERLINE
- OHU — EX. OVERHEAD UTILITY
- OHE — EX. OVERHEAD ELECTRIC
- SAN — EX. SANITARY SEWER
- EX. STORM UTILITY
- GAS — GAS — EX. GAS
- EX. BUILDING
- EX. CURB
- EX. 100 YR WSE
- EX. FLOODPLAIN
- EX. STREAM CENTERLINE
- EX. POND
- EX. STREAM
- EX. WETLAND
- PR. EASEMENT
- PR. BOTTOM OF BANK
- PR. BANKFULL
- PR. WETLAND CREATION
- PR. WETLAND BUFFER
- PR. WOOD TOE
- PR. RIFFLE
- PR. ROCK STRUCTURE

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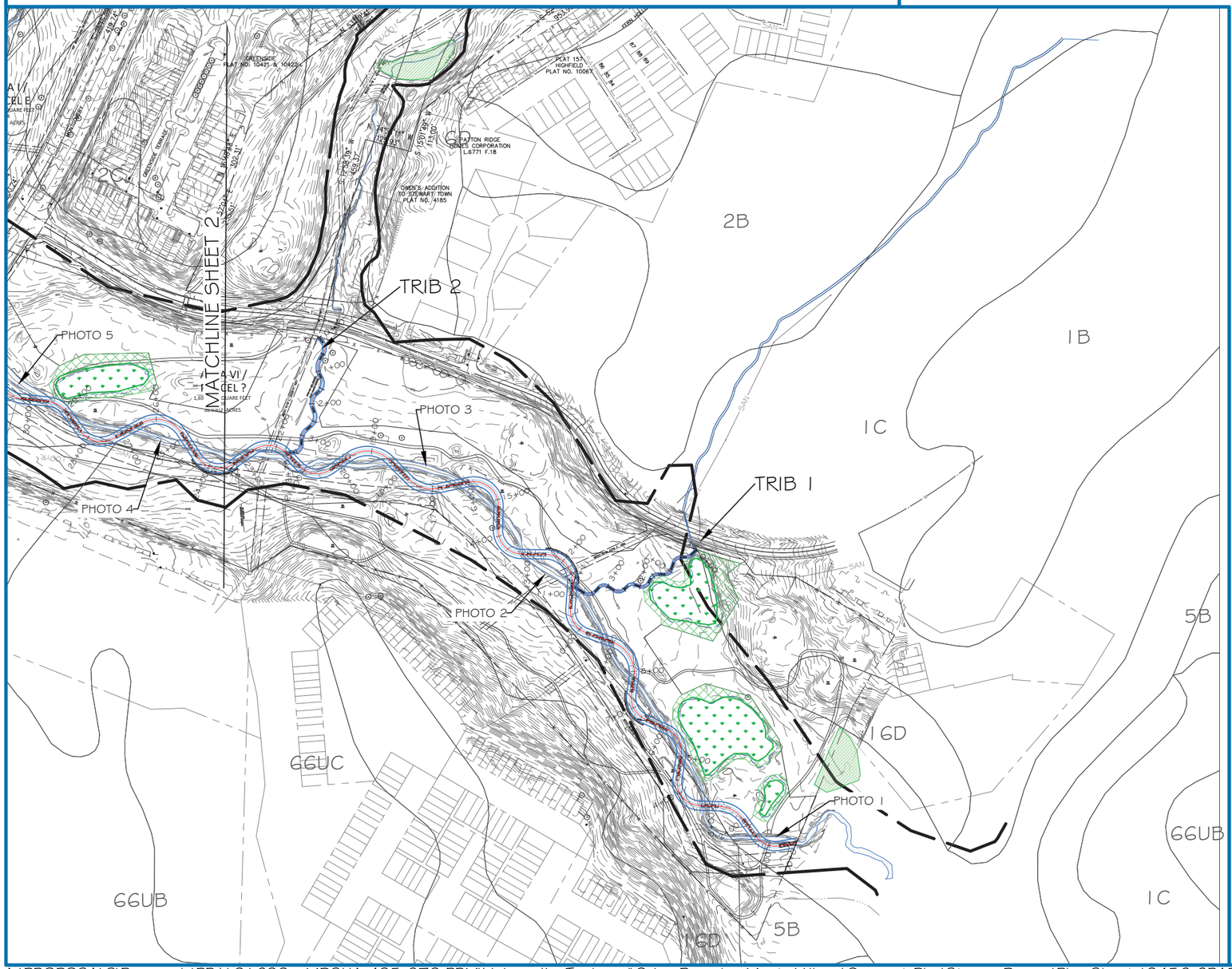


PHOTO LOCATION 1

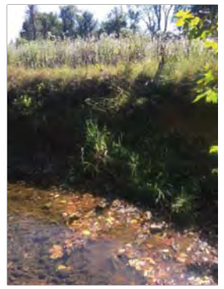


PHOTO LOCATION 2

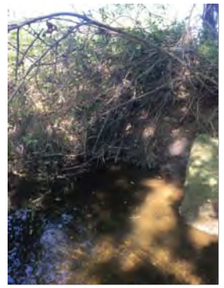


PHOTO LOCATION 3

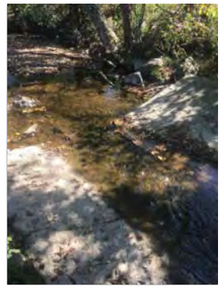


PHOTO LOCATION 4

SOILS LEGEND

MAP UNIT SYMBOL	MAP UNIT NAME	RATING	ACRES IN AOI	PERCENT OF AOI
1B	Baltimore silt loam, 0 to 8 percent slopes	B	22.6	4.1%
1C	Baltimore silt loam, 8 to 15 percent slopes	B	9.6	1.8%
1D	Baltimore silt loam, 15 to 25 percent slopes	B	3.3	0.6%
2B	Chillum silt loam, 0 to 8 percent slopes	B	7	1.3%
2C	Chillum silt loam, 8 to 15 percent slopes	B	8	1.5%
6A	Elkton silt loam, 0 to 2 percent slopes	D	17.6	3.2%
6B	Glenelg silt loam, 2 to 5 percent slopes, very stony	C	0.2	0.0%
16C	Glenville silt loam, 8 to 15 percent slopes	C	1.6	0.3%
16D	Glenville silt loam, 15 to 25 percent slopes	C	0.6	0.1%
5B	Codorus silt loam, 0 to 5 percent slopes	B	2.3	0.4%
66UB	Urban land-Codorus complex, 0 to 5 percent slopes	B/D	22.6	4.1%
66UC	Urban land-Glenville complex, 5 to 15 percent slopes	B	0.2	0.0%
66UD	Urban land-Glenville complex, 15 to 25 percent slopes	B	0.2	0.0%
66UE	Urban land-Glenville complex, 25 to 65 percent slopes	B	0.2	0.0%
66UF	Urban land-Manor complex, 0 to 15 percent slopes	C	0.2	0.0%
66UG	Urban land-Manor complex, 15 to 65 percent slopes	C	0.2	0.0%
W	Water	D	0.2	0.0%
Totals for Area of Interest			551.8	100.0%

NOTES:
1. ALL TOPOGRAPHY, PROPERTY LINES AND OTHER DATA WAS ACQUIRED FROM MONTGOMERY COUNTY DATA.

PROJECT: CABIN BRANCH PHASE I MITIGATION PLAN

CABIN BRANCH AND TRIBUTARY 1 &2

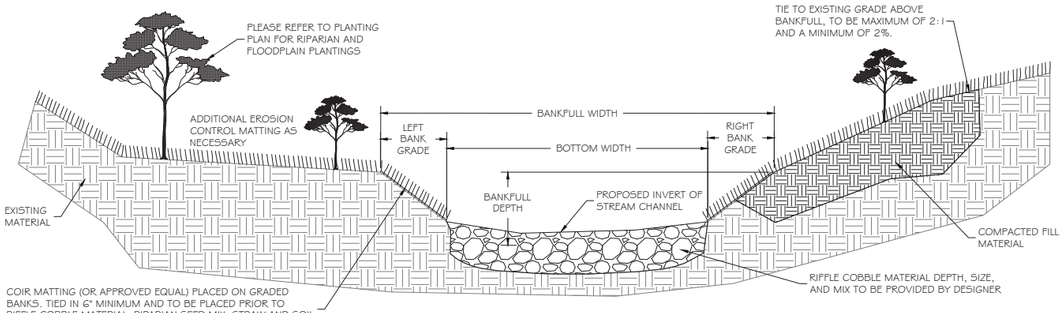
MONTGOMERY COUNTY, MARYLAND

REVISIONS:

1

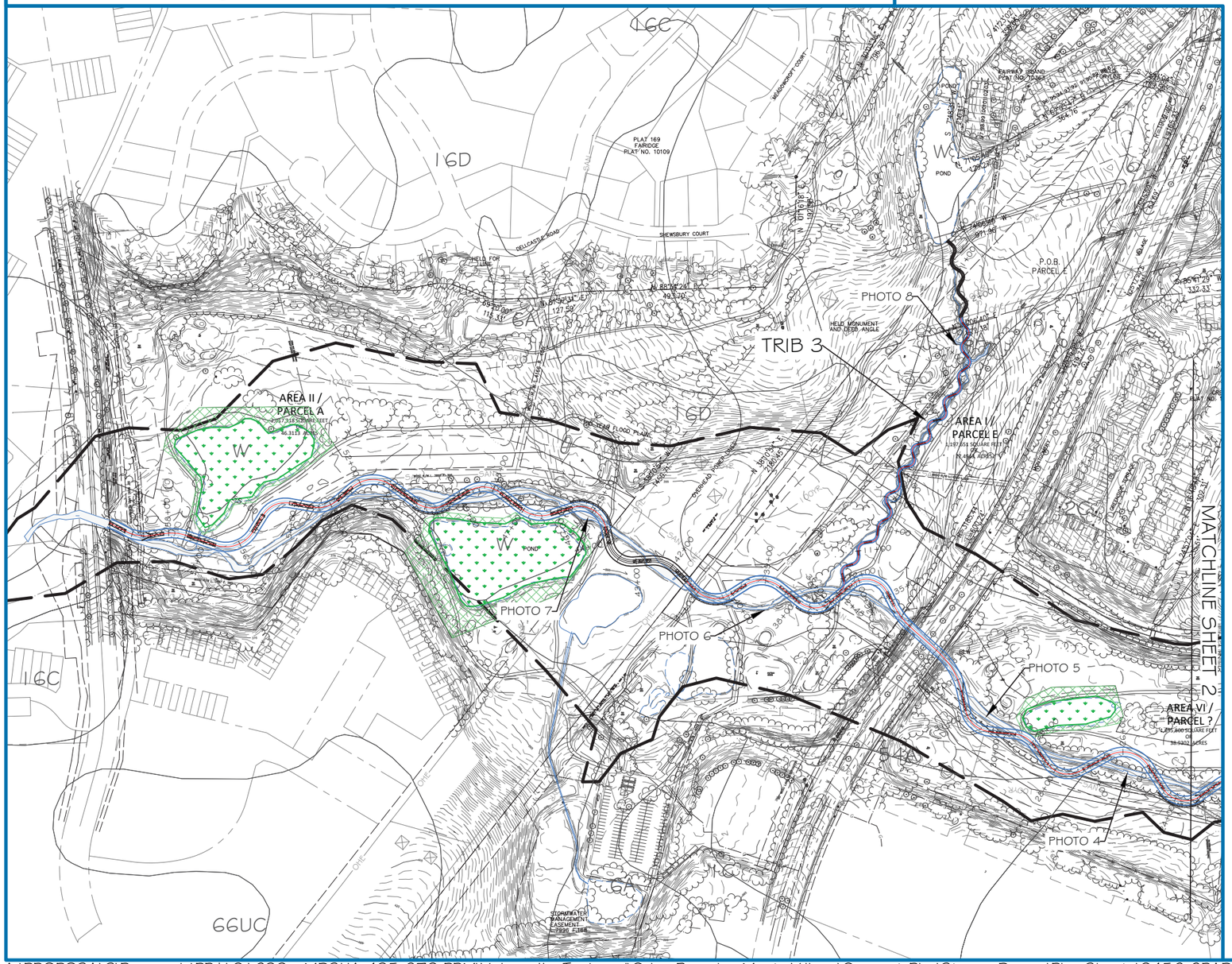
PROJECT STATUS:
7/15/2019 CONCEPT PLAN

PROJECT MANAGER:	RC
DESIGNED:	RC
DRAWN:	KH
JOB NUMBER:	0456
DESIGN TYPE:	CONCEPT PLAN
DATE:	7/15/2019
SHEET NO:	2 OF 5



RIFFLE CROSS SECTION ORIENTATION LOOKING DOWNSTREAM

NOT TO SCALE



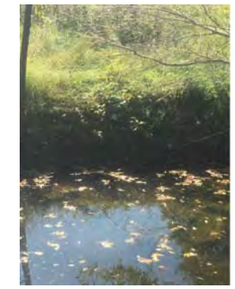


PHOTO LOCATION 5

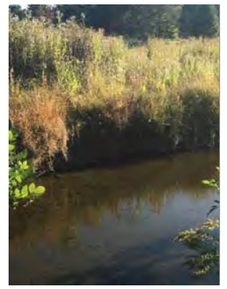


PHOTO LOCATION 6

PHOTO LOCATION 7

PHOTO LOCATION 8

SOILS LEGEND

MAP UNIT SYMBOL	MAP UNIT NAME	RATING	ACRES IN AOI	PERCENT OF AOI
1B	Adelphia loam, 2 to 5 percent slopes	B	25.5	2.1%
1C	Adelphia loam, 5 to 10 percent slopes	B	9.6	0.8%
2B	Codorus loam, 0 to 5 percent slopes	B	60.1	4.9%
2C	Codorus loam, 5 to 10 percent slopes	B	5	0.4%
2D	Codorus loam, 10 to 15 percent slopes	B	1	0.1%
4A	Elkton loam, 0 to 2 percent slopes	D	17.8	1.4%
6B	Glenelg loam, 2 to 5 percent slopes	B	7.6	0.6%
6C	Glenelg loam, 5 to 10 percent slopes	B	23.4	1.9%
6D	Glenelg loam, 10 to 15 percent slopes	B	2.6	0.2%
7B	Hatboro silt loam, 0 to 3 percent slopes	B/D	3.8	0.3%
7C	Codorus silt loam, 3 to 8 percent slopes	B	2.2	0.2%
8A	Manor loam, 0 to 3 percent slopes	B	0.1	0.0%
8B	Manor loam, 3 to 8 percent slopes	B	0.2	0.0%
8C	Manor loam, 8 to 15 percent slopes	B	0.1	0.0%
8D	Manor loam, 15 to 25 percent slopes	B	0.1	0.0%
9A	Mattapex silt loam, 0 to 2 percent slopes, Northern Coastal Plain	B/D	0.1	0.0%
9B	Mattapex silt loam, 2 to 5 percent slopes	B	0.1	0.0%
10A	Matapeake silt loam, 0 to 3 percent slopes	B	0.1	0.0%
10B	Matapeake silt loam, 3 to 8 percent slopes	B	0.1	0.0%
10C	Matapeake silt loam, 8 to 15 percent slopes	B	0.1	0.0%
11A	Mattapex silt loam, 0 to 2 percent slopes, Southern Coastal Plain	B	0.1	0.0%
11B	Mattapex silt loam, 2 to 5 percent slopes, Southern Coastal Plain	B	0.1	0.0%
12A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes	B	0.1	0.0%
12B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes	B	0.1	0.0%
12C	Mattapex and Matapeake silt loams, 5 to 10 percent slopes	B	0.1	0.0%
13A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain	B	0.1	0.0%
13B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain	B	0.1	0.0%
14A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain	B	0.1	0.0%
14B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain	B	0.1	0.0%
15A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
15B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
16A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
16B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
17A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
17B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
18A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
18B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
19A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
19B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
20A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
20B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
21A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
21B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
22A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
22B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
23A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
23B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
24A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
24B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
25A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
25B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
26A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
26B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
27A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
27B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
28A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
28B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
29A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
29B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
30A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
30B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
31A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
31B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
32A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
32B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
33A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
33B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
34A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
34B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
35A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
35B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
36A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
36B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
37A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
37B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
38A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
38B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
39A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
39B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
40A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
40B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
41A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
41B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
42A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
42B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
43A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
43B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
44A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
44B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
45A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
45B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
46A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
46B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
47A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
47B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
48A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
48B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
49A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
49B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
50A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
50B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
51A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
51B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
52A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
52B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
53A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
53B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
54A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
54B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
55A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
55B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
56A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
56B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
57A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
57B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
58A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
58B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
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59B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
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60B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
61A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
61B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
62A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
62B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
63A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
63B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
64A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
64B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
65A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
65B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
66A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
66B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
67A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
67B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
68A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
68B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
69A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
69B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
70A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
70B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
71A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
71B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
72A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
72B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
73A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
73B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
74A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
74B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
75A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
75B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
76A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
76B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
77A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
77B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
78A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
78B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
79A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
79B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
80A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
80B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
81A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
81B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
82A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
82B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
83A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
83B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
84A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
84B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
85A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
85B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
86A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
86B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
87A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
87B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
88A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
88B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
89A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
89B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
90A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
90B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
91A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
91B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
92A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
92B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
93A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
93B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
94A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
94B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
95A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
95B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
96A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
96B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
97A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
97B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
98A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
98B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
99A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
99B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Southern Coastal Plain, Eroded	B	0.1	0.0%
100A	Mattapex and Matapeake silt loams, 0 to 2 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
100B	Mattapex and Matapeake silt loams, 2 to 5 percent slopes, Northern Coastal Plain, Eroded	B	0.1	0.0%
Totals for Area of Interest			1,197.6	100.0%

NOTES:
1. ALL TOPOGRAPHY, PROPERTY LINES AND OTHER DATA WAS ACQUIRED FROM MONTGOMERY COUNTY DATA.

GRAPHIC SCALE: 1" = 150'

0 150' 300' 450'

LEGEND:

- EX. PROPERTY LINE
- EX. PROPERTY ADJACENT
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. EDGE OF PAVEMENT
- EX. ROAD CENTERLINE
- OHU — EX. OVERHEAD UTILITY
- OHE — EX. OVERHEAD ELECTRIC
- SAN — EX. SANITARY SEWER
- EX. STORM UTILITY
- GAS — GAS — EX. GAS
- EX. BUILDING
- EX. CURB
- EX. 100 YR WSE
- EX. FLOODPLAIN
- EX. STREAM CENTERLINE
- EX. POND
- EX. STREAM
- EX. WETLAND
- PR. EASEMENT
- PR. BOTTOM OF BANK
- PR. BANKFULL
- PR. WETLAND CREATION
- PR. WETLAND BUFFER
- PR. WOOD TOE
- PR. RIFFLE
- PR. ROCK STRUCTURE

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PROJECT: CABIN BRANCH PHASE I MITIGATION PLAN

CABIN BRANCH AND TRIBUTARY 3

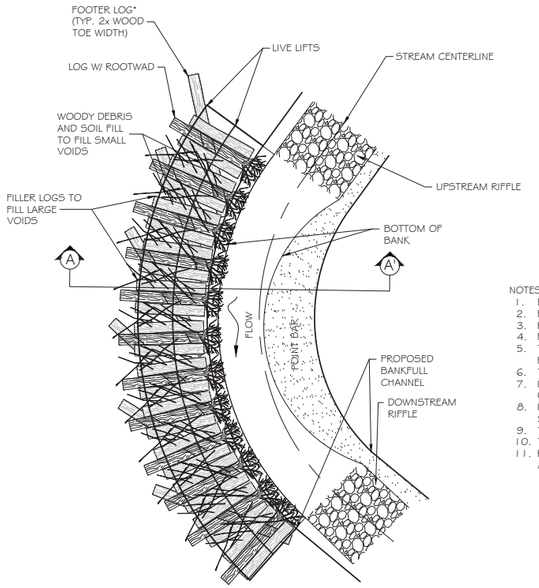
MONTGOMERY COUNTY, MARYLAND

REVISIONS:

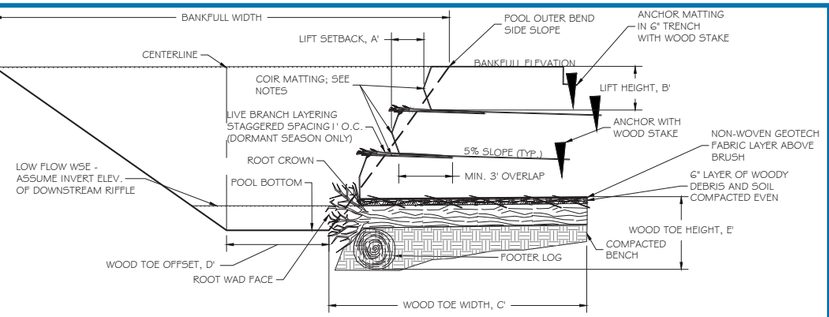
1

PROJECT STATUS:
7/15/2019 CONCEPT PLAN

PROJECT MANAGER:	RC
DESIGNED:	RC
DRAWN:	KH
JOB NUMBER:	0456
DESIGN TYPE:	CONCEPT PLAN
DATE:	7/15/2019
SHEET NO:	3 OF 5



PLAN VIEW
NOT TO SCALE

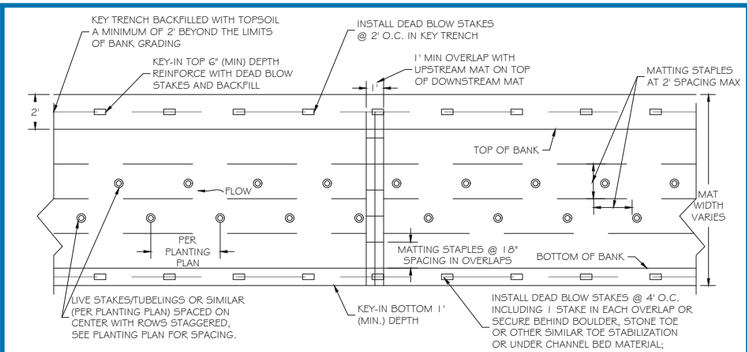


SECTION A - A'
NOT TO SCALE

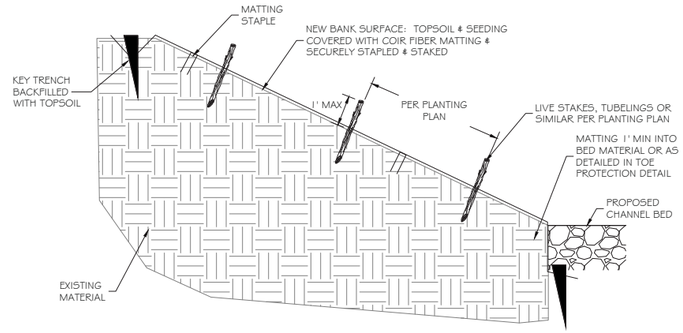
NOTES:
1. BASE OF STRUCTURE SHOULD BE A COMPACTED SOIL BENCH THAT THE TRENCHES FOR EACH LOG CAN BE CUT INTO.
2. FOOTER AND ROOTWAD LOGS SHOULD BE ROUGHLY HALF OF THE WOOD TOE HEIGHT TO ADD UP TO A MINIMUM OF THE VALUE SHOWN IN TABLE.
3. ROOTWADS SHALL BE TOUCHING OR OVERLAPPING SO THAT THERE ARE NO GAPS ALONG THE FACE OF THE REVETMENT.
4. FILLER LOGS SHALL BE ANY SCRAP LOGS NOT USED FOR ROOTWADS AND TIGHTLY FITTED IN TO HOLD THE ROOTWADS IN PLACE. USE WOODY DEBRIS AND SOIL TO FILL SMALLER VOID SPACES.
5. THE WOODY DEBRIS AND SOIL FILL SHALL BE COMPACTED WITH EXCAVATOR BUCKET IN THE VOIDS AROUND THE LOGS AND ON TOP OF THE WOOD TOE LAYER TO PROVIDE AN EVEN SURFACE FOR THE BOTTOM SOIL LIFT.
6. THE SOIL USED FOR LIVE LIFTS SHALL BE FREE OF STICKS, ROOTS, AND ROCKS LARGER THAN GRAVEL. THIS SOIL SHALL CONTAIN NO LESS THAN 50% TOPSOIL.
7. IF ONLY ONE (1) LIFT IS SPECIFIED PER REVETMENT, COIR 700 MAY BE USED AND LIFT SHOULD MATCH CHANNEL GEOMETRY. IF MULTIPLE LIFTS ARE SPECIFIED ALL LIFTS SHALL USE COIR 1000 OR ALTERNATIVE MATERIAL AS APPROVED BY ENGINEER.
8. IF LIFTS ARE COMPLETED DURING GROWING SEASON WHEN LIVE BRANCHES ARE NOT AVAILABLE, USE HIGH DENSITY LIVE STAKING DURING THE FOLLOWING DORMANT SEASON. LIVE BRANCHES SHALL BE OF THE SAME SPECIES SPECIFIED FOR LIVE STAKES OR ALTERNATIVE AS APPROVED BY THE ONSITE ENGINEER. FOLLOW SEEDING AND PLANTING SCHEDULE PROVIDED IN THE PLANS.
9. THE OVERALL SLOPE CREATED BY THE WOOD TOE AND LIVE LIFTS SHALL MATCH THE PROPOSED CROSS SECTION SHAPE FOR THE OUTER BANK OF THE PROPOSED POOL.
10. THE SURFACE SHALL BE FINISHED TO A SMOOTH AND COMPACT SURFACE IN ACCORDANCE WITH THE ELEVATIONS, GRADES, AND/OR CROSS-SECTIONS SHOWN IN THE PLANS.
11. REDRESSING OF CHANNEL, BENCHES, AND FLOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF THIS STRUCTURE AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION. ADDITIONAL ROOTWADS OR RIPRAP MAY BE USED TO ADDRESS AREAS OF CONCERN FOR EROSION, ESPECIALLY AT THE ENDS OF THIS STRUCTURE.

1 WOOD TOE REVETMENT
NOT TO SCALE

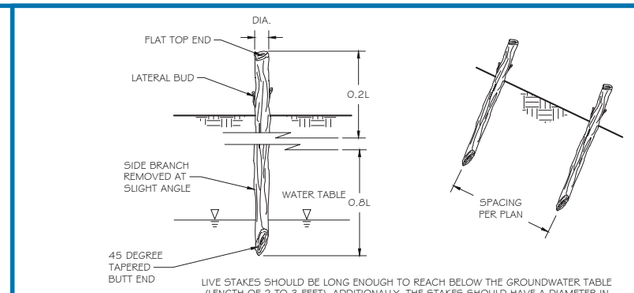
^ OFFSET FROM THE CENTERLINE APPLIES ONLY AT THE DMAX/MIDPOINT OF THE POOL. WOOD TOE REVETMENT SHOULD TRANSITION TO AND FROM THE RIFFLE CROSS-SECTION FROM THAT POINT.



2 COIR FIBER MATTING DETAIL IN-CHANNEL INSTALLATION
NOT TO SCALE

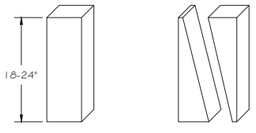


5 COIR FIBER MATTING WITH LIVE STAKES
NOT TO SCALE



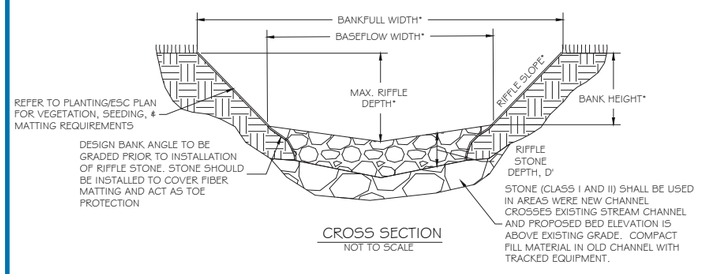
LIVE STAKES SHOULD BE LONG ENOUGH TO REACH BELOW THE GROUNDWATER TABLE (LENGTH OF 2 TO 3 FEET). ADDITIONALLY, THE STAKES SHOULD HAVE A DIAMETER IN THE RANGE OF 0.75 TO 1.5 INCHES.

3 LIVE STAKES
NOT TO SCALE

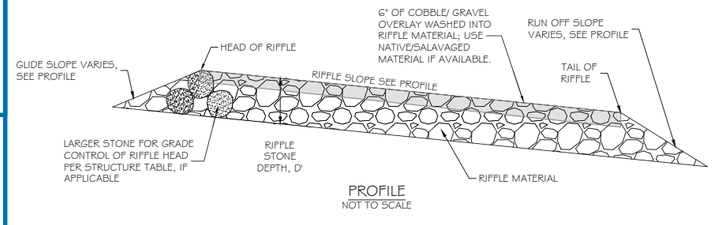


SAW A 2X3 DIAGONALLY TO PRODUCE (2) DEAD BLOW STAKES

4 DEAD BLOW STAKE
NOT TO SCALE



CROSS SECTION
NOT TO SCALE



PROFILE
NOT TO SCALE

STRUCTURE TABLE

	RIFFLE STONE DEPTH, ^	ROCK HEIGHT (A)	ROCK DEPTH (B)	ROCK LENGTH (C)
NA				

SEE FINAL PLAN

RIFFLE MATERIAL

MATERIAL	PERCENT
CLASS I	10%
	20%
VDOT #1	30%
GABION	30%
FINES	10%

6 CONSTRUCTED RIFFLE
NOT TO SCALE

*NOTE: SEE CROSS-SECTION GEOMETRY TABLE FOR CHANNEL DIMENSIONS AND SLOPES.

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PROJECT: CABIN BRANCH PHASE I MITIGATION PLAN

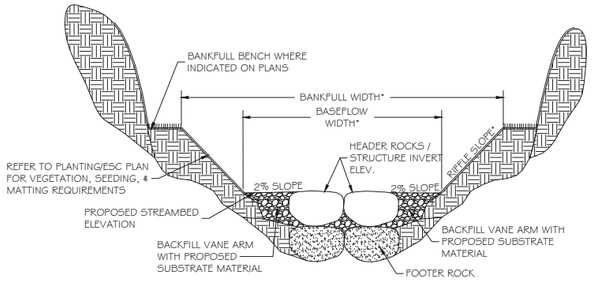
STREAM DETAILS

MONTGOMERY COUNTY, MARYLAND

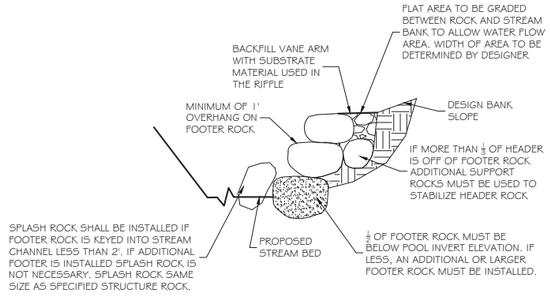
REVISIONS:
1

PROJECT STATUS:
7/15/2019 CONCEPT PLAN

PROJECT MANAGER:	RC
DESIGNED:	RC
DRAWN:	KH
JOB NUMBER:	0456
DESIGN TYPE:	CONCEPT PLAN
DATE:	7/15/2019
SHEET NO:	4 OF 5



SECTION A - A'
NOT TO SCALE



SECTION E - E'
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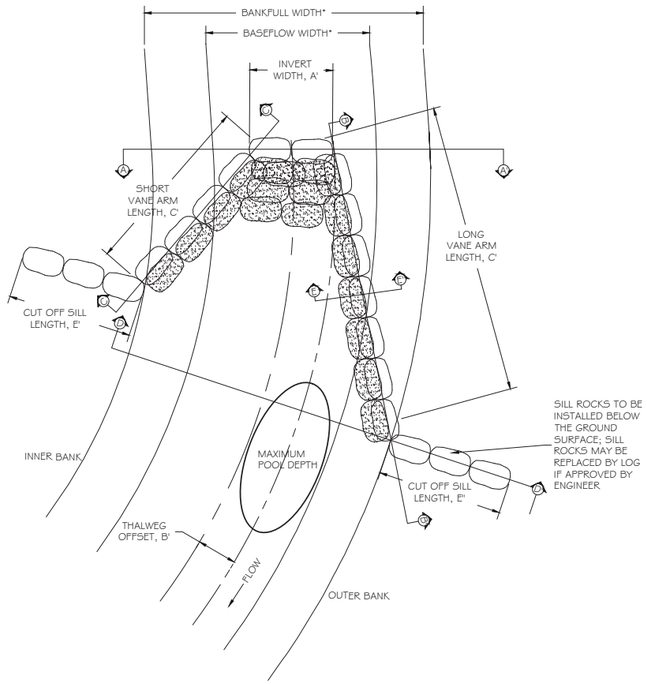
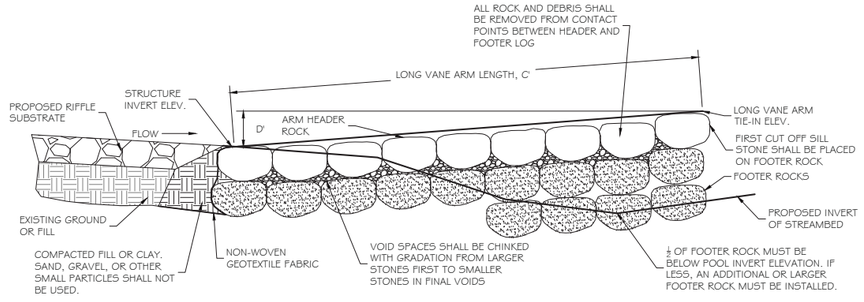
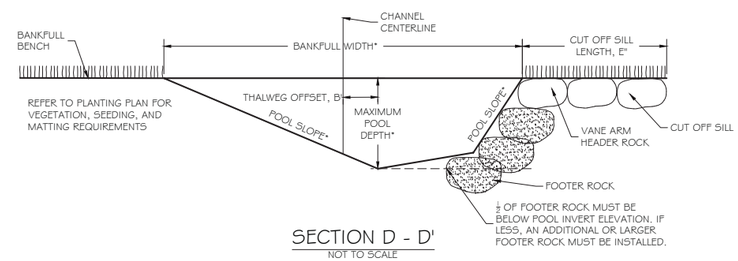


PLAN VIEW
NOT TO SCALE

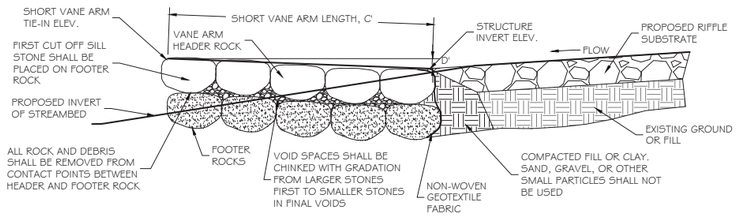


SECTION B - B'
NOT TO SCALE



SECTION D - D'
NOT TO SCALE

*NOTE: SEE CROSS-SECTION GEOMETRY TABLE FOR CHANNEL DIMENSIONS AND SLOPES.



SECTION C - C'
NOT TO SCALE

7 OFFSET CROSS VANE/STEP POOL
NOT TO SCALE

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PROJECT: CABIN BRANCH PHASE I MITIGATION PLAN

STREAM DETAILS

MONTGOMERY COUNTY, MARYLAND

REVISIONS:
1

PROJECT STATUS:
7/15/2019 CONCEPT PLAN

PROJECT MANAGER:	RC
DESIGNED:	RC
DRAWN:	KH
JOB NUMBER:	0456
DESIGN TYPE:	CONCEPT PLAN
DATE:	7/15/2019
SHEET NO:	5 OF 5

RFP-3: TUSCARORA CREEK

Tuscarora Creek Stream and Wetland Mitigation

The Tuscarora Creek project will restore approximately 5,096 linear feet of stream, create approximately 4.88 acres of forested non-tidal wetlands, preserve approximately 1.6 acres of non-tidal forested wetlands, and preserve/enhance approximately 22 acres of non-tidal wetland buffer and riparian habitat. The project is within the Middle Potomac-Catoctin watershed (Federal 8-Digit HUC 02070008) and located at 5515B Mountville Road, Adamstown, MD, 21710. The wetland, stream, and buffer components will be fully integrated to provide the greatest functional uplift while generating compensatory mitigation credits as outlined below.

Tuscarora Creek Proposed Compensatory Mitigation Credit

ACTIVITY	LINEAR FEET (LF)/ACREAGE (AC)	RATIO	CREDITS
Stream Restoration	5,096 LF	1:1	5,096
Wetland Restoration	4.88 AC	1:1	4.88
Wetland Preservation	1.62 AC	10:1	0.16
Wetland Buffer Enhancement	0.31 AC	15:1	0.02
Wetland Buffer Preservation	1.00 AC	20:1	0.05
Total Wetland Credits			5.11
Riparian Buffer	20.52 AC	-	-

The proposed restoration reach currently exhibits incised banks, disconnection from the floodplain, and accelerated bank erosion. There is evidence of channel migration including abandoned oxbows, tortuous meander patterns, active bank erosion, and compromised stream side trees. Concrete and other debris illustrates evidence of historic channel alterations that have further compromised channel stability. In addition, the lower portion of the channel appears to have been straightened which is most likely a result of historic agricultural practices. Tuscarora Creek is classified as a use I-P stream, “Water Contact Recreation, Protection of Aquatic Life, and Public Water Supply” (COMAR 26.08.02.08) and is part of the 303(d) Upper Monocacy River TMDL.

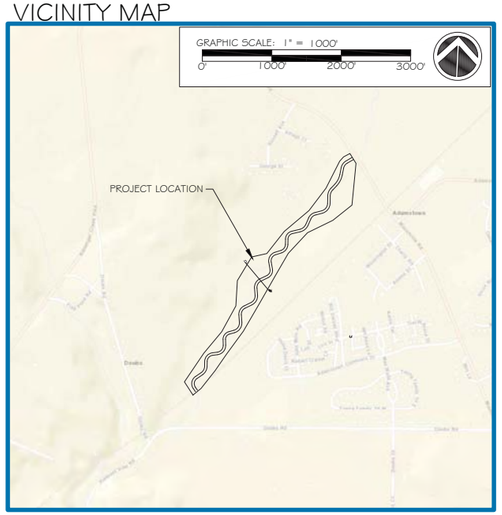
Design objectives include restoration of stream channel hydraulics and geomorphology to create ecological uplift and landscape connectivity along the entire reach of Tuscarora Creek. The current design approach will include Priority I/II restoration that include channel relocation combined with raising the channel profile and excavation of lower floodplain elevations to ensure bank height ratios of ≤ 1.2 and functional dimension and pattern. Another important restoration component is addition of woody material within the channel. This will include installation of wood toe structures to promote channel stability and habitat creation. In addition, log vanes and wood enhanced riffle structures may be used to further promote stabilization, bed form complexity, and enhanced hyporheic exchange that will result in further ecological uplift. The riparian corridor will be reforested and enhanced with native woody species to promote long-term diversity and structure within the project area. While not a specific project objective, the current design approach will result in significant nutrient reductions and other important co-benefits to the site and Upper Monocacy TMDL.

Wetland creation will be achieved through connection with existing wetlands and an increased groundwater table as a result of the proposed stream design. Greater floodplain connection will further enhance wetland hydrology by increasing the likelihood of overbank flows into proposed wetland areas. Wetland elevations will be determined based on a ground water analysis and final stream channel elevations. An important component of wetland creation will be incorporating the abandoned stream after channel relocation. This will provide the opportunity for complex wetland features without significant additional site disturbance. With the integration of wetland, stream, and riparian features, the Tuscarora Creek project will provide compensatory

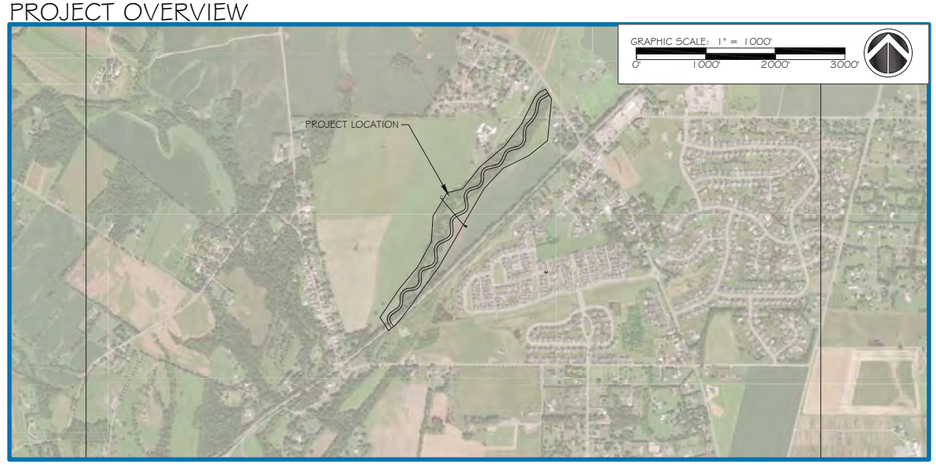
mitigation and significant ecological uplift in support of the Maryland State Highway Administration I-495 & I-270 Managed Lanes Study.

TUSCARORA CREEK PHASE I
MITIGATION PLAN
FREDERICK COUNTY, MARYLAND

VICINITY MAP



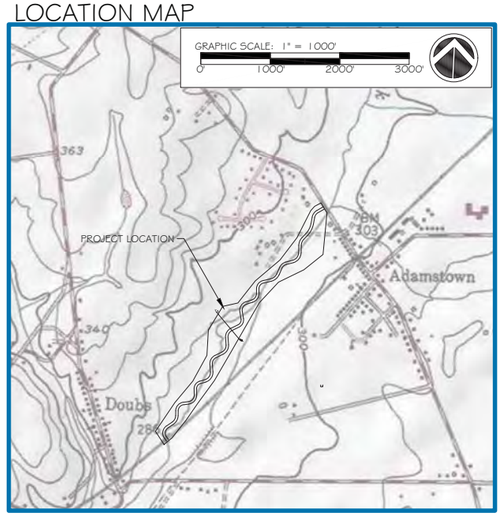
PROJECT OVERVIEW



FEMA FIRMETTE

REFERENCE FEMA MAP: 24021C0430D

LOCATION MAP



LATITUDE: N 39° 18' 19"
LONGITUDE: W 77° 29' 04"

PROJECT SUMMARY

Tuscarora Creek Stream and Wetland Mitigation

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SHEET INDEX:

1 - COVER SHEET
2 - 5 - PROPOSED DESIGN
6 - 9 - STANDARD DETAILS SHEET

An accounting of the proposed stream and wetlands credits from the restoration activities outlined in the Project Summary are detailed in the table below.

PROJECT STATUS	
DATE	DESCRIPTION
2/17/2020	CONCEPT PLAN

TUSCARORA CREEK PHASE I MITIGATION PLAN

PROJECT MANAGER: RC	JOB NUMBER: 102055
DESIGNED: KH	DESIGN TYPE: STREAM PLAN
DRAWN: KH	INITIAL PLAN DATE: 02/17/2020

res

CORPORATE | 5367 TELEPHONE ROAD, WARRENTON, VIRGINIA 20187
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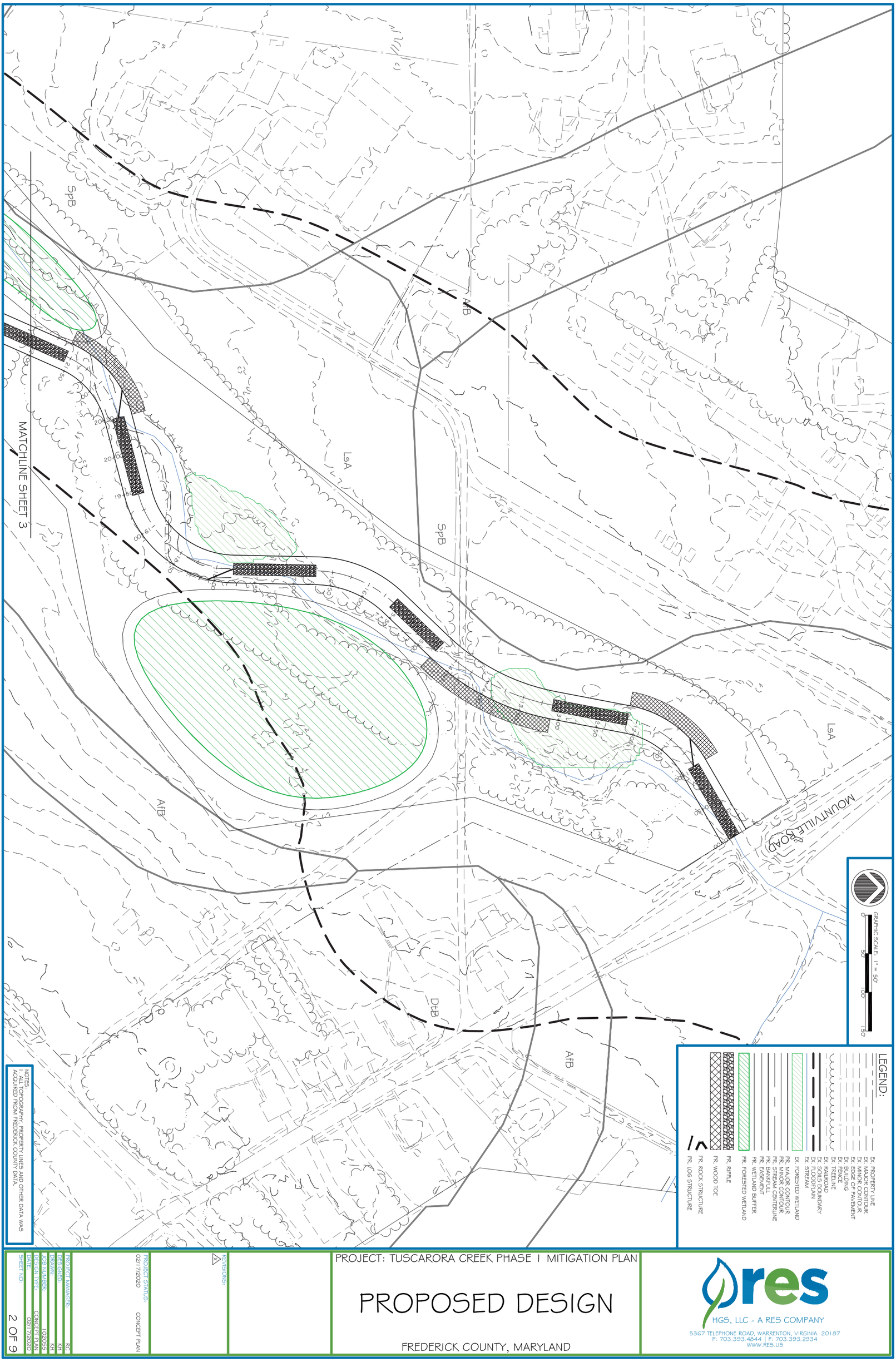
JOB NUMBER: 102055
TUSCARORA CREEK PHASE I MITIGATION PLAN



NOTES:
1. ALL TOPOGRAPHY, PROPERTY LINES AND OTHER DATA WAS ACQUIRED FROM FREDERICK COUNTY DATA.

PROJECT: TUSCARORA CREEK PHASE I MITIGATION PLAN

PROPOSED DESIGN

FREDERICK COUNTY, MARYLAND

PROJECT MANAGER:	KC
DESIGNED:	KM
DRAWN:	KM
JOB NUMBER:	102055
DESIGN TYPE:	CONCEPT PLAN
DATE:	02/17/2020
SHEET NO:	2 OF 9

PROJECT STATUS:
02/17/2020 CONCEPT PLAN

REVISIONS

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A:\Active Jobfiles\102055 MDSHA Tuscarora Creek\Engineering\Graphics\CONCEPT PLAN\Plan Sheets\102055_PR CONDITIONS.dwg, 2/17/2020 1:59:44 PM, khiemstra, 1:1

GRAPHIC SCALE: 1" = 50'
0 50 100 150

MATCHLINE SHEET 2

MATCHLINE SHEET 4

LEGEND:

- EX. PROPERTY LINE
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. EDGE OF PAVEMENT
- EX. BUILDING
- EX. FENCE
- EX. TREELINE
- EX. RAILROAD
- EX. SOILS BOUNDARY
- EX. FLOODPLAIN
- EX. STREAM
- EX. FORESTED WETLAND
- PR. MAJOR CONTOUR
- PR. MINOR CONTOUR
- PR. STREAM CENTERLINE
- PR. BANKFULL
- PR. EASEMENT
- PR. WETLAND BUFFER
- PR. FORESTED WETLAND
- PR. RIFFLE
- PR. WOOD TOE
- PR. ROCK STRUCTURE
- PR. LOG STRUCTURE

NOTES:
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PROJECT: TUSCARORA CREEK PHASE I MITIGATION PLAN

PROPOSED DESIGN

FREDERICK COUNTY, MARYLAND

REVISIONS:
1

PROJECT STATUS:
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PROJECT MANAGER:	RC
DESIGNED:	KH
DRAWN:	KH
JOB NUMBER:	102055
DESIGN TYPE:	CONCEPT PLAN
DATE:	02/17/2020
SHEET NO:	3 OF 9

GRAPHIC SCALE: 1" = 50'
0 50' 100' 150'

LEGEND:

- EX. PROPERTY LINE
- EX. MAJOR CONTOUR
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- EX. EDGE OF PAVEMENT
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- EX. FENCE
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- PR. FORESTED WETLAND
- PR. RIFFLE
- PR. WOOD TOE
- PR. ROCK STRUCTURE
- PR. LOG STRUCTURE

MATCHLINE SHEET 3

MATCHLINE SHEET 5

RaC
BgB
CrB
LsA
AfB
DtB

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PROPOSED DESIGN

PROJECT: TUSCARORA CREEK PHASE I MITIGATION PLAN
FREDERICK COUNTY, MARYLAND

REVISIONS:
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0 50' 100' 150'

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- PR. FORESTED WETLAND
- PR. RIFFLE
- PR. WOOD TOE
- PR. ROCK STRUCTURE
- PR. LOG STRUCTURE

MATCHLINE SHEET 4

BgB
BgB
LsA
KeC
PfB
AfB
DtB
LsA
DtB

NOTES:
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PROJECT: TUSCARORA CREEK PHASE I MITIGATION PLAN

PROPOSED DESIGN

FREDERICK COUNTY, MARYLAND

REVISIONS:
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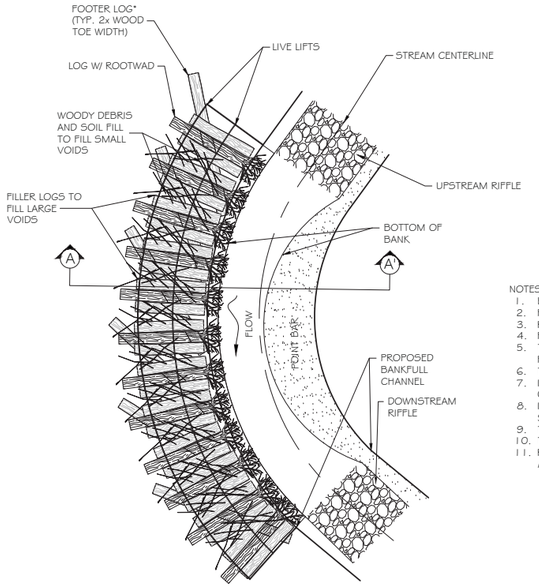
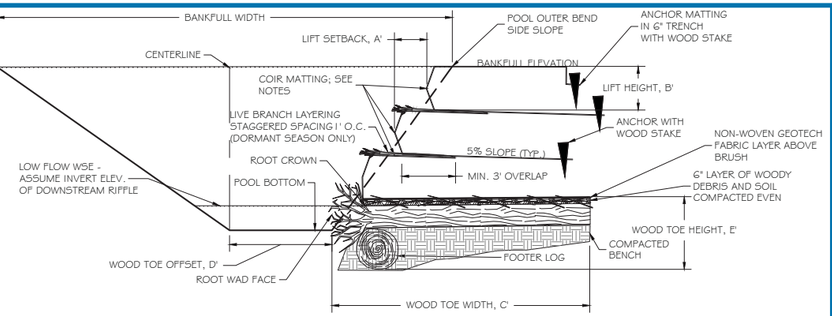
DESIGNED:	KH
DRAWN:	KH
JOB NUMBER:	102055
DESIGN TYPE:	CONCEPT PLAN
DATE:	02/17/2020
SHEET NO:	5 OF 9



PLAN VIEW
NOT TO SCALE

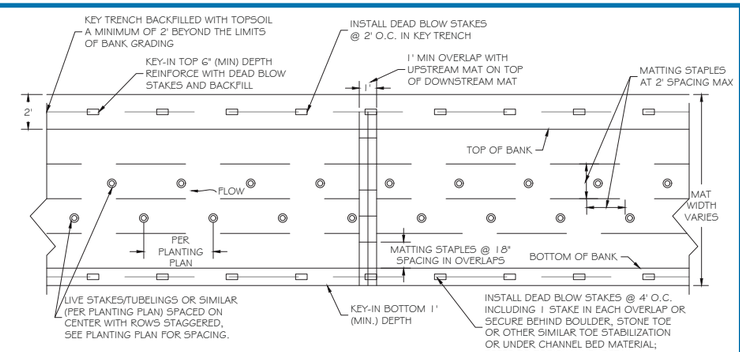


SECTION A - A'
NOT TO SCALE

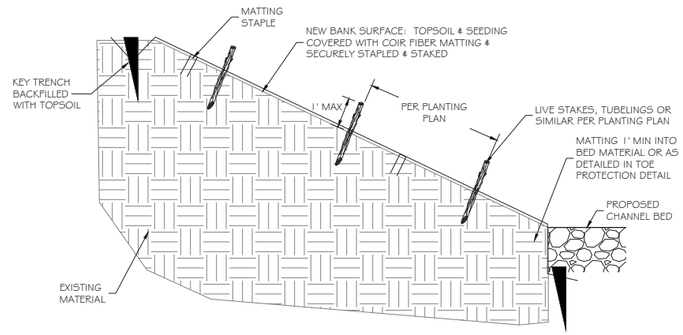
NOTES:
1. BASE OF STRUCTURE SHOULD BE A COMPACTED SOIL BENCH THAT THE TRENCHES FOR EACH LOG CAN BE CUT INTO.
2. FOOTER AND ROOTWAD LOGS SHOULD BE ROUGHLY HALF OF THE WOOD TOE HEIGHT TO ADD UP TO A MINIMUM OF THE VALUE SHOWN IN TABLE.
3. ROOTWADS SHALL BE TOUCHING OR OVERLAPPING SO THAT THERE ARE NO GAPS ALONG THE FACE OF THE REVETMENT.
4. FILLER LOGS SHALL BE ANY SCRAP LOGS NOT USED FOR ROOTWADS AND TIGHTLY FITTED IN TO HOLD THE ROOTWADS IN PLACE. USE WOODY DEBRIS AND SOIL TO FILL SMALLER VOID SPACES.
5. THE WOODY DEBRIS AND SOIL FILL SHALL BE COMPACTED WITH EXCAVATOR BUCKET IN THE VOIDS AROUND THE LOGS AND ON TOP OF THE WOOD TOE LAYER TO PROVIDE AN EVEN SURFACE FOR THE BOTTOM SOIL LIFT.
6. THE SOIL USED FOR LIVE LIFTS SHALL BE FREE OF STICKS, ROOTS, AND ROCKS LARGER THAN GRAVEL. THIS SOIL SHALL CONTAIN NO LESS THAN 50% TOPSOIL.
7. IF ONLY ONE (1) LIFT IS SPECIFIED PER REVETMENT, COIR 700 MAY BE USED AND LIFT SHOULD MATCH CHANNEL GEOMETRY. IF MULTIPLE LIFTS ARE SPECIFIED ALL LIFTS SHALL USE COIR 1000 OR ALTERNATIVE MATERIAL AS APPROVED BY ENGINEER.
8. IF LIFTS ARE COMPLETED DURING GROWING SEASON WHEN LIVE BRANCHES ARE NOT AVAILABLE, USE HIGH DENSITY LIVE STAKING DURING THE FOLLOWING DORMANT SEASON. LIVE BRANCHES SHALL BE OF THE SAME SPECIES SPECIFIED FOR LIVE STAKES OR ALTERNATIVE AS APPROVED BY THE ONSITE ENGINEER. FOLLOW SEEDING AND PLANTING SCHEDULE PROVIDED IN THE PLANS.
9. THE OVERALL SLOPE CREATED BY THE WOOD TOE AND LIVE LIFTS SHALL MATCH THE PROPOSED CROSS SECTION SHAPE FOR THE OUTER BANK OF THE PROPOSED POOL.
10. THE SURFACE SHALL BE FINISHED TO A SMOOTH AND COMPACT SURFACE IN ACCORDANCE WITH THE ELEVATIONS, GRADES, AND/OR CROSS-SECTIONS SHOWN IN THE PLANS.
11. REDRESSING OF CHANNEL, BENCHES, AND FLOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF THIS STRUCTURE AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION. ADDITIONAL ROOTWADS OR RIPRAP MAY BE USED TO ADDRESS AREAS OF CONCERN FOR EROSION, ESPECIALLY AT THE ENDS OF THIS STRUCTURE.

1 WOOD TOE REVETMENT
NOT TO SCALE

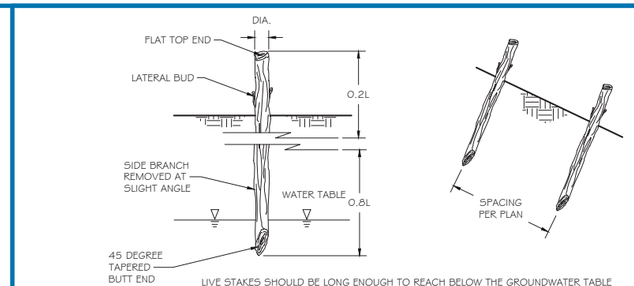
^OFFSET FROM THE CENTERLINE APPLIES ONLY AT THE DMAX/MIDPOINT OF THE POOL. WOOD TOE REVETMENT SHOULD TRANSITION TO AND FROM THE RIFFLE CROSS-SECTION FROM THAT POINT.



2 COIR FIBER MATTING DETAIL IN-CHANNEL INSTALLATION
NOT TO SCALE

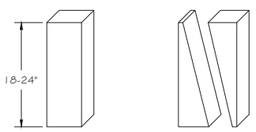


3 COIR FIBER MATTING WITH LIVE STAKES
NOT TO SCALE



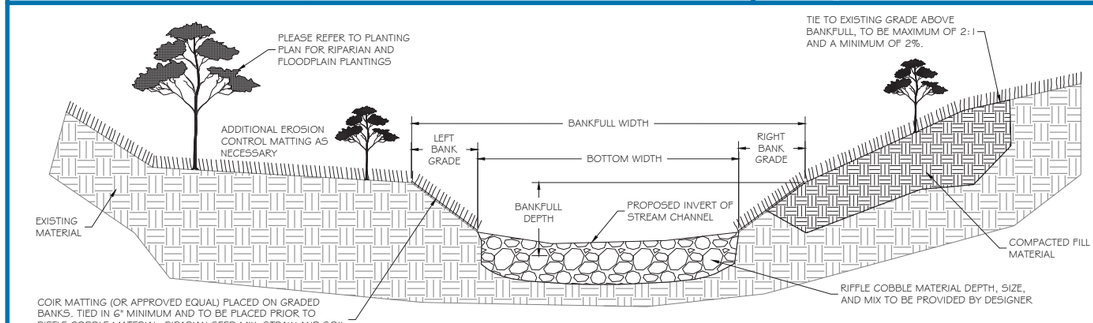
LIVE STAKES SHOULD BE LONG ENOUGH TO REACH BELOW THE GROUNDWATER TABLE (LENGTH OF 2 TO 3 FEET). ADDITIONALLY, THE STAKES SHOULD HAVE A DIAMETER IN THE RANGE OF 0.75 TO 1.5 INCHES.

4 LIVE STAKES
NOT TO SCALE

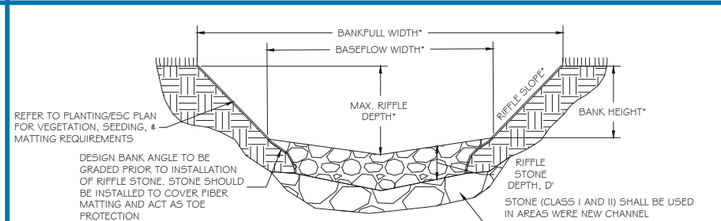


SAW A 2X3 DIAGONALLY TO PRODUCE (2) DEAD BLOW STAKES

5 DEAD BLOW STAKE
NOT TO SCALE



6 RIFFLE CROSS SECTION ORIENTATION LOOKING DOWNSTREAM
NOT TO SCALE



CROSS SECTION
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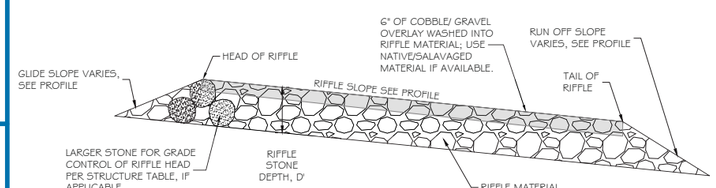

PROFILE
NOT TO SCALE

STRUCTURE TABLE

	RIFFLE STONE DEPTH, D	ROCK HEIGHT (A)	ROCK DEPTH (B)	ROCK LENGTH (C)
NA				

SEE FINAL PLAN

RIFFLE MATERIAL

MATERIAL	PERCENT
CLASS I	10%
3S A1	20%
VDOT #1	30%
GABION	30%
FINES	10%

7 CONSTRUCTED RIFFLE
NOT TO SCALE

*NOTE: SEE CROSS-SECTION GEOMETRY TABLE FOR CHANNEL DIMENSIONS AND SLOPES.

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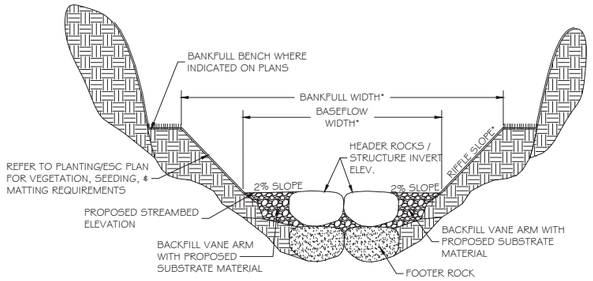
PROJECT: TUSCARORA CREEK PHASE I MITIGATION PLAN

STREAM DETAILS

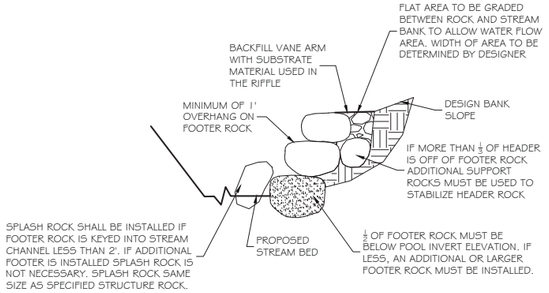
FREDERICK COUNTY, MARYLAND

REVISIONS:
1

PROJECT STATUS:	
02/17/2020	CONCEPT PLAN
PROJECT MANAGER:	RC
DESIGNED:	KH
DRAWN:	KH
JOB NUMBER:	102055
DESIGN TYPE:	CONCEPT PLAN
DATE:	02/17/2020
SHEET NO:	6 OF 9



SECTION A - A'
NOT TO SCALE



SECTION E - E'
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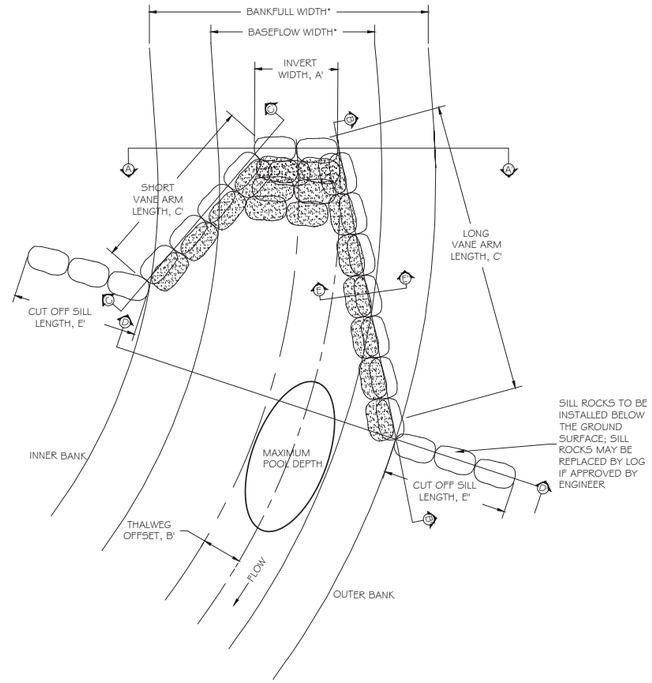
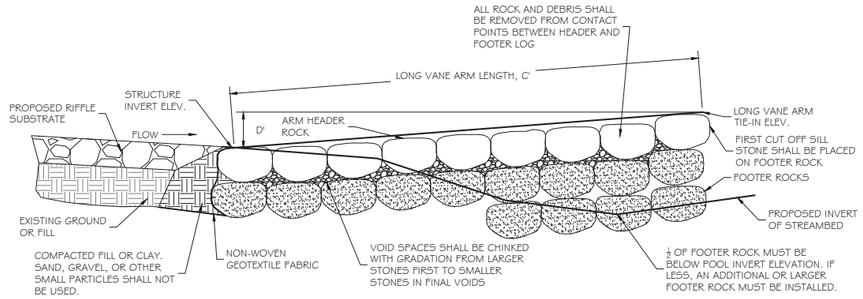


PLAN VIEW
NOT TO SCALE



SECTION B - B'
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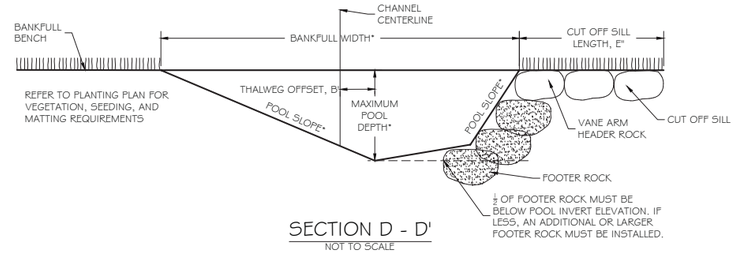
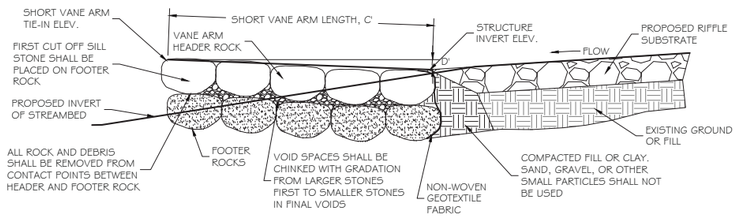


SECTION D - D'
NOT TO SCALE
*NOTE: SEE CROSS-SECTION GEOMETRY TABLE FOR CHANNEL DIMENSIONS AND SLOPES.



SECTION C - C'
NOT TO SCALE

8 OFFSET CROSS VANE/STEP POOL
NOT TO SCALE

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PROJECT: TUSCARORA CREEK PHASE I MITIGATION PLAN

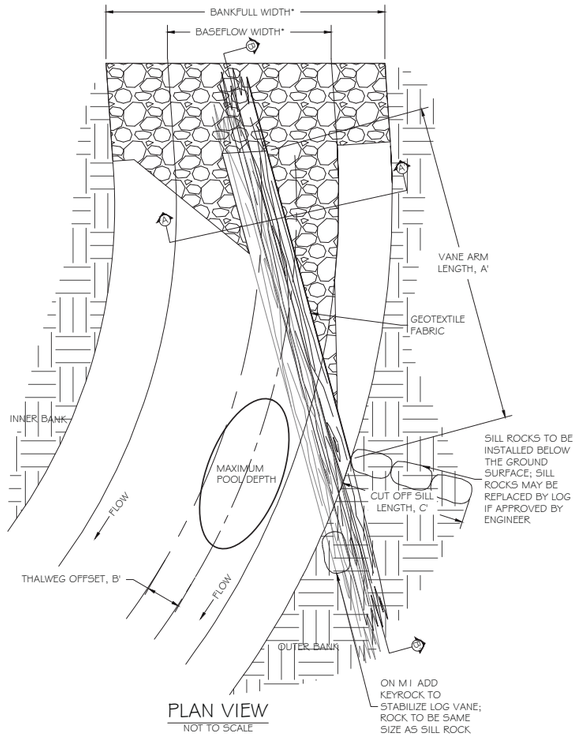
STREAM DETAILS

FREDERICK COUNTY, MARYLAND

REVISIONS:
1

PROJECT STATUS:
02/17/2020 CONCEPT PLAN

PROJECT MANAGER:	RC
DESIGNED:	KH
DRAWN:	KH
JOB NUMBER:	102055
DESIGN TYPE:	CONCEPT PLAN
DATE:	02/17/2020
SHEET NO:	7 OF 9



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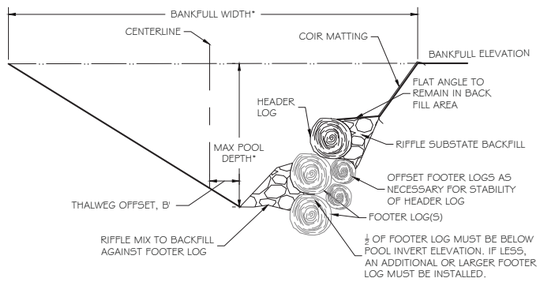

SECTION A - A'
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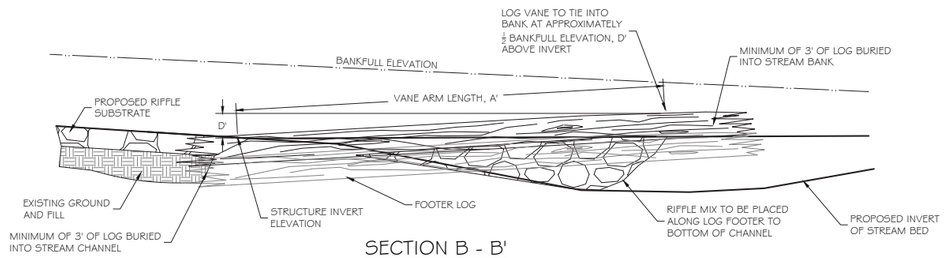

SECTION B - B'
NOT TO SCALE

9 LOG VANE
NOT TO SCALE

*NOTE: SEE CROSS-SECTION GEOMETRY TABLE FOR CHANNEL DIMENSIONS AND SLOPES.

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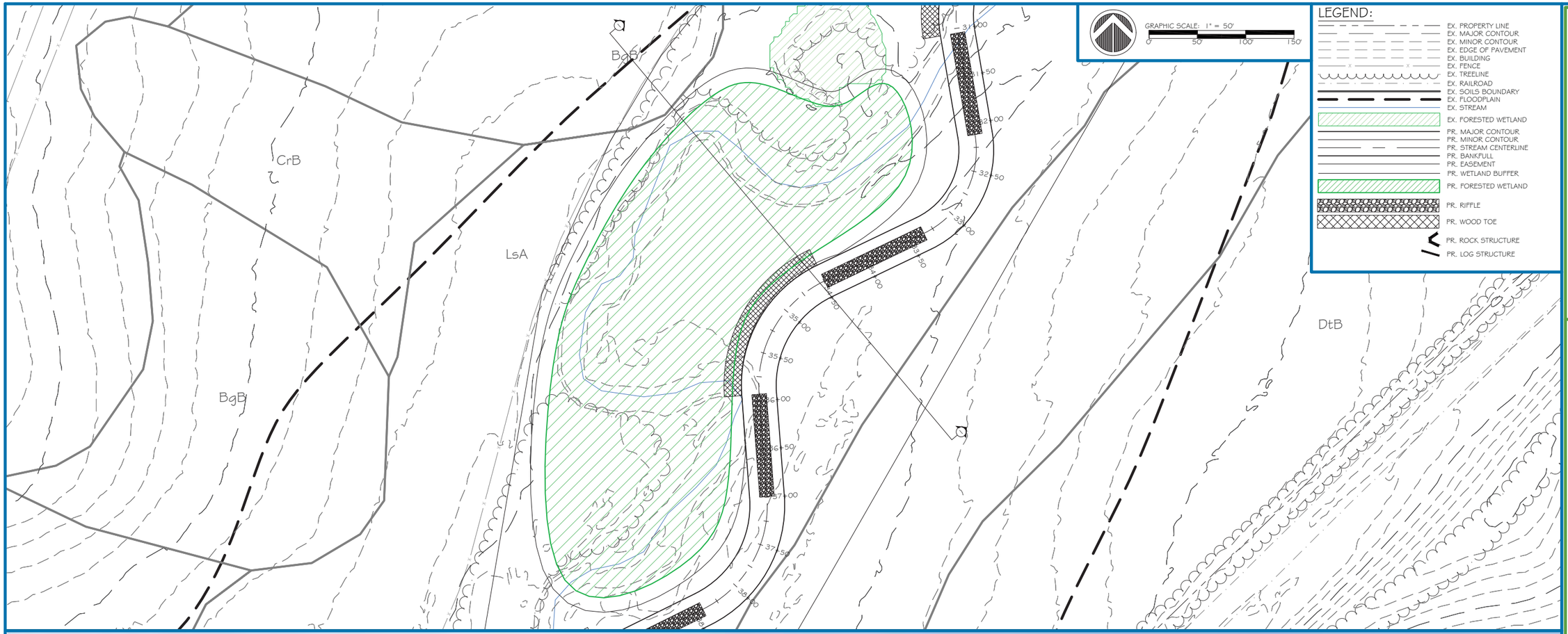

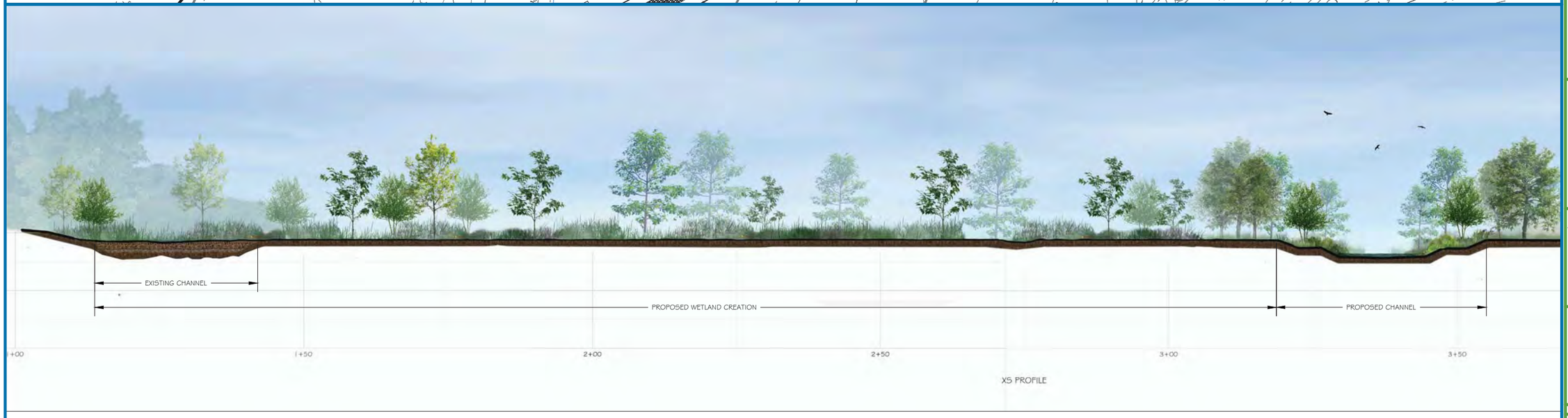

XS 1-1

GRAPHIC SCALE: 1" = 10'
0
20
30
40

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STREAM DETAILS

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SHEET NO:	9 OF 9

RFP-4: CABIN BRANCH

I-495 & I-270 Managed Lanes Study Wetland & Stream Mitigation - Cabin Branch
MDOT SHA Contract# AZ0485172-A

The following is a summarized PHASE I Mitigation Plan for the Cabin Branch Stream and Wetland Mitigation Site. This summary includes project areas detailed in GreenVest 404's July 17, 2019 Volume II -Technical Proposal submitted in response to RFP Full Delivery Stream and Wetland Mitigation Services, Solicitation No. AZ0485172 as well as supplemental mitigation areas requested by MDOT|SHA.

Existing Conditions Summary

Location Information

County: Anne Arundel

Federal HUC-8 Watershed: Patuxent (0206006)

MDE 8-digit Watershed: Patuxent River Middle watershed (02131102)

Coordinates: 38.810642, -76.645949

Location: Greenock Road, Lothian, MD 20711

Property Ownership: The proposed restoration reaches within the Wilson Owens Branch and Cabin Branch are contiguous reaches on one "site" that traverses several adjacent parcels. The project area contains 10 parcels under private ownership located near a watershed divide (Greenock Road) and includes stream and wetland creation within two 12-digit subwatersheds, Wilson Owens Branch-Patuxent River (020600060403) and Lyons Creek (hereafter referred to as Cabin Branch – 020600060501).

Parcel Areas:

Map ID	Total Acres	Map ID	Total Acres
3	98.89	11	31.20
6	12.69	13	25.31
8	10.36	20	14.68
10a	24.50	21	86.03
10b	3.10	31	182.09

Drainage Area: Wilson Owens Branch 0.88 square miles
Cabin Branch 1.27 square miles

Stream Use Class: I

Existing Land Use: Historic and present land use within a half mile of the project area is a mix of forest and agriculture, primarily horse pasture (Maryland Department of Planning 1973). Current land use now consists of very low and low-density residential, forest, agricultural areas, and a golf course. Cabin Branch and Wilson Owens Branch and their tributaries and related floodplains are not protected from stormwater runoff and have been manipulated over the years (including ditching and draining), resulting in significant bed/bank form alteration and functional impairment.

Constraints: None

I-495 & I-270 Managed Lanes Study Wetland & Stream Mitigation - Cabin Branch
MDOT SHA Contract# AZ0485172-A

Mapped Soils:

Soil	*Soil Description*	*Drainage Class*	*Hydric Rating*	*K-factor*	*Parent Material*
DfB	Dodon very fine sandy loam, 2-5% slopes	Moderately well drained	Non-hydric	0.32	loamy fluviomarine deposits
DfC	Dodon very fine sandy loam, 5-10% slopes	Moderately well drained	Non-Hydric	0.32	loamy fluviomarine deposits
MaB	Marr-Dodon complex, 2-5% slopes	Well drained	Non-Hydric	0.20	loamy fluviomarine deposits
MaC	Marr-Dodon complex, 5-10% slopes	Well drained	Non-Hydric	0.20	loamy fluviomarine deposits
MaD	Marr-Dodon complex 10-15% slopes	Well drained	Non-Hydric	0.20	loamy fluviomarine deposits
MDE	Marr and Dodon soils, 15-25% slopes	Well drained	Non-Hydric	0.20	loamy fluviomarine deposits
MDF	Marr and Dodon soils, 25-40% slopes	Well drained	Non-Hydric	0.20	loamy fluviomarine deposits
WBA	Widewater and Issue soils, 0-2% slopes, frequently flooded	Poorly drained	Partially Hydric	0.37	loamy alluvium

Description:

The Cabin Branch Stream and Wetland Mitigation Project contains several degraded stream reaches and non-tidal wetlands that have been altered over time as Wilson Owens Branch and Cabin Branch have downcut. The incised channels have disconnected the stream reaches from their respective floodplains and have lowered the seasonal high groundwater table within the stream's zone of influence, negatively affecting the hydroperiod in the adjacent wetlands. The alterations in hydroperiod and hydrology have negatively impacted the structure, composition, and functions of these floodplain wetlands. Headcuts are actively migrating upstream and laterally along the length of the proposed restoration project. If these channels are not restored and stabilized, it will result in further impairment and degradation in the existing forested wetlands and agricultural fields.

No Tier II waters were identified in the study area; however, Cabin Branch and Wilson Owens Branch are located within a Tier II catchment basin. According to the Maryland 303(d) list of impaired waterways, the Patuxent River Middle watershed is listed as Category 5 – impaired for sulfates and total suspended solids downstream of the project area.

According to the Water Resources Registry, the CBSWMP site has been identified as:

- Riparian Preservation and Restoration,
- Stormwater Natural Infrastructure Preservation,
- Stormwater Compromised Infrastructure Restoration,
- Upland Preservation and Restoration,
- Wetland Preservation and Restoration, and
- Part of the Biodiversity Conservation Network.

The Cabin Branch portion of the project area is a Targeted Ecological Area, includes Preservation and Gaps in the Green Infrastructure plan, is a Maryland Tier II Catchment, and is included under Anne Arundel County's MS4 Phase I permit.

The existing riparian buffer along the streams targeted for restoration are narrow and, in some places, non-existent with agricultural land or fairways adjoining the channels. In general, trees within the forested areas of the site are in good to fair condition. The understory within these areas is a combination of woody shrubs and herbaceous vegetation, including varying degrees of invasive species cover.

Please note that the CBSWMP project contains two distinct contiguous reaches; contiguous reaches being preferred by MDE and the ACOE for mitigation. Other desirable characteristics of these projects include:

- The stream restoration, wetland creation, and preservation will re-integrate these aquatic system components resulting in significant functional uplift;
- The site possesses excellent accessibility and constructability with direct access from Greenock Road and Mt. Zion Marlboro Road;
- Sufficient open space is available for efficient staging and stockpiling of material;
- The site's current context and watershed conditions support technically feasibility and self-maintaining restoration; and
- The site meets specific objectives of the MDE's Prioritizing Sites for Wetland Restoration, Mitigation and Preservation in Maryland.

The CBSWMP possesses the necessary chemical, physical, and biological composition; lacks ecological, cultural and historic constraints; and complies with the site selection criteria of the Federal Rules on Compensatory Mitigation at 33 CFR 332 as overseen and regulated by the U.S. Army Corps of Engineers and the rules, policy and guidance authorized under the Maryland Nontidal Wetlands Protection Act as overseen and regulated by MDE, as well as Section 106 of the National Historic Preservation Act, Federal Aviation Administration (FAA) Advisory Circular (No. 150/5200-33B) and the State/Federal Endangered Species Acts.

I-495 & I-270 Managed Lanes Study Wetland & Stream Mitigation - Cabin Branch
MDOT SHA Contract# AZ0485172-A

Summary of Opportunities

Proposed Mitigation Type	*Proposed Area/Length*	*Mitigation Credit Ratio*	*Units*
Wetland (PFO) Enhancement	14.23	5:1	2.85
Wetland Creation	4.00	1:1	4.00
Wetland Preservation	18.19	10:1	1.82
Wetland Buffer Enhancement	7.60	15:1	0.51
Wetland Mitigation Total	**44.03**		**9.18**
Stream Mitigation			
Wilson Owens - Upstream	4,683	2:1	2,342
Wilson Owens - Downstream	1,408	1:1	1,408
Cabin Branch	8,221	1:1	8,221
Stream Mitigation Total	**14,312**		**11,971**

Restoration Objectives

- The proposed CBSWMP includes:
  - The enhancement of 14.23 acres of non-tidal wetland;
  - The creation of 4.0 acres of non-tidal wetlands;
  - The preservation of 18.19 acres of non-tidal, forested wetlands;
  - The enhancement of 7.60 acres of non-tidal wetland buffer; and
  - 14,312 linear feet of stream restoration.
- This project as proposed will yield up to 11,971 stream and 9.18 wetland mitigation units.
- The wetland, stream, plus their respective buffer elements will be fully integrated to yield significant ecological and functional uplift.
- Additional credits may be generated during the course of the design and construction through preservation of upland forests and non-tidal, forested wetland buffers.

Restoration Concept

- The proposed design utilizes on-site materials and will iterate to find the ideal balance of impacts required to restore more frequent floodplain access.
  - Create a bank height ratio of 1.2 or less along the restored reaches to reduce shear stresses and velocities for peak flow events and allow for more frequent access to the floodplain.
  - Increase the floodplain inundation area for high frequency storm events, including a bankfull discharge (e.g. 1.25-yr recurrence interval); by increasing the entrenchment ratio to greater than 2.
  - Create stable woody debris structures that will provide habitat and mimic natural processes where it will serve to reduce channel cross sectional area through the formation of depositional features such as inside meander bars and benches. Self-sustaining depositional channel features will increase sinuosity and reduce shear stress on the channel bed and banks.

- Riparian buffers will be maintained, new wetlands will be supported by overbank flows, and invasive species will be controlled.
- Wetland enhancement will be accomplished by re-hydrating remnant hydric soils by increasing the riparian groundwater elevation and floodplain storage.
- Wetland preservation will be requested in high quality areas adjacent to proposed restoration and enhancement practices.
- If, during the course of design, borrow materials are needed during the restoration of either Cabin Branch or Wilson Owen's Branch to balance cut/fill on-site, the excavated areas create an opportunity for additional wetland creation.
- Forested floodplain habitats will be restored/enhanced through invasive species treatment and planting native trees and shrubs.

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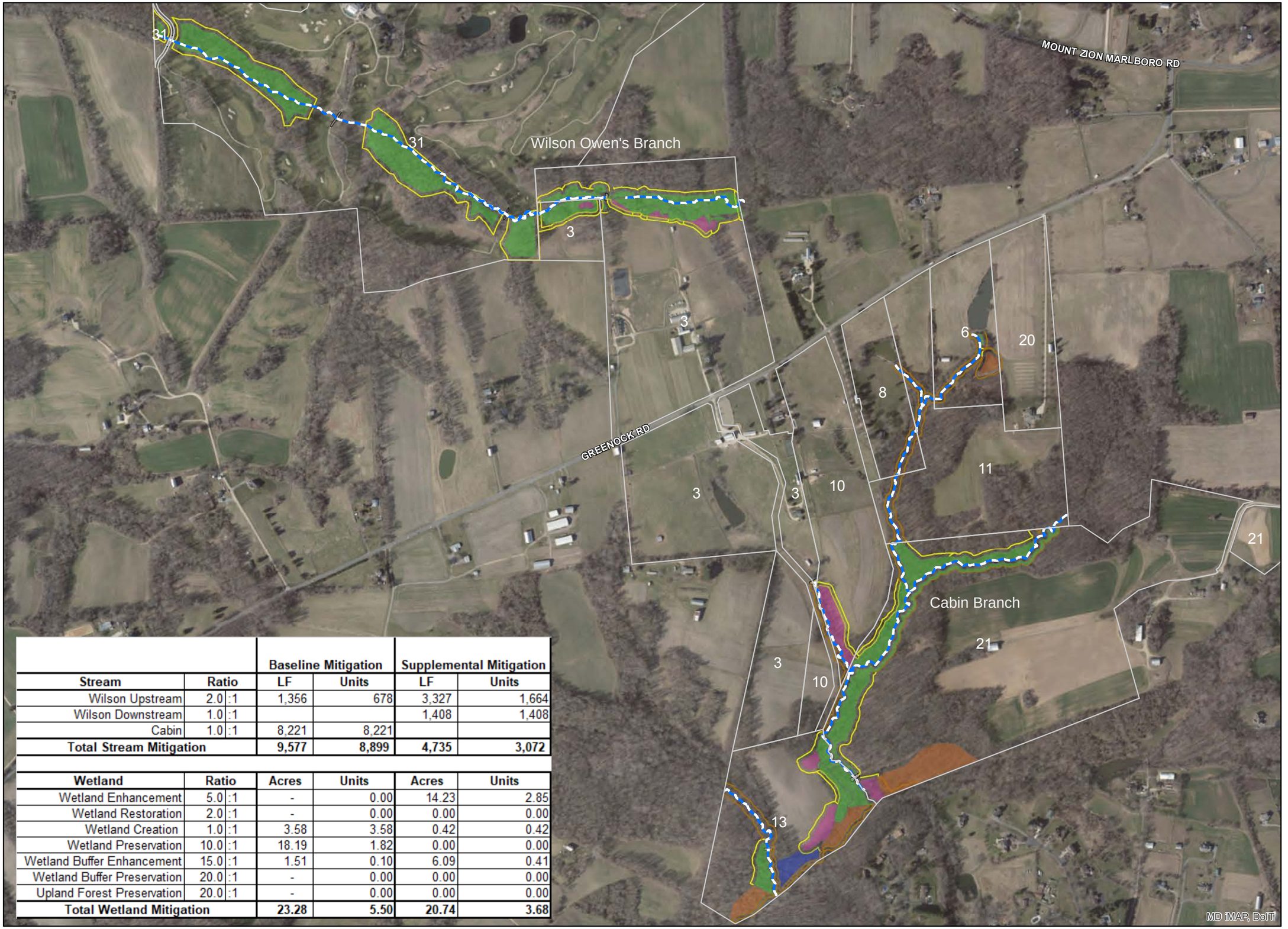

		Baseline Mitigation		Supplemental Mitigation	
Stream	**Ratio**	**LF**	**Units**	**LF**	**Units**
Wilson Upstream	2.0 :1	1,356	678	3,327	1,664
Wilson Downstream	1.0 :1			1,408	1,408
Cabin	1.0 :1	8,221	8,221		
Total Stream Mitigation		**9,577**	**8,899**	**4,735**	**3,072**

Wetland	**Ratio**	**Acres**	**Units**	**Acres**	**Units**
Wetland Enhancement	5.0 :1	-	0.00	14.23	2.85
Wetland Restoration	2.0 :1	-	0.00	0.00	0.00
Wetland Creation	1.0 :1	3.58	3.58	0.42	0.42
Wetland Preservation	10.0 :1	18.19	1.82	0.00	0.00
Wetland Buffer Enhancement	15.0 :1	1.51	0.10	6.09	0.41
Wetland Buffer Preservation	20.0 :1	-	0.00	0.00	0.00
Upland Forest Preservation	20.0 :1	-	0.00	0.00	0.00
Total Wetland Mitigation		**23.28**	**5.50**	**20.74**	**3.68**

Document Path: X:\Planning_Design\PROJECTS\MDOT_FD\Cabin_Branch\GIS Work\Cabin Branch Mitigation Plan w GC_Rev1.mxd

MDOT / SHA
Stream and Wetland Mitigation Services

Overall Mitigation Plan
Cabin Branch Stream
& Wetland Mitigation Project
Patuxent Watershed

Legend:

- Parcels
- Stream Mitigation
- Riparian Buffer
- Wetland Buffer
- Wetland Creation
- Wetland Enhancement
- Wetland Preservation
- Upland Forest Preservation

N

Feet
0 400

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4201 Northview Drive, Suite 202
Bowie, MD 20716
410-987-5500

Date Figure Created: 3/12/2020

RFP-5: HENSON CREEK

I-495 & I-270 Managed Lanes Study Wetland & Stream Mitigation - Henson Creek
MDOT SHA Contract# AZ0485172-D

The following is a summary of the PHASE I Mitigation Plan submitted to MDOT SHA for the Henson Creek Stream and Wetland Mitigation Project (HSWMP). A full PHASE I Mitigation Plan is available in Volume II -Technical Proposal of GreenVest 404's response to RFP Full Delivery Stream and Wetland Mitigation Services, Solicitation No. AS0485172, dated July 17th, 2019.

Existing Conditions Summary

Location Information

County:	Prince George's
Federal HUC-8 Watershed:	Middle Potomac-Anacostia-Occoquan Federal 8-digit watershed (02070010)
MDE 8-digit Watershed:	Potomac River Upper Tidal 8-Digit Watershed (02140201)
Coordinates:	38.764802, -76.995271
Location:	9013 Livingston Rd, Fort Washington, MD 20744
Property Ownership:	The Henson Creek Stream and Wetland Mitigation Site is currently owned by Susan N. Hovermale and Carl W. Hovermale.
Parcel Areas:	The entire parcel owned by Susan and Carl Hovermale is 17.88 acres. A conservation easement will be placed on 16.36 acres.
Drainage Area:	Henson Creek Tributary, approximately 8 acres Henson Creek 21.4 square miles
Stream Use Class:	I
Existing Land Use:	Historic land use cover within a half mile of the project area was predominantly forested land, with agricultural and commercial areas (Maryland Department of Planning 1973). Today land use cover within a half mile of this site is dominated by major transportation networks, commercial, industrial, and residential development.
Constraints:	Washington Sanitary Sewer Commission easements run north to south along the western bank of Henson Creek and west to east through the parcel along the southern bank of the Henson Creek Tributary.

I-495 & I-270 Managed Lanes Study Wetland & Stream Mitigation - Henson Creek
MDOT SHA Contract# AZ0485172-D

Mapped Soils:

Soil	*Soil Description*	*Drainage Class*	*Hydric Rating*	*K-factor*	*Parent Material*
Ada	Adelphia-Holmdel complex, 0 to 2 percent slopes	Moderately well drained	Predominantly Non-Hydric (5)	0.37	Glauconite bearing loamy fluviomarine deposits
CnB	Collington-Wist complex, 2 to 5 percent slopes	Well drained	Non-Hydric (0)	0.17	Glauconite bearing loamy fluviomarine deposits
Iu	Issue-Urban land complex, occasionally flooded	Somewhat poorly drained	Predominantly Non-Hydric (10)	0.37	Loamy alluvium
SrA	Shrewsbury loam, 0 to 2 percent slopes	Poorly drained	Predominantly Hydric (85)	0.24	Glauconite bearing loamy fluviomarine deposits
UrdB	Urban land-Collington-Wist complex, 0 to 5 percent slopes	N/A	Non-Hydric (0)	N/A	N/A
WE	Widewater and Issue soils, frequently flooded	Poorly drained	Predominantly Hydric (60)	0.37	Loamy alluvium

Description:

The HSWMP will create/restore 5.03 acres of palustrine forested (PFO) wetlands, enhance 0.34 acres of existing PEM wetlands to PFO, and preserve an additional 7.07 acres of adjacent forested wetland/upland habitat. Created/restored wetlands will be integrated with the Henson Creek Mainstem, the unnamed channelized tributary (HT), and existing forested wetlands/uplands into a contiguous 14.16-acre habitat restoration/preservation project via surface water and groundwater connection. The main objective of the project's wetland elements is to restore wetland hydrology/hydroperiod, topography, vegetative structure and overall function. Function will be enhanced by integrating the wetland creation/restoration element with the stream restoration and existing forested habitat. The restoration will be accomplished by excavating to targeted wetland elevations such that groundwater will substantially contribute to the proposed hydroperiod. The proposed excavation, evaluation of current drainage area, and the contribution of more frequent bankfull discharge will support wetland hydrology and formation and/or re-establishment of hydric soils. The GVT has laid out a native planting plan to restore a forested wetland system that will meet the hydrophytic and diversity composition required under the standard IRT monitoring protocols for forested wetland sites. The planted areas will be completely enclosed in deer exclusion fencing to allow for proper establishment while promoting the maximum structural development and diversity. A proactive approach to maintenance will ensure that the restored wetlands stay on a trajectory to reaching self-maintaining equilibrium. The GVT will also implement an aggressive invasive species management program where any recolonization of invasive/non-native species will be the threshold for action.

No Tier II waters were identified in the study area. According to the Maryland 303(d) list of impaired waterways, the Potomac River Upper Tidal watershed is listed as Category 5 – impaired for chlorides, sulfates, and total suspended solids.

Please note that the HSWMP is located on one single site, which is preferred by MDE along with these other desirable characteristics:

- Portions of the site were formerly wetland and are connected to existing degraded wetlands all of which will be restored or enhanced as part of this project.
- The entire site is located within the 100-year floodplain. One of the project's objectives is to reconnect Henson Creek with this portion of its floodplain during higher frequency events by removing a levee spoil bank.
- The site possesses excellent accessibility and constructability with direct access from Livingston Road, a parking lot and open areas for efficient staging and stockpiling of material.

According to information available from the Water Resources Registry, the HSWMP site:

- Has been identified for:
  - Riparian Preservation and Restoration,
  - Stormwater Natural Infrastructure Preservation,
  - Upland Preservation and Restoration, and
  - Wetland Preservation.
- The site immediately abuts Protected Natural Areas, and
- Has been identified as a gap in the existing Green Infrastructure Plan and Biodiversity Conservation Network.

The required 25' wetland buffer will be established around the proposed creation, restoration, and enhancement areas as proposed. This site contains areas of existing forested upland and wetland all of which will be preserved as part of this project. Thus, the buffer will be comprised of enhancement and preservation. The additional preservation proposed on this highly urban site will connect the project to protected open space that flanks to the north, south and west thus extending the buffer and totality of restored/preserved habitat. The additional preservation will put the proposed restoration/creation into a more "interior" location, thus increasing its probability of reaching a self-maintain equilibrium plus increasing the function and value of the entire system. The invasive species management program discussed above shall apply to the buffer and all preserved areas on the subject site and will continue throughout the entire maintenance/monitoring period.

This site meets specific objectives of the MDE's Prioritizing Sites for Wetland Restoration, Mitigation and Preservation in Maryland. This site is located in an MDE Priority Restoration Watershed and it will specifically restore and preserve gaps in existing green infrastructure, specifically the Henson Creek Greenway Corridor which flanks the site on three sides. According to the MDE Prioritizing Sites for Wetland Restoration and Preservation, based on DNR mapping in 2006 only 602 acres of forested and 22 acres of scrub-shrub wetlands remained in this watershed. The HSWMP specifically targets restoration of forested non-tidal wetlands with a scrub-shrub component. Further, the State's Clean

Water Action Plan classifies this watershed as Category I for not meeting clean water and other natural resource goals, and it is therefore in need of restoration. Stormwater management is a specific objective set for this watershed, and among other functions this project will provide functional uplift in nutrient cycling, and sediment trapping/sequestration.

The HSWMP site possesses the necessary chemical, physical and biological composition; lacks ecological, cultural and historic constraints; and complies with the site selection criteria of the Federal Rules on Compensatory Mitigation at 33 CFR 332 as overseen and regulated by the USACE and the rules, policy and guidance authorized under the Maryland Non-Tidal Wetlands Protection Act as overseen and regulated by MDE, as well as Section 106 of the National Historic Preservation Act, Federal Aviation Administration (FAA) Advisory Circular (No. 150/5200-33B) and the State/Federal Endangered Species Acts.

Summary of Opportunities

Proposed Mitigation Type	*Proposed Area/Length*	*Mitigation Type to Mitigation Credit Ratio*	*Credits*	*Units*
Wetland Restoration/Creation (PFO)	5.03	1:1	5.03	Acres
Wetland Enhancement (PFO) Resulting in Significant Functional Uplift	0.34	1.5:1	0.23	Acres
Wetland Preservation (PFO)	4.05	10:1	0.41	Acres
Wetland Buffer Enhancement	0.50	15:1	0.03	Acres
Wetland Buffer Preservation	0.44	20:1	0.02	Acres
Upland Preservation	2.58	20:1	0.13	Acres
		Sub-total Wetland	**5.85**	**Acres**
Stream Restoration (Trib)	558	1:1	558.0	Linear Feet
Stream Restoration (Henson Creek)	1,066	2:1	533.0	Linear Feet
		Sub-Total Stream	**1,091**	**Linear Feet**

Restoration Objectives

- The main objective of the project's wetland elements is to restore wetland hydrology/hydroperiod, topography, vegetative structure and overall function. Function will be enhanced by integrating the wetland creation/restoration element with the stream restoration and existing forested habitat.

Restoration Concept

- The proposed design for the Henson Creek Tributary realigns and integrates the channel with the proposed wetland creation/restoration providing an additional source of hydrology where each element will then add habitat complexity for the other.

- Restoration work along the main stem of Henson Creek involves removal of the left bank levee to allow for reconnection of the channel at frequent storm events to the left floodplain and proposed wetland restoration/creation.
- Create a bank height ratio of 1.2 or less along the restored reaches to reduce shear stresses and velocities for peak flow events and allow for more frequent access to the floodplain.
- Increase the floodplain inundation area for high frequency storm events, including a bankfull discharge (e.g. 1.25-yr recurrence interval); by increasing the entrenchment ratio to greater than 2.
- Wetland creation will be accomplished through excavation of fill material to establish, reestablish, and enhance targeted wetland hydroperiod approximating both historic conditions and those of surrounding reference wetlands. Specifically, the large area currently mowed for the driving range will be excavated between 1' and 2'+/-. Microtopographic variation (hummock/hollow) will be created along with a shallow topographic depression design to hold shallow water after storm events to augment hydrology as well as habitat diversity. Proposed elevations will be within one foot of the proposed ground surface elevations for a portion of the growing season (at least 14 consecutive days).
- Riparian buffers will be maintained, new wetlands will be supported by overbank flows, and invasive species will be controlled.
- Wetland preservation may be requested in high quality areas adjacent to proposed restoration and enhancement practices.
- Wetland enhancement may be requested in currently margin areas if functional uplift can be documented either hydrologically or through invasive species control and supplemental planting.
- Restore forested floodplain habitat by invasive species treatment and planting native trees and shrubs.

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RFP FULL DELIVERY STREAM & WETLAND MITIGATION SERVICES
Solicitation No. AZ0485172
HENSON CREEK STREAM & WETLAND MITIGATION PROJECT

GENERAL NOTES

1. ELEVATIONS AND EXISTING CONDITIONS ARE BASED ON AVAILABLE GIS, FIELD OBSERVATIONS, AND MINOR NON-DATUM SURVEY.
2. NO WETLAND DELINEATION, FOREST STAND DELINEATION, OR TOPOGRAPHIC SURVEY HAS BEEN PERFORMED.

MITIGATION SUMMARY

STREAM ENHANCEMENT: 1,066 LF.

STREAM RESTORATION: 558 LF.

STREAM BUFFER: 1.20 AC.

UPLAND / WETLAND PRESERVATION: 2.58 AC.

WETLAND BUFFER ENHANCEMENT: 0.50 AC.

WETLAND CREATION: 5.03 AC.

WETLAND ENHANCEMENT: 0.34 AC.

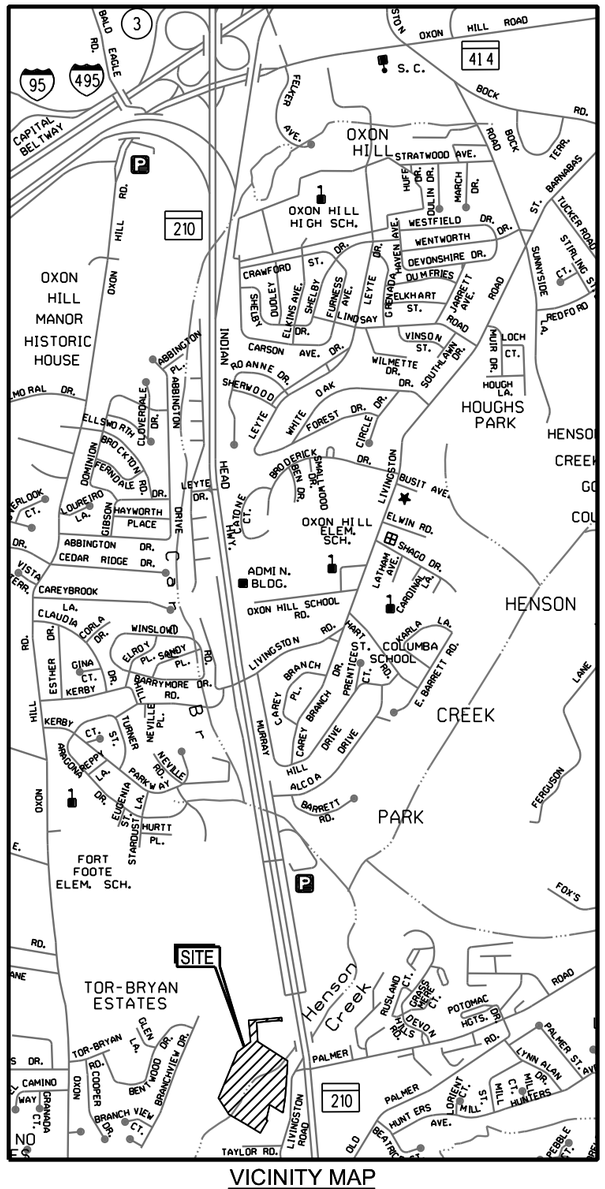
WETLAND PRESERVATION : 4.05 AC.

WETLAND PRESERVATION BUFFER : 0.44 AC.

TOTAL ACRES: 14.16

LEGEND

- EX. CONTOUR
- EX. STORM DRAIN
- EX. SANITARY SEWER
- EX. MANHOLE
- EX. STREAM CENTERLINE
- EX. WOODS LINE
- PROPERTY LINE
- SUBJECT PROPERTY LINE
- EASEMENT LINE
- EX. NON-TIDAL WETLAND
- WUS — WATERS OF THE U.S.
- FP — EX. 100-YR FLOODPLAIN
- LOD — LIMIT OF DISTURBANCE
- PROP. EASEMENT
- 20 — PROP. CONTOUR
- PROP. WETLAND CREATION
- PROP. WETLAND BUFFER ENHANCEMENT
- PROP. WETLAND ENHANCEMENT
- PROP. WETLAND PRESERVATION
- PROP. WETLAND PRESERVATION BUFFER
- PROP. UPLAND / WETLAND PRESERVATION
- PROP. STREAM RESTORATION
- PROP. STREAM BUFFER



VICINITY MAP
SCALE: 1" = 2000'

SHEET INDEX

SHEET NO.	DRAWING NO.	SHEET TITLE
1	TI-01	TITLE SHEET
2	EX-01	EXISTING CONDITIONS
3	SP-01	SITE PLAN
4-6	DE-01 - DE-03	DETAILS
7	LD-01	LANDSCAPE PLANTING SCHEDULE
8	LD-02	LANDSCAPE DETAILS
9	XS-01	CROSS SECTIONS

BEST MANAGEMENT PRACTICES FOR WORKING IN NONTIDAL WETLANDS, WETLAND BUFFERS, WATERWAYS, AND 100-YEAR FLOODPLAINS

1. NO EXCESS FILL, CONSTRUCTION MATERIAL, OR DEBRIS SHALL BE STOCKPILED OR STORED IN NONTIDAL WETLANDS, NONTIDAL WETLAND BUFFERS, WATERWAYS, OR THE 100-YEAR FLOODPLAIN.
2. PLACE MATERIALS IN A LOCATION AND MANNER WHICH DOES NOT ADVERSELY IMPACT SURFACE OR SUBSURFACE WATER FLOW INTO OR OUT OF NONTIDAL WETLANDS, NONTIDAL WETLAND BUFFERS, WATERWAYS, OR THE 100-YEAR FLOODPLAIN.
3. DO NOT USE THE EXCAVATED MATERIAL AS BACKFILL IF IT CONTAINS WASTE METAL PRODUCTS, UNSIGHTLY DEBRIS, TOXIC MATERIAL, OR ANY OTHER DELETERIOUS SUBSTANCE. IF ADDITIONAL BACKFILL IS REQUIRED, USE CLEAN MATERIAL FREE OF WASTE METAL PRODUCTS, UNSIGHTLY DEBRIS, TOXIC MATERIAL, OR ANY OTHER DELETERIOUS SUBSTANCE.
4. PLACE HEAVY EQUIPMENT ON MATS OR SUITABLY OPERATE THE EQUIPMENT TO PREVENT DAMAGE TO NONTIDAL WETLANDS, NONTIDAL WETLAND BUFFERS, WATERWAYS, OR THE 100-YEAR FLOODPLAIN.
5. REPAIR AND MAINTAIN ANY SERVICEABLE STRUCTURE OR FILL SO THERE IS NO PERMANENT LOSS OF NONTIDAL WETLANDS, NONTIDAL WETLAND BUFFERS, OR WATERWAYS, OR PERMANENT MODIFICATION OF THE 100-YEAR FLOODPLAIN IN EXCESS OF THAT LOST UNDER THE ORIGINALLY AUTHORIZED STRUCTURE OR FILL.
6. RECTIFY ANY NONTIDAL WETLANDS, WETLAND BUFFERS, WATERWAYS, OR 100-YEAR FLOODPLAIN TEMPORARILY IMPACTED BY ANY CONSTRUCTION.
7. ALL STABILIZATION IN THE NONTIDAL WETLAND AND NONTIDAL WETLAND BUFFER SHALL CONSIST OF THE FOLLOWING SPECIES: ANNUAL RYEGRASS (LOLIUM MULTIFLORUM), MILLET (SETARIA ITALICA), BARLEY (HORDEUM SP.), OATS (UNIOLA SP.), AND/OR RYE (SECALE CEREALE). THESE SPECIES WILL ALLOW FOR THE STABILIZATION OF THE SITE WHILE ALSO ALLOWING FOR THE VOLUNTARY REVEGETATION OF NATURAL WETLAND SPECIES. OTHER NON-PERSISTENT VEGETATION MAY BE ACCEPTABLE, BUT MUST BE APPROVED BY THE NONTIDAL WETLANDS AND WATERWAYS DIVISION. KENTUCKY 31 FESCUE SHALL NOT BE UTILIZED IN WETLAND OR BUFFER AREAS. THE AREA SHOULD BE SEEDED AND MULCHED TO REDUCE EROSION AFTER CONSTRUCTION ACTIVITIES HAVE BEEN COMPLETED.
8. AFTER INSTALLATION HAS BEEN COMPLETED, MAKE POST-CONSTRUCTION GRADES AND ELEVATIONS THE SAME AS THE ORIGINAL GRADES AND ELEVATIONS IN TEMPORARILY IMPACTED AREAS.
9. TO PROTECT AQUATIC SPECIES, IN-STREAM WORK IS PROHIBITED AS DETERMINED BY THE CLASSIFICATION OF THE STREAM:

   USE I WATERS: IN-STREAM WORK SHALL NOT BE CONDUCTED DURING THE PERIOD MARCH 1 THROUGH JUNE 15, INCLUSIVE, DURING ANY YEAR.

10. STORMWATER RUNOFF FROM IMPERVIOUS SURFACES SHALL BE CONTROLLED TO PREVENT THE WASHING OF DEBRIS INTO THE WATERWAY.
11. CULVERTS SHALL BE CONSTRUCTED AND ANY RIPRAP PLACED SO AS NOT TO OBSTRUCT THE MOVEMENT OF AQUATIC SPECIES, UNLESS THE PURPOSE OF THE ACTIVITY IS TO IMPOUND WATER.

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KCI TECHNOLOGIES
ENGINEERS
PLANNERS
SCIENTISTS
CONSTRUCTION MANAGERS
936 RIDGEBROOK ROAD
SPARKS, MARYLAND 21152
TELEPHONE: (410) 316-7800
FAX: (410) 316-7818

DATE	JULY 2019
SCALE	AS SHOWN
DESIGNED BY	SL
DRAWN BY	CD

RFP FULL DELIVERY STREAM & WETLAND MITIGATION SERVICES
Solicitation No. AZ0485172
HENSON CREEK STREAM & WETLAND MITIGATION PROJECT
TITLE SHEET
PRINCE GEORGE'S COUNTY, MARYLAND

DRAWING NO. TI-01
SHEET 1 OF 9
KCI JOB NUMBER xxxxxxxx.xx

PLOTTED: "11:38 AM on Tuesday, July 09, 2019"
FILE: V:_RESOURCE_MANAGEMENT\Greater_Mid_Atlantic\Natural_Resources\Proposals\CADD-FILES\Havermale\01-TitleSheet.dgn

HENSON CREEK

HENSON TRIBUTARY

E 1,312,950
N 399,650

E 1,312,950
N 400,950

20' WIDE RIGHT OF WAY

40' WIDE RIGHT OF WAY

20' WIDE RIGHT OF WAY

LEVEE +22'

21.8
22.3
20.9
21.9
20.1

GW2
GROUND
20.1

WSEL
16.6

20.1

22.4

GW3
GROUND 19.7
GROUNDWATER 18.3

20.1
WSEL
17.8

EX. 60"
DIA. CMP

N 399,650
E 1,313,400

23.9
INV.
18.1

GW1
GROUND
21.0

HOVERMALE'S TASTES
BEST ICE CREAM

DRIVING RANGE

LIVINGSTON RD.

EX. 42" SAN.

EX. 10" SAN.

0 50 100
SCALE: 1" = 100'

PLOTTED: 11:08 AM on Tuesday, July 02, 2019"
FILE: V:_RESOURCE_MANAGEMENT\Greater_Md._Atlantic\Natural_Resources\Proposals\CADD-FILES\Hovermale\02-Existing-Conditions-Plan.dgn

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936 RIDGEBROOK ROAD
SPARKS, MARYLAND 21152
TELEPHONE (410) 316-7800
FAX (410) 316-7818

DATE	JULY 2019
SCALE	1" = 100'
DESIGNED BY	SL
DRAWN BY	CD

RFP FULL DELIVERY STREAM &
WETLAND MITIGATION SERVICES
Solicitation No. AZ0485172
HENSON CREEK STREAM & WETLAND MITIGATION PROJECT
EXISTING CONDITIONS
PRINCE GEORGE'S COUNTY, MARYLAND

DRAWING NO.	EX-01
SHEET	2 OF 9
KCI JOB NUMBER	xxxxxxxx.xx

GRADE LEVEE DOWN FROM 22' TO 20-21'-BF.

HENSON CREEK

STEAM BUFFER 1.20 AC.

OVERFLOW AT LESS THAN BF-19.5' ELEV.

E 1,312,950

N 399,650

20' WIDE RIGHT OF WAY

WETLAND PRESERVATION BUFFER 0.44 AC.

WETLAND ENHANCEMENT 0.34 AC.

EXCAVATE WITH MICROGRADING FROM 20' TO ELEV. -18.5' TO 19'

E 1,312,950

N 400,950

WETLAND CREATION 5.03 AC.

TRIBUTARY

N 399,650

EX. 60" DIA. CMP

E 1,313,400

HENSON TRIBUTARY

234 LF BANK GRADING AND WOODY TOE STABILIZATION

WETLAND PRESERVATION 4.05 AC.

600 LF STREAM RESTORATION: REMOVE CMP CULVERT; REALIGN AND GRADE IN BENCHES FOR TRIB. WBF-8: RC-24; INV. 17 TO 18; BF- 18.5 TO 19.5

WETLAND BUFFER ENHANCEMENT 0.50 AC.

UPLAND/WETLAND PRESERVATION 2.58 AC.

PROPOSED EASEMENT

LIVINGSTON RD.

ACCESS AND STAGING AREA

0 50 100

SCALE: 1" = 100'

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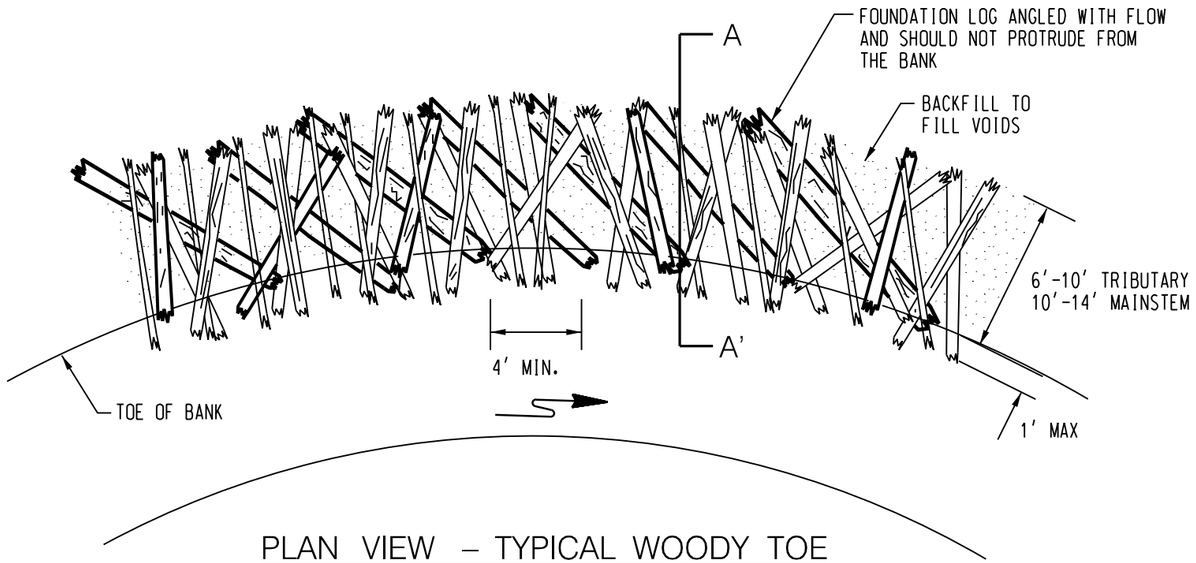
SPARKS, MARYLAND 21152
TELEPHONE: (410) 316-7800
FAX (410) 316-7818

DATE	JULY 2019
SCALE	1" - 100'
DESIGNED BY	SL
DRAWN BY	CD

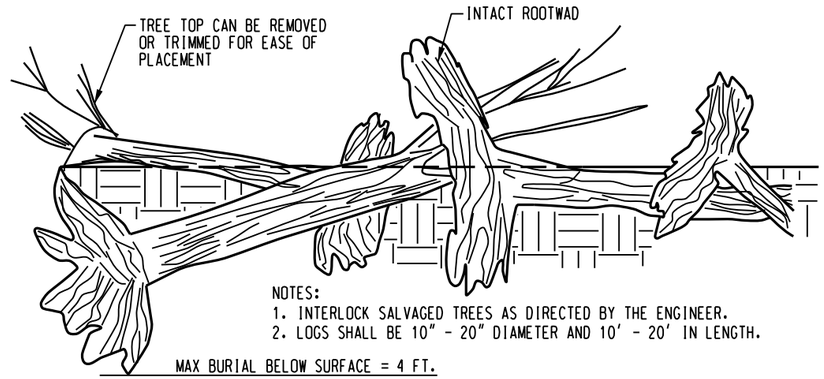
RFP FULL DELIVERY STREAM & WETLAND MITIGATION SERVICES
Solicitation No. AZ0485172
HENSON CREEK STREAM & WETLAND MITIGATION PROJECT
SITE PLAN
PRINCE GEORGE'S COUNTY, MARYLAND

DRAWING NO. SP-01
SHEET 3 OF 9
KCI JOB NUMBER xxxxxxxx.xx



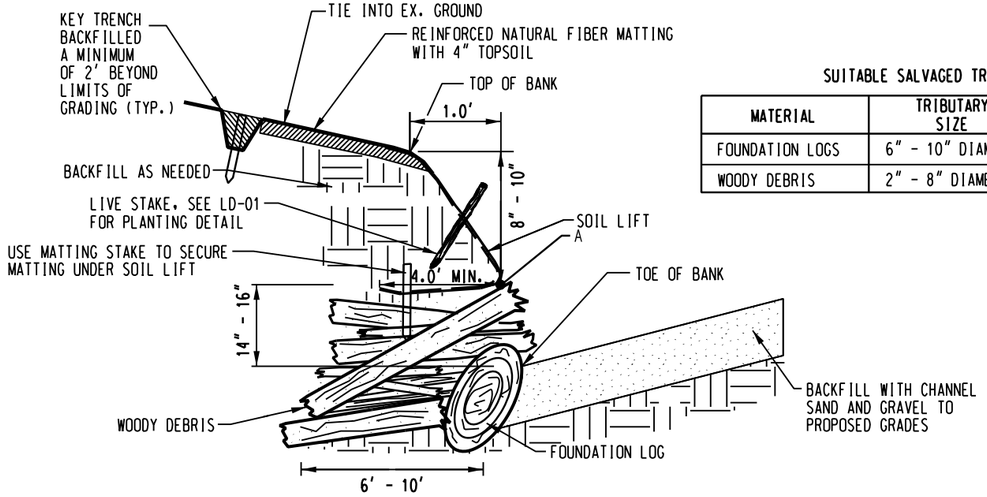
PLAN VIEW – TYPICAL WOODY TOE

NOT TO SCALE



WOODY DEBRIS PLUG

NOT TO SCALE



SUITABLE SALVAGED TREE MATERIALS

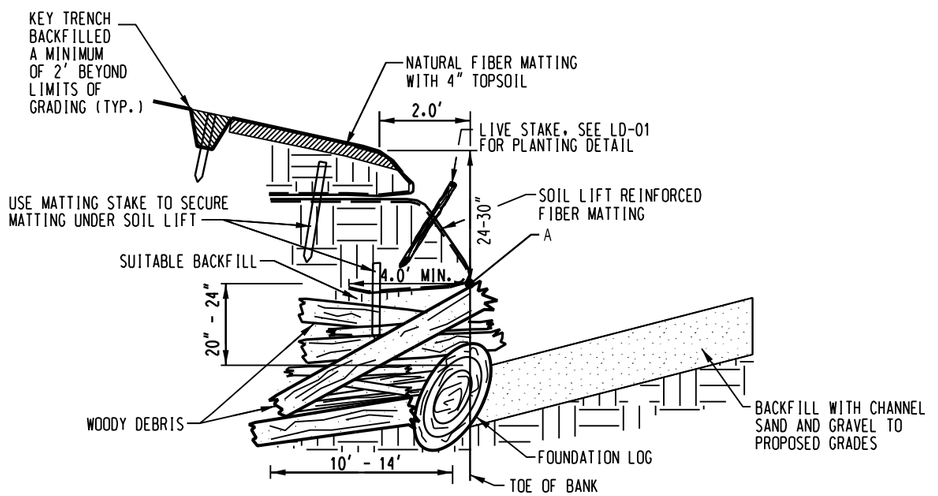
MATERIAL	TRIBUTARY SIZE	MAINSTEM SIZE
FOUNDATION LOGS	6" - 10" DIAMETER	10" - 14" DIAMETER
WOODY DEBRIS	2" - 8" DIAMETER	2" - 8" DIAMETER

CROSS SECTION A–A' TYPICAL WOODY TOE TRIBUTARY

NOT TO SCALE

NOTES:

1. SUITABLE TREE MATERIALS INCLUDING TRUNKS, TOPS, AND LIMBS, SHALL BE SALVAGED FOR USE IN TOE WOOD APPLICATIONS AS APPROVED BY THE ENGINEER.
2. FOUNDATION LOGS SHALL BE ANGLED WITH THE FLOW TO THE BANK AND EXTEND THE FULL WIDTH OF THE FILL SECTION. ORIENT FOUNDATION LOG SLIGHTLY DOWNSTREAM APPROXIMATELY 30 DEGREES FROM TANGENT TO THE BASELINE. ANGLE VARIES WITH BASELINE CURVATURE.
3. WOODY DEBRIS MATERIAL SHALL BE PLACED RANDOMLY ON FOUNDATION LOGS AND PRESSED FLAT WITH THE BUCKET UNTIL THE FINAL DEPTH OF MATERIAL IS REACHED (SEE SECTION A-A').
4. FILL VOIDS WITH SUITABLE BACKFILL MATERIAL. ENSURE THAT VOIDS ARE FILLED BEFORE PLACING SOIL LIFT.
5. INSTALL SOIL LIFT WITH REINFORCED NATURAL FIBER MATTING.



CROSS SECTION A–A' TYPICAL WOODY TOE MAINSTEM

NOT TO SCALE

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DRAWING NO.	DE-01
SHEET	4 OF 9
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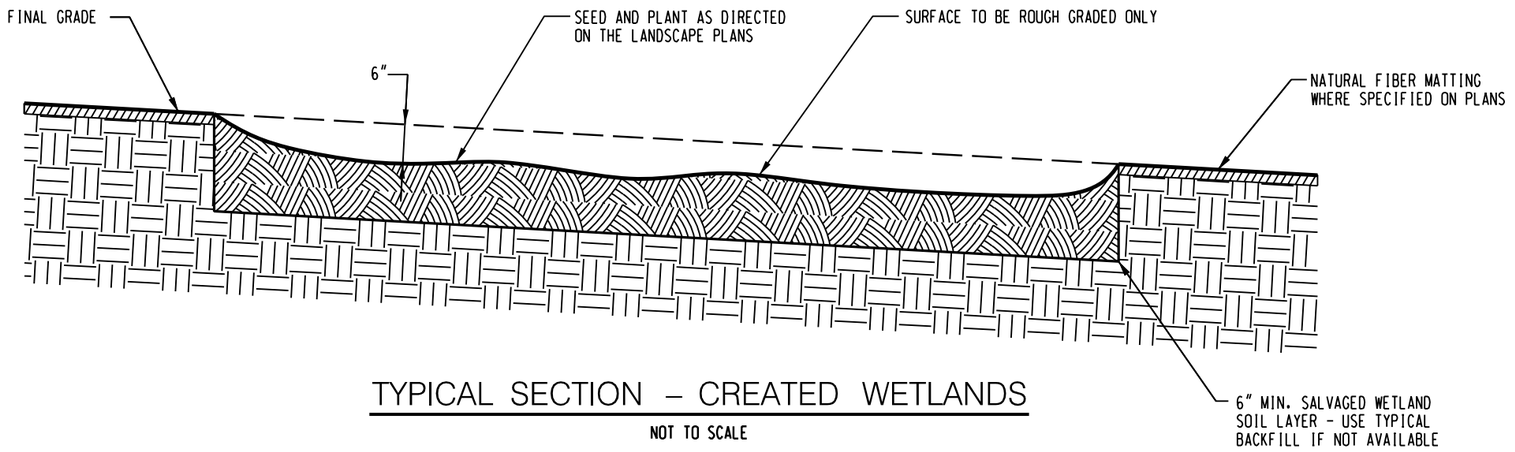

TYPICAL SECTION – CREATED WETLANDS

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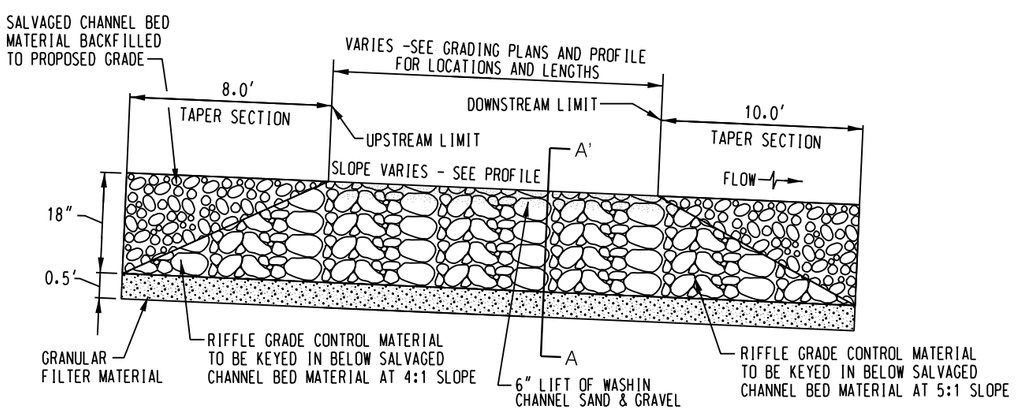
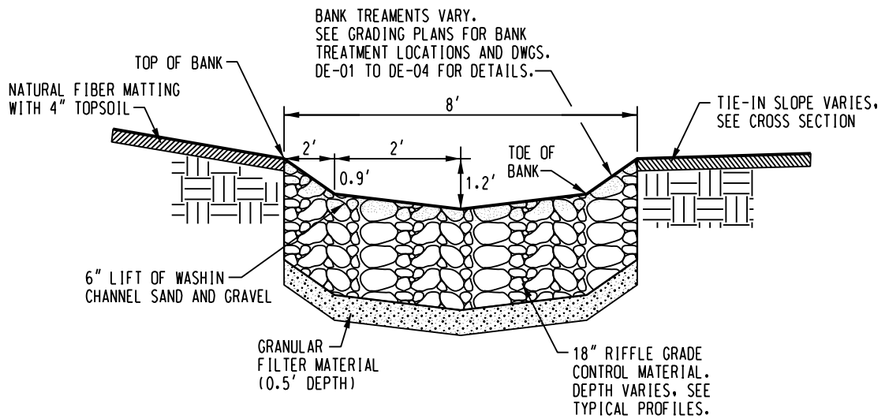


TYPICAL RIFFLE GRADE CONTROL MAINSTEM – PROFILE

NOT TO SCALE



TYPICAL RIFFLE CROSS SECTION A–A'

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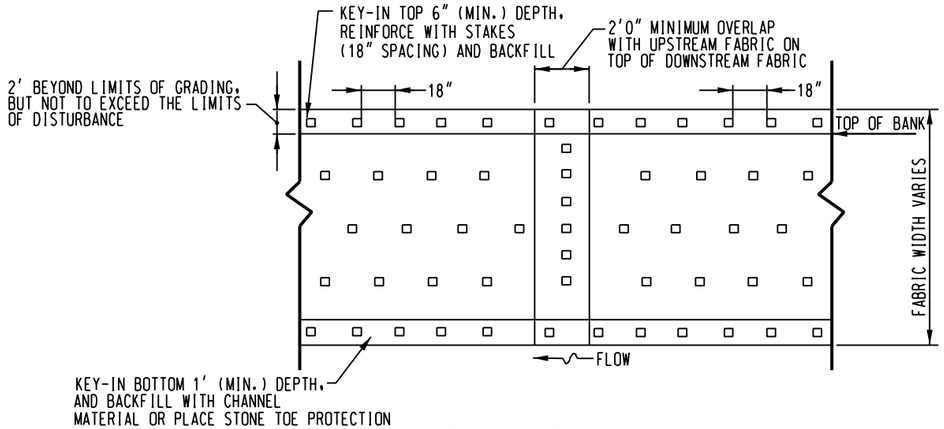
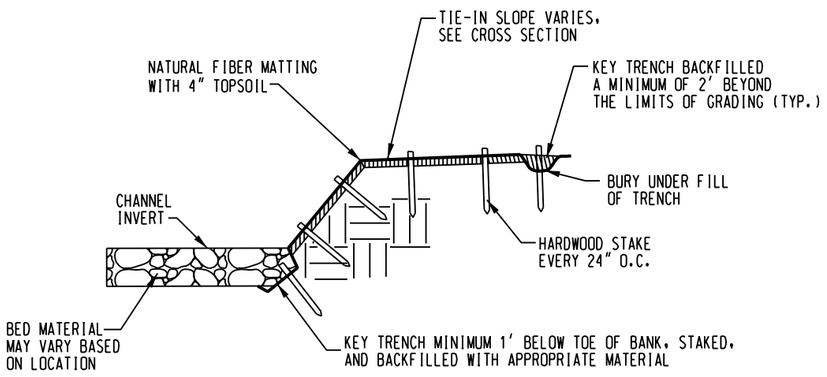


TYPICAL PLAN VIEW NATURAL FIBER MATTING AND REINFORCED NATURAL FIBER MATTING

NOT TO SCALE



NATURAL FIBER MATTING CROSS SECTION

NOT TO SCALE

NOTES FOR NATURAL AND REINFORCED NATURAL FIBER MATTING:

1. NATURAL FIBER MATTING TO BE ROLLED LENGTHWISE ALONG STREAMBANK EXTENDING TO THE BOTTOM OF TOE PROTECTION AND A MINIMUM OF TWO FEET PAST THE LIMITS OF GRADING. IF MORE THAN ONE ROLL IS REQUIRED, MID-BANK OVERLAP SHOULD BE A MINIMUM OF ONE FOOT AND SECURELY FASTENED WITH STAKES. AT TRANSITION BETWEEN NATURAL FIBER MATTING AND REINFORCED NATURAL FIBER MATTING, MATTING SHOULD BE OVERLAPPED TWO FEET AND SECURELY FASTENED WITH STAKES.

2. NATURAL FIBER MATTING IS TO BE INSTALLED ON ALL GRADED SLOPES, HIGHLY ERODIBLE SOILS (SEE SHEET 2), AND WETLAND AREAS.

3. NATURAL FIBER MATTING. MATTING FOR THE BANK TREATMENT AREAS SHALL CONSIST OF A MACHINE PRODUCED MAT OF DEGRADABLE NATURAL FIBERS AND SHALL MEET THE FOLLOWING MINIMUM SPECIFICATIONS:

   MATERIAL: WOVEN COIR FIBER YARN OR TWINE
   THICKNESS: 0.25 IN.
   ELONGATION (DRY/WET): 29%/35%
   WEIGHT: 20 OZ/SY
   OPEN AREA: 50%
   SIZE: 6 FT. WIDE X 150 FT IN LENGTH (100 SY PER ROLL)
   SHEAR STRESS: 2.0 LBS/SQ FT
   FLOW VELOCITY: 8 FT./SEC.
   LIFE EXPECTANCY: 3 YEARS

4. REINFORCED NATURAL FIBER MATTING. MATTING FOR ALTERNATING ROUGHNESS AND WOODY TOE SHALL CONSIST OF A DOUBLE-LAYERED BIODEGRADABLE FABRIC: A BOTTOM LAYER OF JUTE FABRIC AND A TOP LAYER OF HIGH STRENGTH COIR MATTING, CONNECTED TOGETHER. REINFORCED NATURAL FIBER MATTING SHALL MEET THE FOLLOWING MINIMUM SPECIFICATIONS:

   MATERIALS: WOVEN COIR FIBER (TOP LAYER) AND JUTE FABRIC (BOTTOM LAYER)
   THICKNESS: 0.35 IN.
   ELONGATION (DRY/WET): 30%/26% (TOP LAYER) AND 8%/9% (BOTTOM LAYER)
   WEIGHT: 33.3 OZ/SY
   PERMEABILITY: 1.03 IN/SEC
   SHEAR STRESS: 4.5 LBS/SQ FT
   FLOW VELOCITY: 12 FT/SEC

5. REINFORCED NATURAL FIBER MATTING SHOULD BE PLACED AS INDICATED ABOVE IN #1.

6. MATTING STAKES. STAKES FOR SECURING THE MATTING ALONG OTHER PORTIONS OF THE MATTING MATERIAL ABOVE THE TOE TRENCH AND FOR THE KEY-IN TRENCH AT THE TOP OF THE SLOPE SHALL CONSIST OF 1-1/2" X 1-1/2" HARDWOOD STAKES, 18-INCHES IN LENGTH, TAPERED AT THE BOTTOM END FOR EASY INSERTION INTO THE SOIL AND FLAT AT THE TOP END FOR HAMMERING.

   SHEAR STRESS: 4.5 LBS/SQ FT
   FLOW VELOCITY: 12 FT./SEC.
   LIFE EXPECTANCY: 3 YEARS IN REINFORCED NATURAL FIBER MATTING

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Solicitation No. AZ0485172
HENSON CREEK STREAM & WETLAND MITIGATION PROJECT
DETAILS
PRINCE GEORGE'S COUNTY, MARYLAND

DRAWING NO. DE-03
SHEET 6 OF 9
KCI JOB NUMBER xxxxxxxx.xx

MASTER PLANT SCHEDULE

WETLAND CREATION & WETLAND ENHANCEMENT ZONE

(230,088 SQ FT /5.28 AC)

Qty	Botanical Name	Common Name	Size / Form	Spacing/Rate
TREES				
125	Betula nigra	River Birch	#1 Container	10' O.C.
125	Platanus occidentalis	Sycamore	#1 Container	10' O.C.
125	Quercus bicolor	Swamp White Oak	#1 Container	10' O.C.
125	Quercus palustris	Pin Oak	#1 Container	10' O.C.
125	Quercus phellos	Willow Oak	#1 Container	10' O.C.
125	Salix nigra	Black Willow	#1 Container	10' O.C.
125	Betula nigra	River Birch	Bare root	10' O.C.
125	Platanus occidentalis	Sycamore	Bare root	10' O.C.
125	Quercus bicolor	Swamp White Oak	Bare root	10' O.C.
125	Quercus palustris	Pin Oak	Bare root	10' O.C.
125	Quercus phellos	Willow Oak	Bare root	10' O.C.
125	Salix nigra	Black Willow	Bare root	10' O.C.
SHRUBS				
206	Cephalanthus occidentalis	Common Buttonbush	#1 Container	6'-8' O.C.
206	Ilex verticillata	Winterberry	#1 Container	6'-8' O.C.
206	Magnolia virginiana	Sweetbay magnolia	#1 Container	6'-8' O.C.
206	Sambucus nigra 'canadensis'	Common elderberry	#1 Container	6'-8' O.C.
206	Cephalanthus occidentalis	Common Buttonbush	Bare root	6'-8' O.C.
206	Ilex verticillata	Winterberry	Bare root	6'-8' O.C.
206	Magnolia virginiana	Sweetbay magnolia	Bare root	6'-8' O.C.
206	Sambucus nigra 'canadensis'	Common elderberry	Bare root	6'-8' O.C.

CREATED WETLAND BUFFER ZONE

(37,145 SQ FT /0.85 AC)

Qty	Botanical Name	Common Name	Size / Form	Spacing/Rate
TREES				
31	Acer saccharinum	Silver Maple	#1 Container	10' O.C.
31	Asimina triloba	Pawpaw	#1 Container	10' O.C.
31	Liquidambar styraciflua	Sweet Gum	#1 Container	10' O.C.
31	Nyssa sylvatica	Black Gum	#1 Container	10' O.C.
31	Acer saccharinum	Silver Maple	Bare root	10' O.C.
31	Asimina triloba	Pawpaw	Bare root	10' O.C.
31	Liquidambar styraciflua	Sweet Gum	Bare root	10' O.C.
31	Nyssa sylvatica	Black Gum	Bare root	10' O.C.
SHRUBS				
45	Amelanchier canadensis	Serviceberry	#1 Container	6'-8' O.C.
45	Ilex opaca	American Holly	#1 Container	6'-8' O.C.
45	Viburnum dentatum	Southern Arrowwood	#1 Container	6'-8' O.C.
45	Amelanchier canadensis	Serviceberry	Bare root	6'-8' O.C.
45	Ilex opaca	American Holly	Bare root	6'-8' O.C.
45	Viburnum dentatum	Southern Arrowwood	Bare root	6'-8' O.C.

UPLAND BUFFER ENHANCEMENT ZONE

(6,012 SQ FT /0.14 AC)

Qty	Botanical Name	Common Name	Size / Form	Spacing/Rate
TREES				
4	Carya glabra	Pignut Hickory	#1 Container	10' O.C.
4	Liquidambar styraciflua	Sweet Gum	#1 Container	10' O.C.
4	Sassafrass albidum	Sassafras	#1 Container	10' O.C.
4	Quercus alba	White Oak	#1 Container	10' O.C.
4	Quercus rubra	Red Oak	#1 Container	10' O.C.
4	Carya glabra	Pignut Hickory	Bare root	10' O.C.
4	Liquidambar styraciflua	Sweet Gum	Bare root	10' O.C.
4	Sassafrass albidum	Sassafras	Bare root	10' O.C.
4	Quercus alba	White Oak	Bare root	10' O.C.
4	Quercus rubra	Red Oak	Bare root	10' O.C.
SHRUBS				
8	Cercis canadensis	Eastern Redbud	#1 Container	6'-8' O.C.
8	Cornus florida	Flowering Dogwood	#1 Container	6'-8' O.C.
8	Hamamelis virginiana	Witch Hazel	#1 Container	6'-8' O.C.
8	Cercis canadensis	Eastern Redbud	Bare root	6'-8' O.C.
8	Cornus florida	Flowering Dogwood	Bare root	6'-8' O.C.
8	Hamamelis virginiana	Witch Hazel	Bare root	6'-8' O.C.

PERMANENT SEEDING FOR WETLAND CREATION, WETLAND ENHANCEMENT, AND CREATED WETLAND BUFFER ZONE

(267,232 SQ FT /6.13 AC)

Botanical Name	Common Name	% of Mix	Quantity (lbs)
Elymus virginicus	Virginia Wildrye	20	18.39
Carex vulpinoidea	Fox Sedge	15	13.79
Panicum anceps	Beaked Panicgrass	15	13.79
Panicum clandestinum	Deertounge	10	9.2
Carex scoparia	Blunt Broom Sedge	8	7.36
Panicum rigidulum	Redtop Panicgrass	7	6.44
Carex lupulina	Hop Sedge	5.5	5.06
Carex lurida	Shallow Sedge	5.5	5.06
Juncus effusus	Soft Rush	3	2.76
Asclepias incarnata	Swamp Milkweed	2.3	2.11
Carex grayi	Gray's Sedge	2	1.84
Carex intumescens	Star Sedge	2	1.84
Eupatorium perfoliatum	Boneset	1	0.92
Iris versicolor	Blueflag	1	0.92
Vernonia noveboracensis	New York Ironweed	0.9	0.83
Chelone glabra	Turtlehead	0.5	0.46
Lobelia siphilitca	Great Blue Lobelia	0.5	0.46
Scirpus cyperinus	Woolgrass	0.5	0.46
Penthorum sedoides	Ditch Stonecrop	0.3	0.28
		SEED TOTAL	91.5

Application Rate of 15 lb / ac
ERNST MIX # 723: MD LOWER MIDLAND FACW MIX
OR SIMILAR MIX AS APPROVED BY ENGINEER.

PERMANENT SEEDING FOR UPLAND BUFFER ENHANCEMENT ZONE

(6,012 SQ FT/0.14 AC)

Botanical Name	Common Name	% of Mix	Quantity (lbs)
Elymus virginicus	Virginia Wildrye	20	0.42
Panicum anceps	Beaked panicgrass	17	0.36
Panicum clandestinum	Deertounge	15	0.32
Sorghastrum nutans	Indiangrass	15	0.32
Andropogon gerardii	Big Bluestem	9	0.19
Carex vulpinoidea	Fox sedge	8	0.17
Panicum rigidulum	Redtop panicgrass	7	0.15
Chamaecrista fasciculata	Patridge pea	4	0.08
Asclepias incarnata	Swamp milkweed	2	0.04
Eupatorium perfoliatum	Boneset	1.5	0.03
Vernonia noveboracensis	New York Ironweed	1	0.02
Mondarda fistulosa	Wild bergamot	0.5	0.01
		SEED TOTAL	2.1

Application Rate of 15 lb / ac
ERNST MIX # 722: LOWER MIDLAND RIPARIAN MIX
OR SIMILAR MIX AS APPROVED BY ENGINEER.

LIVE STAKES

(837 LF)

Qty	Botanical Name	Common Name	Size	Form	Spacing/Rate
105	Cornus amomum	Silky Dogwood	3' Length 0.5"-1.5" dia.	Dormant Stems	2' O.C.
104	Cornus sericea	Red Osier Dogwood	3' Length 0.5"-1.5" dia.	Dormant Stems	2' O.C.
105	Salix lucida	Shinning willow	3' Length 0.5"-1.5" dia.	Dormant Stems	2' O.C.
105	Salix sericea	Silky willow	3' Length 0.5"-1.5" dia.	Dormant Stems	2' O.C.

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LANDSCAPE PLANTING SCHEDULE
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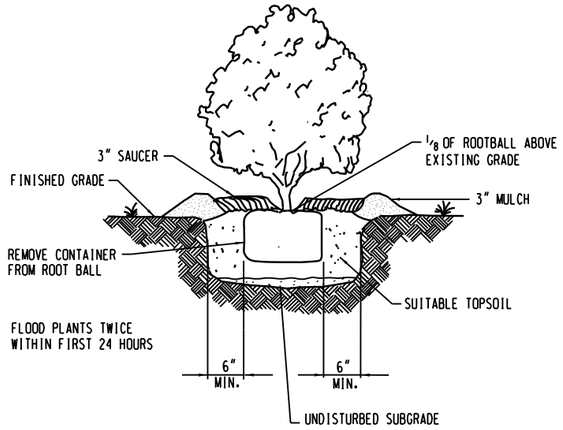

SHRUB PLANTING DETAIL

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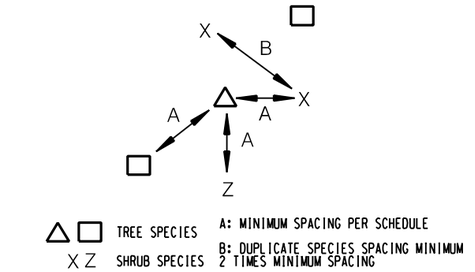
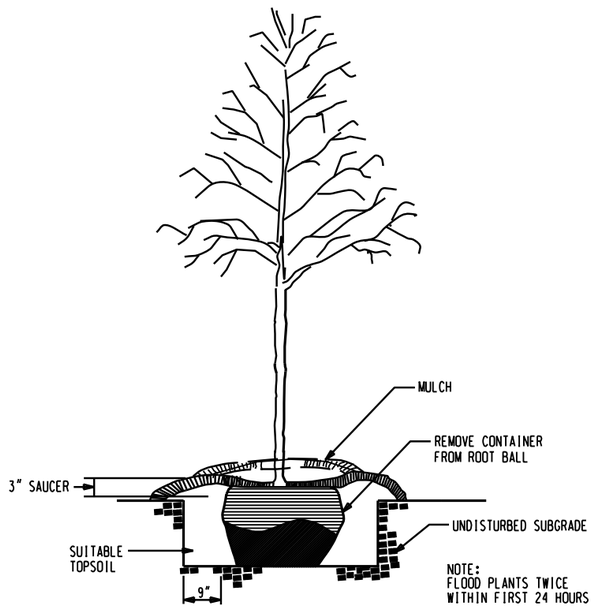


TREE AND SHRUB RANDOM SPACING

NOT TO SCALE



TREE PLANTING DETAIL

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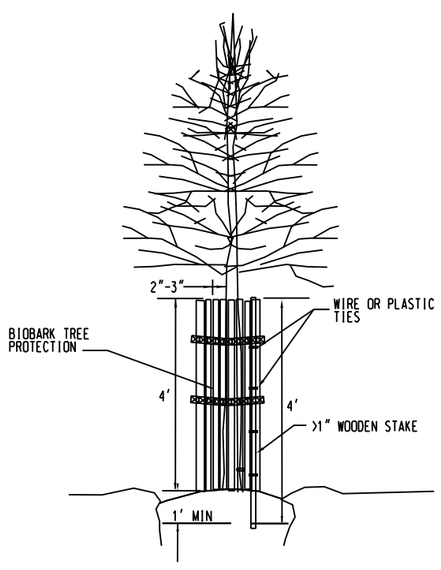

TREE SHELTER DETAIL

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LANDSCAPE DETAILS
PRINCE GEORGE'S COUNTY, MARYLAND

DRAWING NO. LD-02
SHEET 8 OF 9
KCI JOB NUMBER xxxxxxxx.xx

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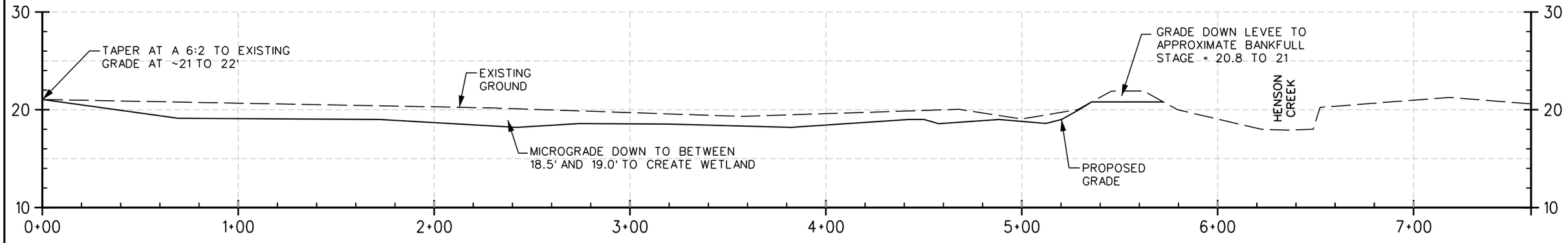
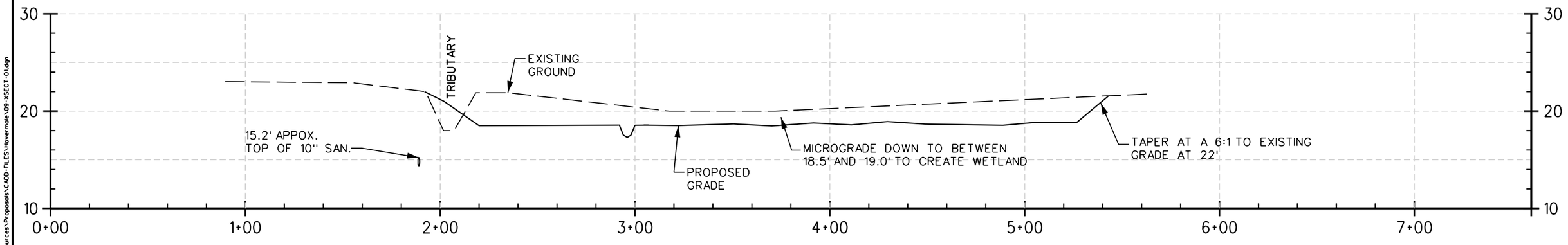


PROPOSED LEVEE REMOVAL AND WETLAND GRADING SECTION A-A'



PROPOSED TRIBUTARY AND WETLAND GRADING SECTION B-B'

PLOTTED: 11:08 AM on Tuesday, July 02, 2019"
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GreenVest
VISION · PERFORMANCE · RESULTS

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DATE	JULY 2019
SCALE	HORZ. 1" = 50' VERT. 1" = 10'
DESIGNED BY	SL
DRAWN BY	CD

RFP FULL DELIVERY STREAM &
WETLAND MITIGATION SERVICES
Solicitation No. AZ0485172
HENSON CREEK STREAM & WETLAND MITIGATION PROJECT
CROSS SECTIONS
PRINCE GEORGE'S COUNTY, MARYLAND

DRAWING NO. XS-01
SHEET 9 OF 9
KCI JOB NUMBER xxxxxxx.xx

RFP- 6: Mill Swamp Creek

I-495 & I-270 Managed Lanes Study Wetland & Stream Mitigation - Mill Swamp Creek
MDOT SHA Contract# AZ0485172

The following is a summarized PHASE I Mitigation Plan for the Mill Swamp Creek Stream and Wetland Mitigation Site (MSWMP). This summary includes project areas detailed in GreenVest 404's July 17, 2019 Volume II -Technical Proposal submitted in response to RFP Full Delivery Stream and Wetland Mitigation Services, Solicitation No. AZ0485172.

Existing Conditions Summary

Location Information

County: Charles

Federal HUC-8 Watershed: Middle Potomac-Anacostia-Occoquan (02070010)

MDE 8-digit Watershed: Potomac River Middle Tidal drainage watershed (02140102)

Coordinates: 38.652836, -77.086043

Location: Ward Place, Bryans Road, MD 20616

Property Ownership: The proposed stream and wetland restoration project is located within three separate private parcels which contain the Mill Swamp Creek mainstem and the unnamed tributary to Mill Swamp Creek (MST). The majority of the MST reach is included in two contiguous parcels north of Ward Place. A third parcel spans both sides of Ward Place. The north section of the parcel contains the confluence of Mill Swamp Creek and its tributary. Mill Swamp Creek flows from north to south on this parcel before crossing underneath Ward Place and continuing onto the southern section of the parcel.

Parcel Areas:

Map ID	Total Acres
1	23.98
2	7.00
3	5.01

Drainage Area: Mill Swamp Creek Mainstem 5.57 square miles
Mill Swamp Creek Tributary (MST) 3.05 square miles

Stream Use Class: I

Existing Land Use: Historic and present land use within a half mile of the project area is a mix of forest, wetlands, and agriculture. The subject parcels are located within Charles County's Rural Conservation Zone and have been used for intensive agricultural purposes for at least 70 years based on historic aerials. Mill Swamp Creek, its tributary (MST), and the related floodplains are not protected from stormwater runoff and have been manipulated over the years from agriculture-related use (channelization and drainage) and development within the drainage areas, resulting in significant bed/bank form alteration and functional impairment.

Constraints: None

Mapped Soils:

Soil	*Soil Description*	*Drainage Class*	*Hydric Rating*	*K-factor*	*Parent Material*
CmD	Croom-Marr complex, 10-15% slopes	Well drained	Non-hydric	0.15	Gravelly fluviomarine deposits
CmE	Croom-Marr complex, 15-25% slopes	Well drained	Non-Hydric	0.15	Gravelly fluviomarine deposits
GcB	Galestown-Hammonton complex, 0-5% slopes	Somewhat excessively drained to moderately well drained	Non-Hydric	0.02	Sandy eolian deposits and/or fluviomarine sediments
LxD	Liverpool-Piccowaxen complex, 5-15% slopes	Moderately well drained to somewhat poorly drained	Non-Hydric	0.43	Silty and loamy fluviomarine deposits
MnD	Marr-Dodon complex 10-15% slopes	Well drained to moderately well drained	Non-Hydric	0.20	loamy fluviomarine deposits
MT	Mispillion and Transquaking soils, tidally flooded	Very poorly drained	Hydric	N/A	Herbaceous organic material over silty estuarine sediments
NG	Nanticoke and Mannington soils, frequently flooded	Very poorly drained	Hydric	0.43	Silty and loamy alluvium
PcA	Piccowaxen loam, 0-2% slopes	Somewhat poorly drained	Partially Hydric	0.37	Silty and loamy fluviomarine deposits
PcB	Piccowaxen loam, 2-5% slopes	Somewhat poorly drained	Partially Hydric	0.37	Silty and loamy fluviomarine deposits
Pu	Potobac-Issue, 2-5% slopes	Poorly drained to somewhat poorly drained	Hydric	0.28	Loamy alluvium

Description:

The Mill Swamp Creek Stream and Wetland Mitigation Project contains two degraded stream reaches and several non-tidal wetlands that have been altered over time from continued agriculture and regional development. The incised channels have disconnected the stream reaches from their respective floodplains and have lowered the seasonal high groundwater table within the stream's zone of influence,

negatively affecting the hydroperiod in the adjacent wetlands. The alterations in hydroperiod and hydrology have negatively impacted the structure, composition, and functions of these floodplain wetlands. If these channels are not restored and stabilized, it will result in further impairment and degradation in the existing forested wetlands and agricultural fields.

No Tier II waters were identified in the study area and Mill Swamp Creek is not located within a Tier II catchment basin. According to the Maryland 303(d) list of impaired waterways, the Potomac River Middle watershed is listed as Category 5 – impaired for high levels of nutrients resulting in poor levels of dissolved oxygen.

According to the Water Resources Registry, the MSWMP site is currently a gap in the Maryland Biological Stream Survey's monitored stream network and has been identified as:

- Riparian Preservation and Restoration,
- Stormwater Natural Infrastructure Preservation,
- Upland Preservation and Restoration,
- Wetland Preservation and Restoration,
- Part of the Biodiversity Conservation Network, and
- Sea Level Rise Vulnerability.

The MSWMP site is also contiguous with Priority Conservation Areas such as Targeted Ecological Areas, Green Infrastructure, and Maryland Critical Areas. The site also meets specific objectives of the MDE's Prioritizing Sites for Wetland Restoration, Mitigation, and Preservation in Maryland. This site is located in an MDE Priority Restoration Watershed and will specifically restore and preserve gaps in existing green infrastructure corridors, create an additional green infrastructure hub, and restore/protect headwater wetland and streams.

The existing riparian buffers along the streams targeted for restoration are narrow and, in some places, non-existent with degraded wetlands that transition to upland hay/pasture fields. In general, trees within the forested areas of the site are in good to fair condition. The understory within these areas is a combination of woody shrubs and herbaceous vegetation, including varying degrees of invasive species cover.

Please note that the MSWMP project contains two distinct contiguous reaches; contiguous reaches being preferred by MDE and the ACOE for mitigation. Other desirable characteristics of these projects include:

- The stream restoration, wetland creation, and preservation will re-integrate these aquatic system components resulting in significant functional uplift;
- The site possesses excellent accessibility and constructability with direct access from Ward Place and Fenwick Road;

- Sufficient open space is available for efficient staging and stockpiling of material;
- The site's current context and watershed conditions support technically feasibility and self-maintaining restoration; and
- The site meets specific objectives of the MDE's Prioritizing Sites for Wetland Restoration, Mitigation and Preservation in Maryland.

The MSWMP site possesses the necessary chemical, physical, and biological composition; lacks ecological, cultural and historic constraints; and complies with the site selection criteria of the Federal Rules on Compensatory Mitigation at 33 CFR 332 as overseen and regulated by USACE and the rules, policy, and guidance authorized under the Maryland Non-Tidal Wetlands Protection Act as overseen and regulated by MDE, as well as Section 106 of the National Historic Preservation Act, Federal Aviation Administration (FAA) Advisory Circular (No. 150/5200-33B) and the State/Federal Endangered Species Acts.

Summary of Opportunities

Proposed Mitigation Type	***Proposed Area/Length***	***Mitigation Credit Ratio***	***Units***
Wetland (PFO) Enhancement	6.53	1.5:1	4.353
Wetland Creation	4.97	1:1	4.970
Wetland Preservation	5.86	10:1	0.586
Wetland Buffer Enhancement	3.24	15:1	0.216
Wetland Buffer Preservation	2.27	20:1	0.114
Upland & Upland Buffer Preservation	2.23	20:1	0.112
Wetland Mitigation Total	**25.1**		**10.35**
Stream Mitigation			
Stream Restoration (MST)	789	1:1	789
Stream Restoration (Mainstem)	1,738	2:1	869
Stream Mitigation Total	**2,527**		**1,658**

Restoration Objectives

- The proposed MSWMP includes:
  - The enhancement of 6.53 acres of non-tidal wetland (farmed wetland conversion to forested wetland);
  - The creation of 4.97 acres of non-tidal wetlands;
  - The preservation of 5.86 acres of non-tidal, forested wetlands;
  - The enhancement of 3.24 acres of non-tidal wetland buffer;
  - The preservation of 2.27 acres of non-tidal wetland buffer;
  - The preservation of 2.23 acres of upland and upland buffer; and
  - 2,527 linear feet of stream restoration.
- This project as proposed will yield up to 1,658 stream and 10.35 wetland mitigation units.

- The wetland, stream, plus their respective buffer elements will be fully integrated to yield significant ecological and functional uplift.
- Additional credits may be generated during the course of the design and construction through Creation or enhancement of additional wetlands, preservation of upland forests and non-tidal, forested wetland buffers.

Restoration Concept

- The proposed design utilizes on-site materials and will iterate to find the ideal balance of impacts required to restore more frequent floodplain access.
    - Create a bank height ratio of 1.2 or less along the restored reaches to reduce shear stresses and velocities for peak flow events and allow for more frequent access to the floodplain.
    - Increase the floodplain inundation area for high frequency storm events, including a bankfull discharge (e.g. 1.25-yr recurrence interval), by increasing the entrenchment ratio to greater than 2.2.
    - Create stable woody debris structures that will provide habitat and mimic natural processes where it will serve to reduce channel cross sectional area through the formation of depositional features such as inside meander bars and benches. Self-sustaining depositional channel features will increase sinuosity and reduce shear stress on the channel bed and banks.
- Riparian buffers will be maintained, new wetlands will be supported by overbank flows, and invasive species will be controlled.
- Wetland enhancement will be accomplished by re-hydrating remnant hydric soils by increasing the riparian groundwater elevation and floodplain storage.
- Wetland preservation will be requested in high quality areas adjacent to proposed restoration and enhancement practices.
- If, during the course of design, borrow materials are needed during the restoration of either Mill Swamp Creek or MST to balance cut/fill associated with stream restoration, the excavated areas create an opportunity for additional wetland creation.
- Forested floodplain habitats will be restored/enhanced through invasive species treatment and planting native trees and shrubs.

Confidential, Pre-Decisional, and Deliberative

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Mitigation Plan

Proposal:
SHA Full Delivery
Charles County, MD

Mill Swamp

Legend

Wetland Crediting

- Creation
- Enhancement
- Preservation
- Upland Preservation

25' Wetland Buffer

- Enhancement
- Preservation
- Upland Preservation
- Proposed Stream Work
- 2 FT Contours
- Easements
- DNR Wetlands
- NWI Wetlands

Adjacent Parcels Ownership

- Private

0 125 250
Feet

N

Biohabitats

June, 2019

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APPENDIX M: PHASE I MITIGATION SITE PRELIMINARY MHT & RTE RESULTS

Table M-1: Phase I Mitigation Site Preliminary MHT and RTE Results

Site ID	Site Name	Database ID	No. of Maryland Inventory of Historic Places (MIHP) Properties	No. of Archaeological Sites	No. of Eligible or Listed HP or Archaeological Sites	No. of Archaeological Surveys	% of Area Surveyed	MIHP Comments	Archaeology Comments	USFWS IPaC Results
AN-1	Crabbs Branch	MPAO0032 & MPAO0012	0	0	0	4	32	--	Surveys: MO236, PR290, PR12, MD1V2 Site: 18MO320 (No DOE)	Northern Long-eared bat. 16 Migratory birds.
AN-3	Pebblestone Dr. Tributary	MPAO0014	0	0	0	6	35	--	Surveys: MO37B, MO8, MO222, MO276, MO250, MO222ADD	Northern Long-eared bat. 9 Migratory birds.
AN-6	Paint Branch Fish Passage	MPAO0033	1	4	1	2	70	PG:62-14 (Eligible 1999)	Sites: 18PR111 (No DOE), 18PR746 (Not Eligible), 18PR220 (Not Eligible); BELTSV-QF19; Surveys: MO236, PR12	Northern Long-eared bat. 13 Migratory birds.
AN-7	Paint Branch South Farm Tributaries	MPAO0001 & MPAO0003	1 2	1 1	1 2	1 0	10 0	PG:62-14 (Eligible 1999); PG:62-14 (Eligible 1999); PG:66-79 (Eligible 2018)	18PR111 (No DOE); Survey MO236 18PR113 (No DOE)	Northern Long-eared bat. 13 Migratory birds.
CA-2	Lower Magruder Branch	WSS-150147A & MO_00013A	0	0	0	0	0	--	--	Northern Long-eared bat. 10 Migratory birds.
CA-3	Upper Magruder Branch	WSS-150147B & MO_00013B	0	0	0	0	0	--	--	Northern Long-eared bat. 10 Migratory birds.
CA-5	Seneca Creek Tributary	MO_00064	0	0	0	1	5	M: 19-38 (No DOE)	--	Northern Long-eared bat. 7 Migratory birds.
PA-1	Back Branch	PG_00160	1	1	0	0	0	PG:79-000 (Not Eligible 2004)	Site: 18PR605 (No DOE)	Northern Long-eared bat. 18 Migratory birds.
RFP-1	Indian Creek and Tributaries at Konterra	N/A	12	0	0	5	5	DOE-PR-0061 (Not Eligible 2005); DOE-PR-0063 (Not Eligible 2005); DOE-PR-0062 (Not Eligible 2005); PG:60-38 (Not Eligible 2001); PG:60-3 (Demolished); PG:60-10 (Not Eligible 2001); PG:61-54 (Not Eligible 2001); PG:60-37 (Not Eligible 2001); PG:60-35 (Not Eligible 2001); PG:60-18 (Not Eligible 2001); PG:60-12 (Not Eligible 2001); PG:60-2 (Cemetery/No DOE) adjoins stream in Area 6	Survey: MO37, MO37B, MO279, MO8, PR285	Northern Long-eared bat.
RFP-2	Cabin Branch	N/A	0	0	0	0	0	Montgomery Village golf course may need DOE (opened 1967)	--	None
RFP-3	Tuscarora Creek	N/A	4	1	1	0	0	F-1-182 (No DOE); F-1-202 (No DOE); F-1-134 (Eligible 2002); F-1-222 (Not Eligible 2019)	Site: BUCKLEY-QF02	Northern Long-eared bat.
RFP-4	Cabin Branch	N/A	0	0	0	0	0	--	--	Northern Long-eared bat.
RFP-5	Henson Creek	N/A	1	0	1	0	0	PG:80-25 (Eligible 2000); Fort Washington Driving Range (over 50 years old; may need DOE)	--	Northern Long-eared bat.
RFP-6	Mill Swamp Creek	N/A	0	0	0	0	0	--	--	Northern Long-eared bat.